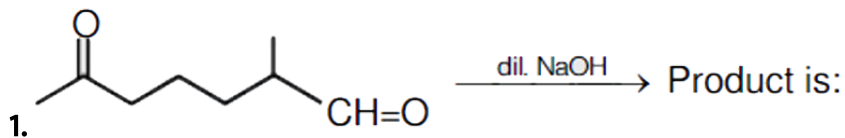# CHEMISTRY

BOOKS - JEE MAINS PREVIOUS YEAR ENGLISH
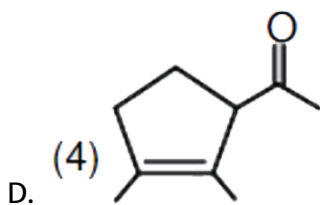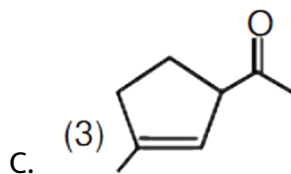
JEE MAINS

CHEMISTRY

1.

$$\xrightarrow{\text{dil. NaOH}}$$ Product is:

dil. NaOH
→ product is:

A. (1)

B. (2)

C. (3)

D. (4)
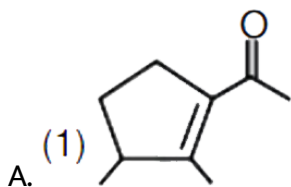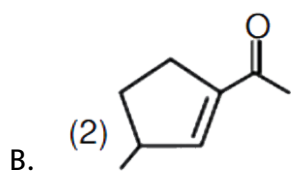
Answer: B

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2. Maximum concentration of copper in drinking water is ?

A. 5

B. 3

C. 0.5

D. 0.05

Answer: B

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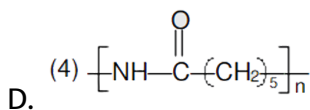
3. Glucose and fructose can be distinguished by

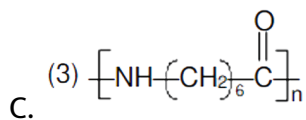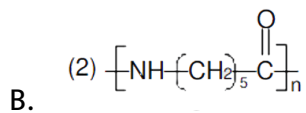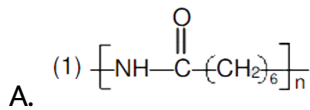A. Barford's tests

B. Fehling solution

C. Bendict

D. Saliwanoff's test

Answer: D

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4. What is the correct structure of Nylon-6 ?

A. (1) $\left[\!\!\begin{array}{c} \text{NH}-\overset{\displaystyle O}{\overset{\|}{\text{C}}}-(\text{CH}_2)_6 \end{array}\!\!\right]_n$

B. (2) $\left[\!\!\begin{array}{c} \text{NH}-(\text{CH}_2)_5-\overset{\displaystyle O}{\overset{\|}{\text{C}}} \end{array}\!\!\right]_n$

C. (3) $\left[\!\!\begin{array}{c} \text{NH}-(\text{CH}_2)_6-\overset{\displaystyle O}{\overset{\|}{\text{C}}} \end{array}\!\!\right]_n$

D. (4) $\left[\!\!\begin{array}{c} \text{NH}-\overset{\displaystyle O}{\overset{\|}{\text{C}}}-(\text{CH}_2)_5 \end{array}\!\!\right]_n$

Answer: B

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6.

$\xrightarrow[\text{(2) H}_2\text{O},\Delta]{\text{(1) Cl}_2\,/\,\text{hv}}$ Product is: उत्पाद है–

5.

$(1)\,Cl_2/\,hv$

$\rightarrow$ $(2).H_O\Delta$ product is

A.

(1) COOH — benzene ring — Cl

B.

(2) CHCl$_2$ — benzene ring — Cl

C.

(3) CH=O — benzene ring — Cl

D.

(4) CH$_2$–OH — benzene ring — Cl
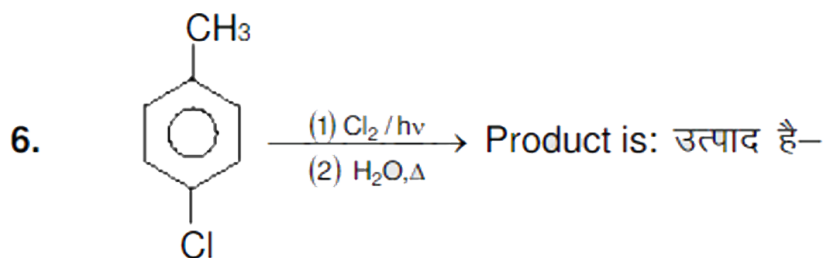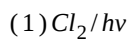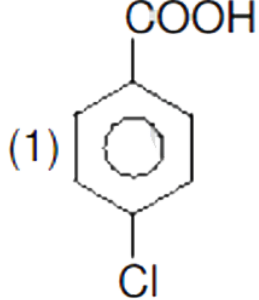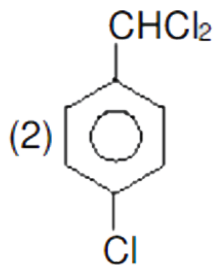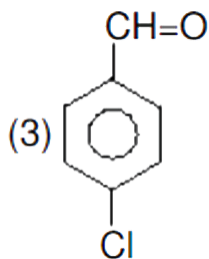
Answer: D
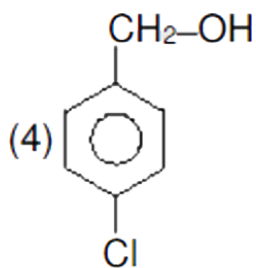
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6. Polysubstitution is drawback of which reaction

  A. friedel craft alkylation

  B. friedel craft acylation

  C. nitration on aromatic ring

  D. chlorination on aromatic ring

Answer: A

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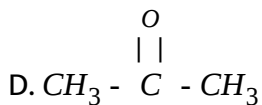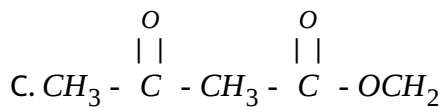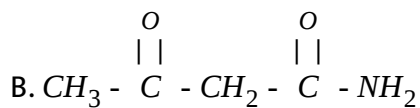**7.** Which of the following alkenes will give anti-markownikoff's product as major product.

  A. $Cl - CH = CH_2$

  B. $CH_3 - O - CH = CH_2$

  C. $NH_2 - CH = CH_2$

D. $CF_3 - CH = CH_2$

Answer: D

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8. Enol content is maximum in

A. $\underset{\displaystyle \overset{O}{||}}{CH_3 - C} - CH_2 - \underset{\displaystyle \overset{O}{||}}{C} - CH_3$

B. $\underset{\displaystyle \overset{O}{||}}{CH_3 - C} - CH_2 - \underset{\displaystyle \overset{O}{||}}{C} - NH_2$

C. $\underset{\displaystyle \overset{O}{||}}{CH_3 - C} - CH_3 - \underset{\displaystyle \overset{O}{||}}{C} - OCH_2$

D. $\underset{\displaystyle \overset{O}{||}}{CH_3 - C} - CH_3$
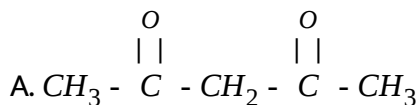
Answer: A

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9. 0.27 g of fatty acid is dissolved in 100 ml of solvent, 10 ml such solution is taken & placed over round plate. Distance from the centre of edge of round plate is 10 cm. Now solvent is evaporated & only fatty acid is remained. Density of fatty acid is $0.9g/c$. Determine height of fatty acid layer. ($\pi = 3$)
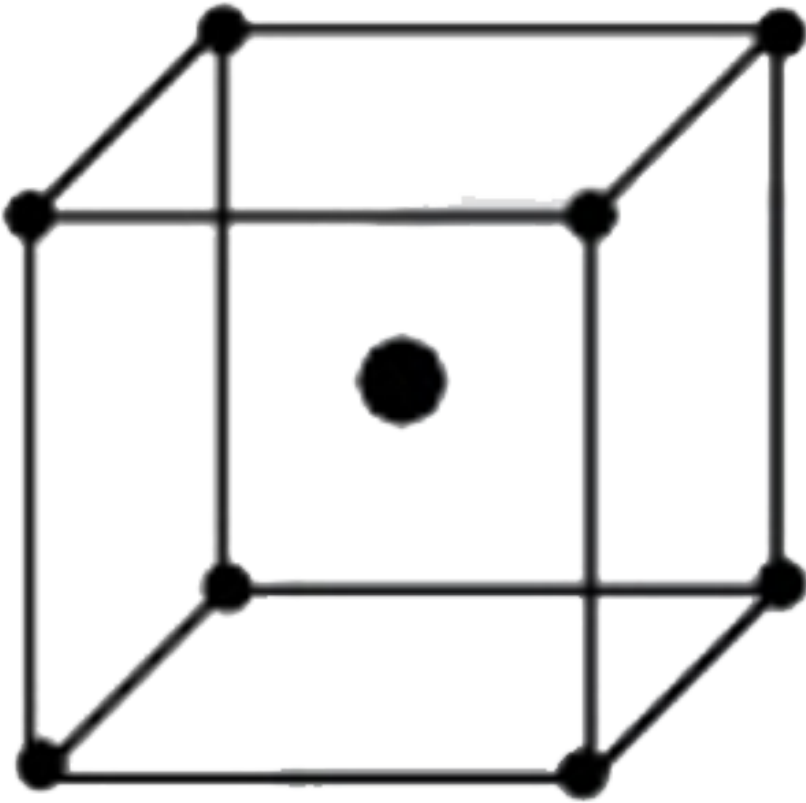
A. $10^{-4}cm$

B. $10^{-6}cm$

C. $10^{-8}cm$

D. $10^{-2}cm$

Answer: A

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10.

When radius of central atom is double with respect to corner atoms, then find out % packing efficiency

A. 75 %

B. 90 %

C. 60 %

D. 65 %

Answer: B

---

11. If wavelength of particle moment P is equal to λ, then what will be its wavelength for momentum 1.5P

A. $\dfrac{2}{3}\lambda$

B. $\dfrac{4}{3}\lambda$

C. $\dfrac{3}{2}\lambda$

D. λ

Answer: A

---

12. $A \xrightarrow{K_1} B \xrightarrow{K_2} C$ if all the reaction are 1st order and $\dfrac{d[B]}{dt} = 0$. Determine $[B]$.
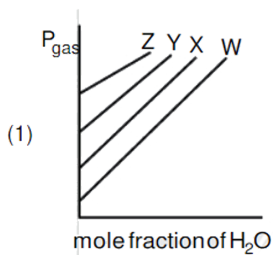
A. $\left(K_1 + K_2\right)[A]$

B. $\left(K_1 - K_2\right)[A]$

C. $\left(K_1 \times K_2\right)[A]$
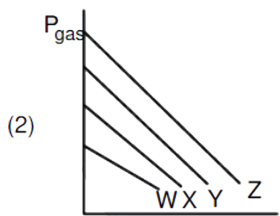
D. $\dfrac{K_1}{K_2} \times [A]$

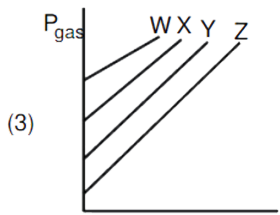**Answer: D**

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13. For the solution of the gases W, X, Y and Z in water at 298 K , the Henry's law constants (K_H) are 0.5, 2, 35 and 40 kbar, respectively. The correct plot for the given data is :
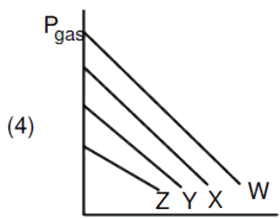

(1)

A.

(2)

P_{gas}

W X Y   Z

mole fraction of H_2O

B.

(3)

P_{gas} W X Y   Z

mole fraction of H_2O

C.

(4)

P_{gas}

Z Y X   W

mole fraction of H_2O

D.

Answer: D

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14. Which of the following metal is purified by using Mond's process.

A. Ni

B. *Zr*

C. *Ti*

D. *Cu*

Answer: A

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15. Find out % strength of 11.2V H_2O_2
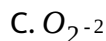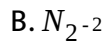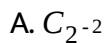
A. 34 %

B. 3.4 %

C. 1.7 %

D. 13.8 %

Answer: B

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16. Which species is diamagnetic and have shortest bond length?
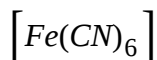
A. C_2^{-2}

B. N_2^{-2}

C. O_2^{-2}

D. O_2

Answer: B

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17. What is the value of spin only magnetic moment of anionic and cationic part of complex $\left[Fe\left(H_2O\right)_6\right]_2$ $\left[Fe(CN)_6\right]$

A. 4.9 B.M & zero

B. zero and 4.9 B.M

C. 2.9 B.M. and 0

D. 0 and 2.9 B.M.

Answer: B

18. Which compound to use for treatment of tumor?

A. $Cis\left[PdCl_2\left(NH_3\right)_2\right]$

B. Trans $\left[PdCl_2\left(NH_3\right)_2\right]$

C. $Cis\left[PtCl_2\left(NH_3\right)_2\right]$

D. Trans $\left[PtCl_2\left(NH_3\right)_2\right]$
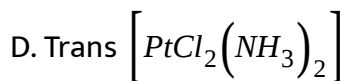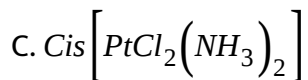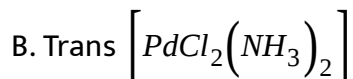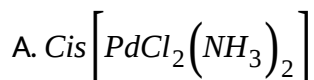
Answer: C

19. Find out mole % of C in CH_4

A. 80 %

B. 20 %

C. 25 %

D. 75 %

Answer: B

20. Which of the following is covelent in nature ($X = Cl, Br, I$)

A. BeX_2

B. CaX_2

C. MgX_2

D. SrX_2

Answer: A

21. Which of the following compound have sp^3d^2 hybridisation

A. $BrF_2{}^-$

B. $ICl_4{}^-$

C. $ICl_2{}^-$

D. IF_7

Answer: B

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22. $Fe^{2+} + Ag^+ \rightarrow Fe^{3+} + Ag$
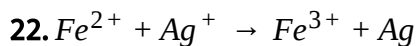
if $E°$ of $Ag^+/Ag = x$

$E°$ of $Fe^{2+}/Fe = y$

$E°$ of $Fe^{3+}/Fe = z$

Determine std. EMF of given cell reaction.

A. $x + 2y - 3z$

B. $x - y$

C. $x - z$

D. $2x + y - 3z$

Answer: A

23. Which of the following is incorrect about interstitial compounds.

A. very reactive

B. high metallic conductivity

C. very hard

D. high melting point.

Answer: A

24. IUPAC symbol of atomic number 119.

A. Uuh

B. Uun

C. Uue

D. Uub

Answer: C

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25. Which of the following is correct about $\left[ICl_4\right]^-$ and ICl_5 compound

A. both are isostructural

B. $\left[ICl_4\right]^-$ is square planar and ICl_5 is square pyramidal.

C. $\left[ICl_4\right]^-$ is square pyramidal and ICl_5 is square planar.

D. $\left[ICl_4\right]^-$ is tetrahedral and ICl_5 is pentagonal bipyramidal.

Answer: B

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26. 5 mole of ideal gas at $100K\left(C_{v.m} = 28J/mol/K\right)$. It is heated upto 200 K. Calculate $\triangle U$ and $\triangle (PV)$ for the process $(R = 8J/mol - K)$

A. $\triangle U = 28KJ, \; \triangle (PV) = 8KJ$

B. $\triangle U = 14KJ, \; \triangle (PV) = 4KJ$

C. $\triangle U = 14KJ: \; \triangle (PV) = 8KJ$

D. $\triangle U = 28KJ, \; \triangle (PV) = 4KJ$

Answer: B

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27. $S(s) + O_2 \leftrightarrow SO_2(g)$ $K_1 = 10^{52}$

$2S(s) + 3O_2 \leftrightarrow 2SO_3(g)$ $K_2 = 10^{129}$
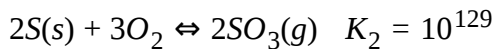
Calculate $K_{equilibrium}$ for
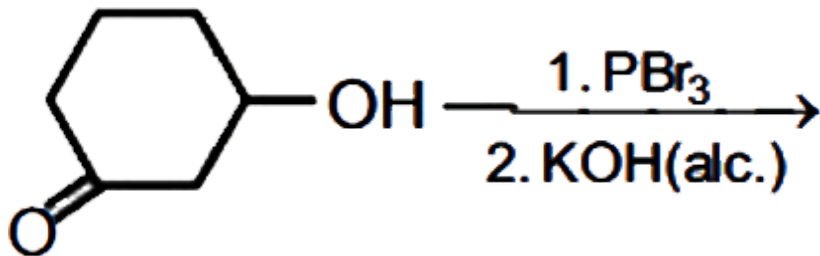
A. 10^{25}

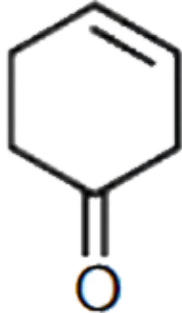B. 10^{77}

C. 10^{70}

D. 10^{40}

Answer: A

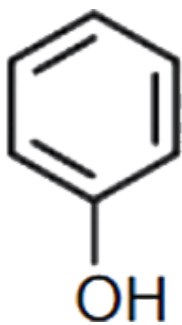▶ Watch Video Solution

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28. The product of the following reaction is:
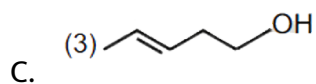
A.

(1)

B.

(2)

C.

(3)

OH

D.

(4)

Answer: D

---

29. Which of the following is the major product of give reation:
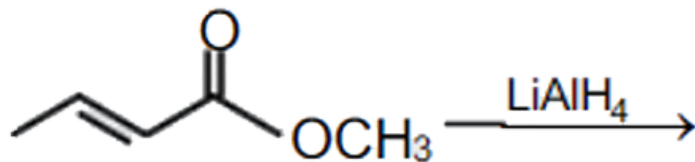
$\xrightarrow{\text{LiAlH}_4}$

overset(LiAlH_(4))rarr`

A. (1) OH

B. (2) CHO

C. (3) OH

D. (4) OH

Answer: A

3.

NO_2

CI
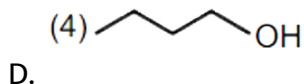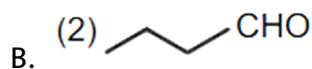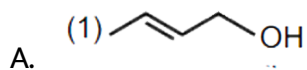
CH_3
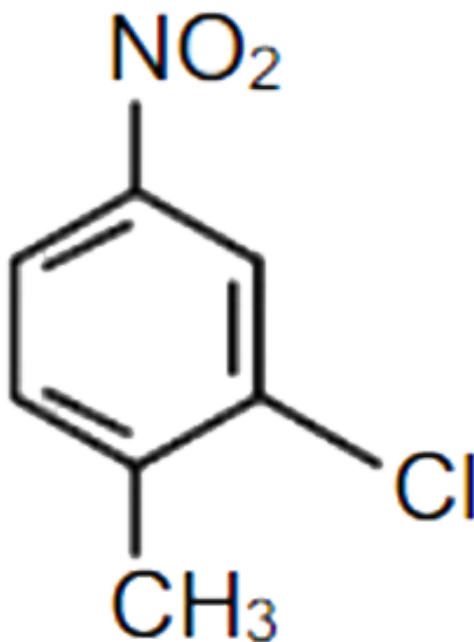
30.

Write the *IUPAC* name of given compound:

A. 1 - Choro 2 - methyl 5 - nitro benzene

B. 2 - Chloro 1 - methyl 4 - nitro benzene

C. 3 - Chloro 4 - methyl 1 - nitro benzene

D. 5 - Chloro 4 - methyl 1 - nitro benzene

Answer: B

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31. Arrange the following compounds in the correct increasing rate of aromatic electrophilic substitution.
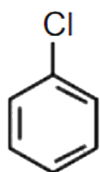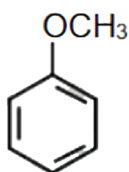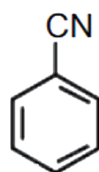
(A) (B) (C) (D)

A. $A < B < C < D$

B. $D < A < B < C$

C. $C < B < A < D$

D. $C < A < B < D$

Answer: B

32. Which of the following statement is not True for sucrose?

A. It is called invert sugar

B. It is non-reducing sugar

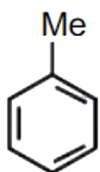C. It has glycosidic linkage between C_1 of α - glucose and C_1 of β

   fructose

D. On hydrolysis gives D - Glucose and D - fructose

Answer: C

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33. What is the effect of release of CO_2 gas on atmosphere?

   A. Global warming

   B. Photochemical smog

   C. Ozone layer depletion

   D. Tsunami

Answer: A

34. The correct product of the following reaction is:

$$\text{Alkaline } KMnO_4$$
$$H_3O^+$$

AlkalineKMnO$_4$

→ H_3O^-

COOH

(1)

A.

$\overset{O}{\overset{\|}{C}}$–O–CH$_3$

(2)

B.

COOH

(3)

C.

(4)

D.
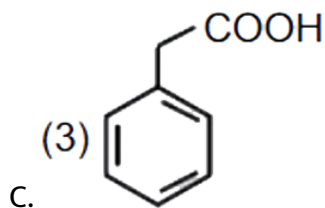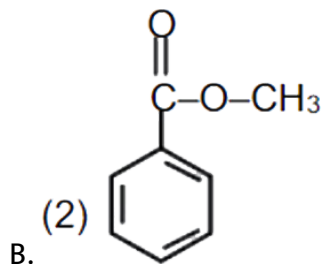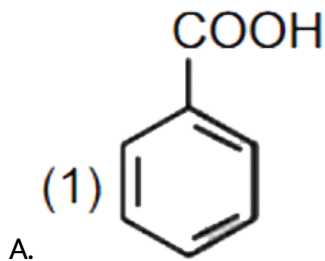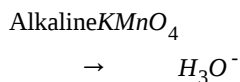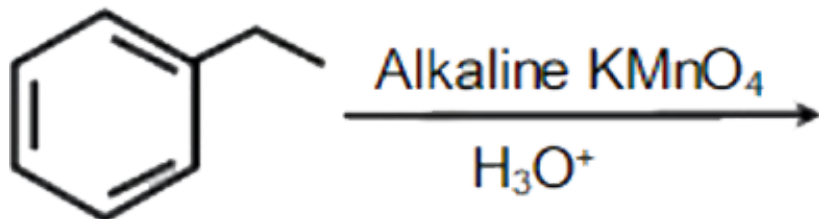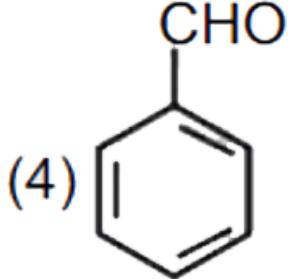
Answer: A

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35. The major product of the following reaction is:

$$CH_3C \equiv CH \xrightarrow[\quad (ii)DI \quad]{(i)DCl\,(1\,equiv.)}$$

A. **(1)**

B. **(2)**

C. **(3)**

D. (4)
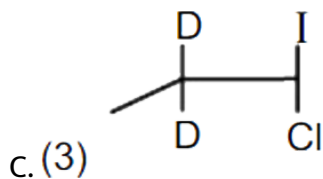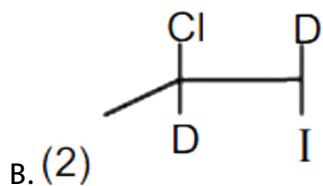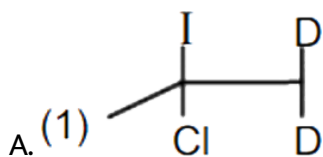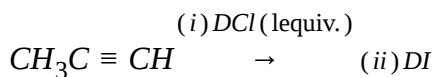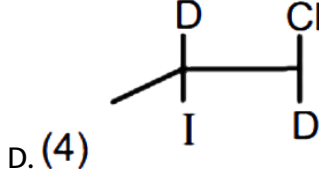
Answer: A

36. Complete the following reaction

$$\xrightarrow[\substack{\text{2.Polymerisation} \\ \text{(free radical mechanism)}}]{\text{1.KOH(alc.)}}$$

Polymer is:

A.

(1)

(2)

OH

B.

(3)

OH

C.

(4)

Cl

D.

Answer: A

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11.
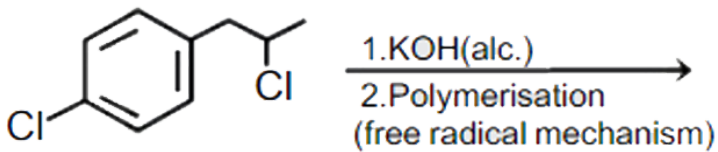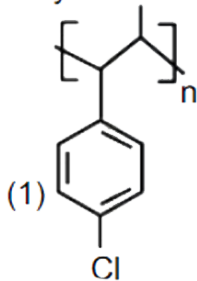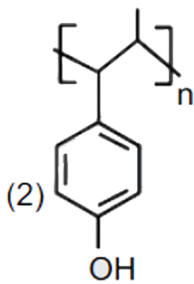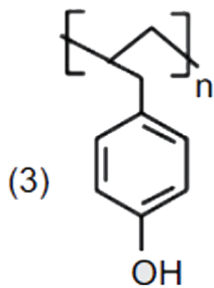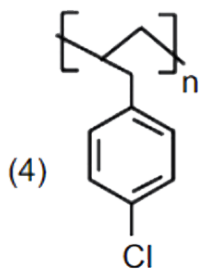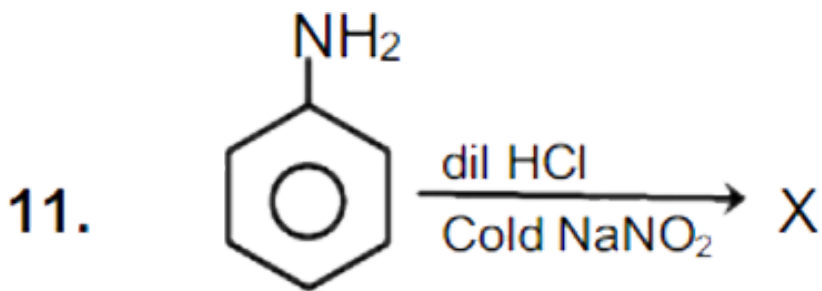
37.

$\xrightarrow{dilHCl}$ ColdNaNO$_2$X

X is mixed with a mixture of phenol and aniline in acidic medium. The product obtained is

A. (1)

B. (2)

C. (3)

D. (4)
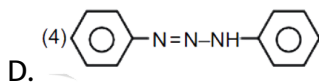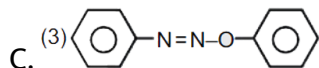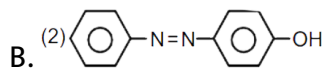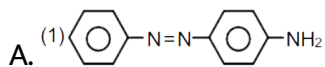
Answer: A

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38. In $CuSO_4.5H_2O$ how many molecules of water are indirectly connected

to Cu

    A. 5

    B. 4

    C. 2

    D. 1

Answer: D

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39. $[r] =$ concentration of reactant and t be the time
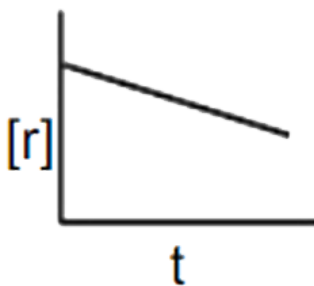
Identify the correct option for order-

A. 1 and 0

B. 2 and 3

C. 3 and 2

D. 0 and 2

Answer: A

40. The vapour pressure of pure liquid M&N are $700mm$ of Hg and $450mm$

of Hg respectively. Which of the following option is correct ?

Given : X_N, X_M = mole fraction of N&M in liquid phase

Y_N, Y_M = mole fraction of N&M in vapour phase

A. $X_M - X_N > Y_M - Y_N$

B. $\dfrac{X_M}{X_N} > \dfrac{Y_M}{Y_N}$

C. $\dfrac{X_M}{X_N} < \dfrac{Y_M}{Y_N}$

D. $\dfrac{X_M}{X_N} - \dfrac{Y_M}{Y_N}$

Answer: C

41. Consider $Zn + Cu^{2+} \rightarrow Zn^{2+} + Cu$

If the standard emf is $E°$(cell) $= 2.0V \& F = 96500C$

Find $\Delta G°$ $(KJ\text{mol})$

A. -388

B. +388

C. -194

D. +194

Answer: A

42. A solution of XY (100 % ionised) has osmotic pressure equal to four times the osmotic pressure of $0.01 M BaCl_2$ (100 % ionised). Find the molarity of XY

A. $6 \times 10^{-2} M$

B. $3 \times 10^{-2} M$

C. $4 \times 10^{-2} M$

D. $12 \times 10^{-2} M$

Answer: A

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43. What is the ratio of $\Delta v = = v_{max} - v_{min}$ for spectral lines corresponding to lyman & Balmer series for hydrogen

A. $9:4$

B. $4:9$

C. 5 : 7

D. 7 : 5

Answer: A

44. Which of the following are path functions

(A) W

(B) Q

(C) $Q + W$

(D) $H - TS$

A. A and D

B. A and B

C. A,B and D

D. A,C and D

Answer: B

45. Given a and b values for Xe, Kr. Ar and He are

	Xe	Kr	Ar	He
a(L^2bar/mol^2)	4.1	2.3	1.3	0.03
b(L/mol)	0.1	0.04	0.03	0.02

The gas with highest T_c is

A. Xe

B. Kr

C. Ar

D. He

Answer: B

46. Consider the graph
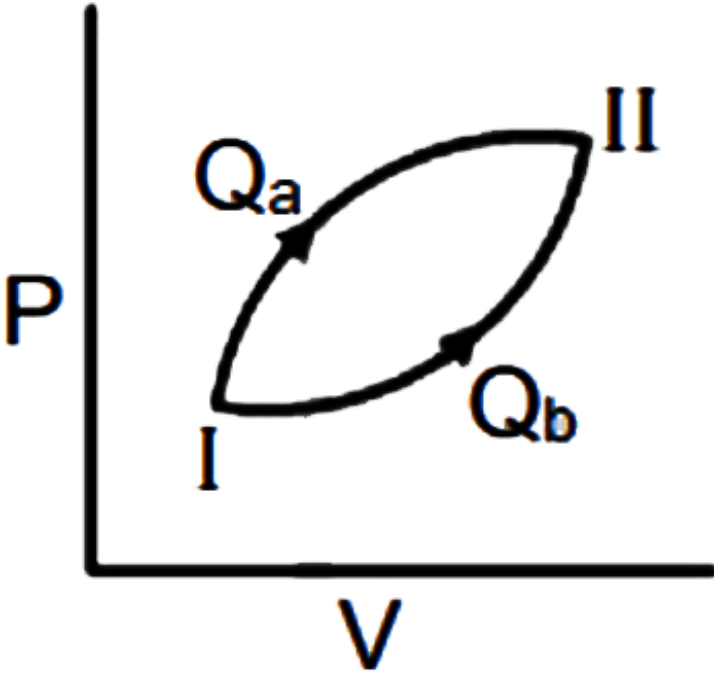
Identify correct option

A. $\Delta U_a = \Delta U_b$, $Q_a > Q_b$

B. $\Delta U_a > \Delta U_b$, $Q_a = Q_b$

C. $\Delta U_a = \Delta U_b$, $Q_a < Q_b$

D. $\Delta U_a < \Delta U_b$, $Q_a = Q_b$

Answer: C

---

47. Out of C_2, F_2O_2NO, Which will be stabilized after forming anion ?

A. C_2

B. F_2

C. O_2

D. NO

Answer: A

---

48. Arrange in the increasing order of oxidation state of nitrogen for following nitrogen oxides N_2O, NO_2, NO, N_2O_3

A. $N_2O < NO < NO_2 < N_2O_3$

B. $NO < N_2O < N_2O < N_2O_3 < NO_2$

C. $N_2O < NO < N_2O_3 < NO_2$

D. $NO_2 < N_2O_3 < N_2O < NO$
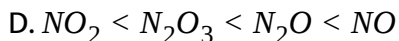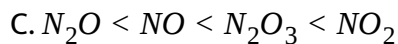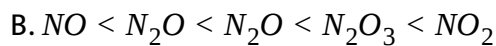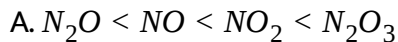
Answer: C

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49. C_{60} is aromatic allotrope of carbon containing

A. 18 Pentagons, 14 hexagons

B. 16 Pentagons, 16 hexagons

C. 12 Pentagons, 20 hexagons

D. 20 Pentagons, 12 hexagons

Answer: C

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50. Which of the following ores contains fluorine ?

A. Malachite

B. Sphalerite

C. Cryolite

D. Bauxite

Answer: C

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51. Which of the following will have highest difference between IE_1 and IE_2?

A. K

B. Mg

C. Sr

D. Sc

Answer: A

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52. Which of the following will show optical activity

A.

B.

C.

D.
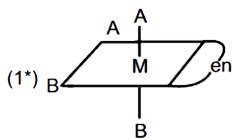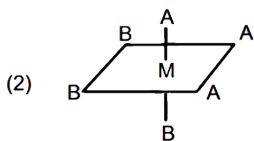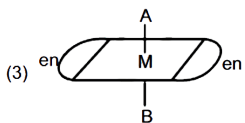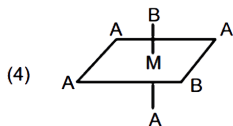
Answer: A

53. Which of the following orbitals are degenerate for $\left[Cr\left(H_2O\right)_6\right]^{3-}$

A. $d_x^2 - y^2, d_{xy}$

B. d_{xy}, d_{yz}

C. $d_{x^2} - y_2, d_{yz}$

D. d_2, d_{xy}
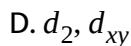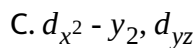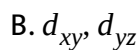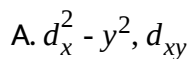
Answer: B

54. Which of the following is Hinsberg reagent ?

A. $C_6H_5SO_2CH_3$

B. $C_6H_5SO_2Cl$

C. $SnCl_2$

D. $CoCl_2$
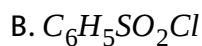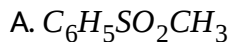
Answer: B

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55. Which of the following is potential energy diagram for S_N1 reaction?

A.

(1)

B.

(2)

C.

(3)

(4)
D.
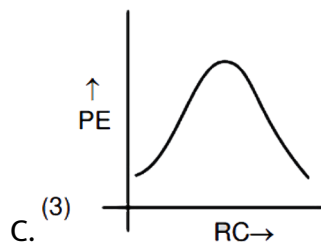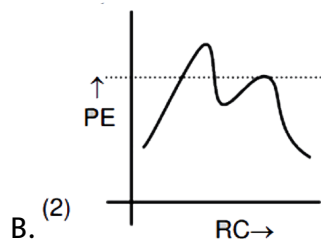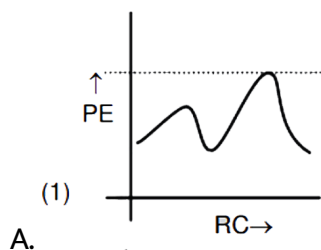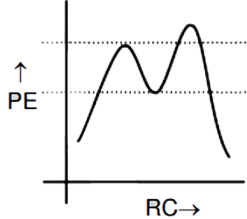
Answer: B

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56. Reactivity order of $S_N 1$ reaction for the following compounds is

(a)

(b)

(c) CH_3–Cl

(d)
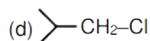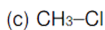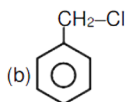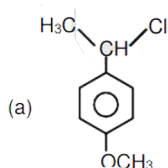
A. $a > b > c > d$

B. $a > d > c > b$

C. $c > d > b > a$

D. $a > b > d > c$

Answer: D

57. The atmosphere between the heights 10 to 50 kilometer above the Sea level is:

A. Troposphere

B. Stratophere

C. Mesosphere

D. Ionosphere

Answer: B

58. Noradrenaline is one of the example of :

A. Anti-depressant

B. Anti-Histamine

C. Neurotransmitter

D. Antacid

Answer: C

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59. The product of following reaction

$\xrightarrow[\text{CCl}_4]{\text{Br}_2}$

A. (1)

B. (2)

(3) C.

(4) D.
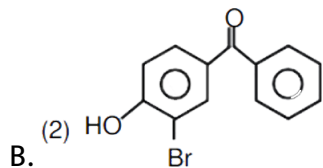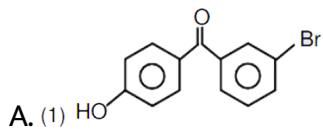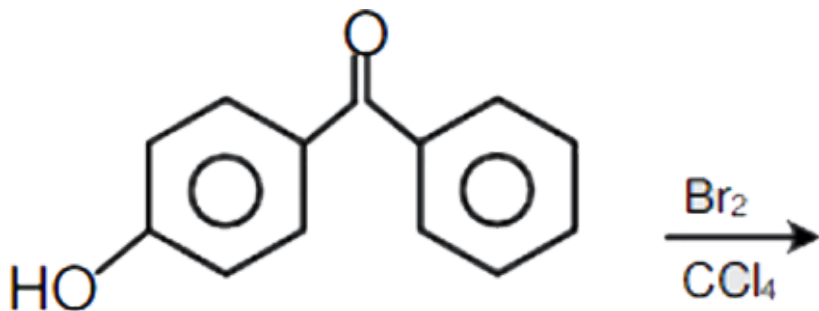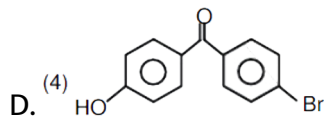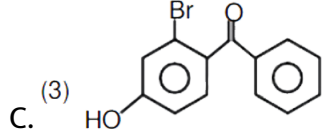
Answer: B

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60. The product of following reaction is:

$$\xrightarrow[CHCl_3]{H_2SO_4(Cat.)}$$

$H_2SO_4(Cat.)$
→ $CHCl_3$

(1)

A.

B. (2)

C. (3)

D. (4)
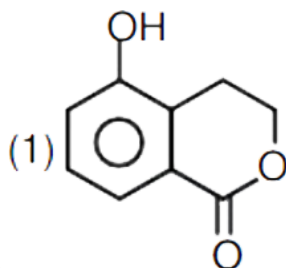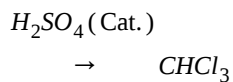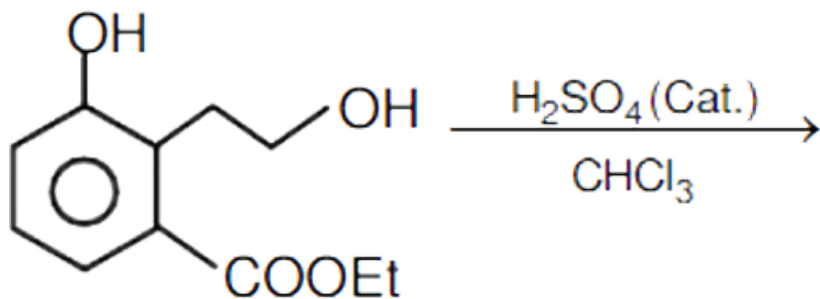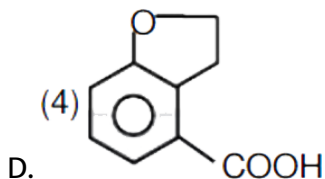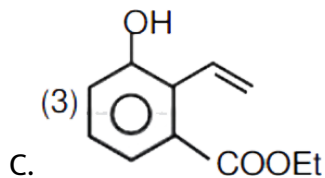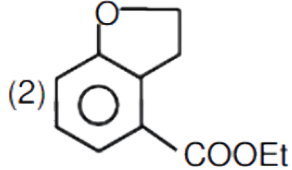
Answer: A

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61. Monomer of $\left[NH - \overset{O}{\overset{||}{C}} - NH - CH_2 \right]_n$ is:

A. Methanamine

B. N Methyl urea

C. Formaldehyde

D. Ammonia

Answer: C

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62. Which can give both carbylamine test and cerric ammonium nitrate test?

A. Asn-Gln

B. Lys-Gln

C. Asp-Lys

D. Lys-Ser

Answer: D

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63.

$KCN \atop \rightarrow DMSO$ $H_2, Pd \atop \rightarrow$ product is

A. (1)

CH₂–NH₂ → $CH_2\text{--}NH_2$

B. (2)

OH, CH₂–NH₂

C. (3)

HO, NH₂

D. (4)

HO, CH₂–NH₂
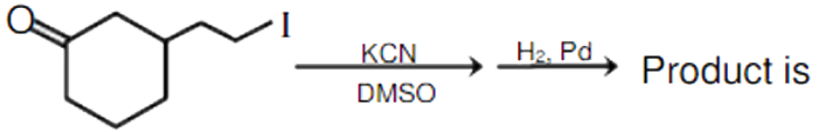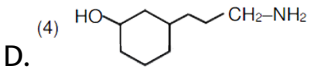
Answer: B

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64. $0.1 M HCl$ is added to an unknown strength of $NaOH$ solution. Identify the correct diagram

A. (1)

Volume added

B. (2)

Volume added

C. (3)

Volume added

D. (4)

Volume added
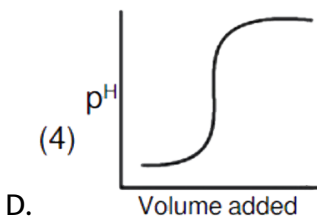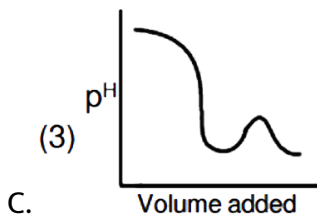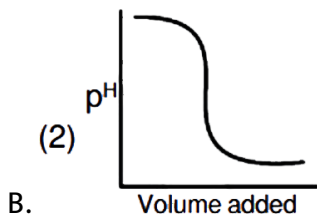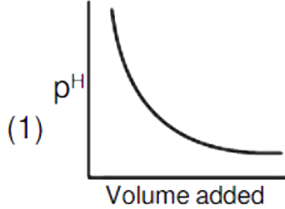
Answer: B

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65. Calculate ΔU if $2kJ$ heat is released and $10kJ$ work is done on the system.

A. $12kJ$

B. $8kJ$

C. $-8kJ$

D. $-12kJ$

Answer: B

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66. $0.1F$ charge is supplied to a solution of $Ni(NO_3)_2$. Then the amount of Ni deposited (in mol) at the cathode will be:

A. 0.05

B. 1.0

C. 0.5

D. 0.10

Answer: A

67. Which of the following is amorphous form of silica

    A. Quartz

    B. Kieselguhr

    C. Tridymite

    D. Cristobalite

Answer: B

68. 10 mL of 1 mM surfactant solution forms a monolayer covering $0.24 cm^2$ on a polar substrate. If the polar head is approximated as a cube, what is its edge length?

    A. $2 \pm$

B. $2fm$

C. $1 \pm$

D. $1fm$

Answer: A

---

69. Which of the following is not a carbonate ore?

A. Calamine

B. Siderite

C. Bauxite

D. Malachite

Answer: C

70. Why does HF has the maximum boiling point amongst all hydrogen halides?

A. Due to hydrogen bonding

B. Due to Vander Waal's forces

C. Due to minimum molecular mass

D. None of these

Answer: A

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71. In the given polymers which is a condensation polymer.

A. Teflon

B. Neoprene

C. Buna-S

D. Nylon-6,6

Answer: D

---

72. N-Ethyphthalimide → Ethylamine

Reagent for the conversion of this reaction is

A. H_2O

B. $NaBH_4$

C. $NH_2 - NH_2$

D. CaH_2

Answer: A

(a) (b) (c) (d)

73.
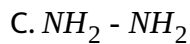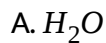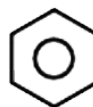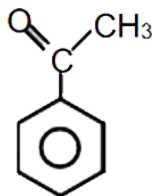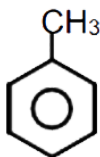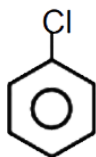
The correct rate of reaction of given compounds towards electrophilic aromatic substitution reaction is

A. $b > d > a > c$

B. $b > a > d > c$

C. $c > a > d > b$

D. $a > b > d > c$

Answer: A

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74. The regions of the atmosphere, where clouds form and where we live, respectively, are :

A. Troposphere and troposphere

B. proposphere and stratosphere

C. stratosphere and stratosphere

D. stratosphere and troposphere

Answer: A

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75. in $Sc^{3+}, Ti^{2+}, Ti^{3+}, V^{2+}$ increasing order of spin only magnetic moment is:

A. $Sc^{3+} < Ti^{2+} < Ti^{3+} < V^{2+}$

B. $Sc^{3+} < Ti^{3+} < Ti^{2+} < V^{2+}$

C. $Ti^{2+} < Sc^{3+} < Ti^{3+} < V^{2+}$

D. $Sc^{3+} < Ti^{2+} < V^{2+} < Ti^{3+}$

Answer: B

76. In which case, process will be spontaneous at all temperature?

A. $\triangle H < 0$, $\triangle S > 0$

B. $\triangle H > 0$, $\triangle S > 0$

C. $\triangle H < 0$, $\triangle S < 0$

D. $\triangle H > 0$, $\triangle S < 0$

Answer: A

77. Which alloy is used in the manufacturing of aeroplane?

A. Mg - Al

B. Mg - Sn

C. Mg - Pb

D. Mg - Sb

Answer: A

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78. Which of the following does not have S-S linkage?

A. $H_2S_2O_5$

B. $H_2S_2O_7$

C. $H_2S_2O_3$

D. $H_2S_2O_6$
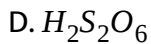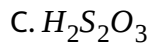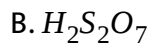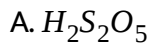
Answer: B

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79. In which of the following option all are isoelectronic?

A. $N^{3-}, O^{2-}, F^-, Na^+$

B. Na^+, N^{-3}, F^-, Li^+

C. $Li^+, N^{3-}, F^-, O^{2-}$

D. Li^+, Na^+, O^{2-}, F^-
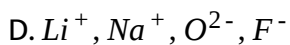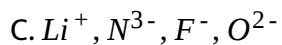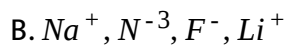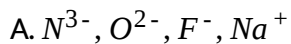
Answer: A

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80. Which of the following reagent is not used to carry out the reaction

A. H_2/Ni
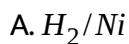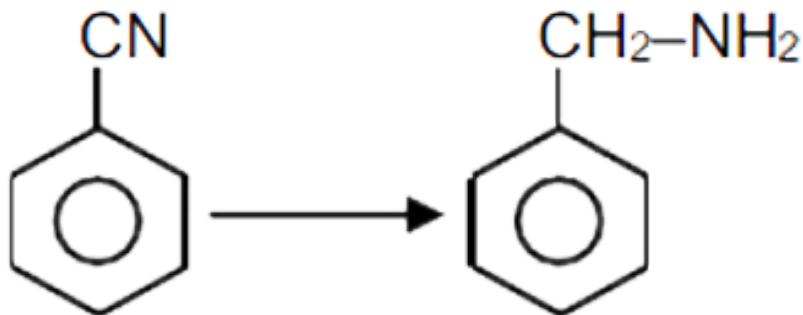
B. $LiAlH_4$

C. $Sn/HCl. NaBH_4$

D. H_2/Pd

Answer: C

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81. The number of pentagons in C_{60} and trigons (triangles) in white phosphorus, respectively, are :

A. 12,3

B. 12,4

C. 20,3

D. 20,4

Answer: B

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82. Maximum oxidation state of uranium and plutonium are respectively :

A. 4 and 6

B. 5 and 6

C. 6 and 7

D. 6 and 8

Answer: C

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83. Which noble gas is not found in atmosphere?

A. He

B. Ne

C. Kr

D. Rn

Answer: D

84. The minimum amount of O_2 (g) consumed per gram of reactant is for the reaction:

(Given atomic mass: Fe = 56, O = 16, Mg = 24, P = 31, C = 12, H = 1)

A. $P_4 + 5O_2 \rightarrow P_4O_{10}$

B. $2Mg + O_2 \rightarrow 2MgO$

C. $2Fe + 3O_2 \rightarrow 2Fe_2O_3$

D. $C_3H_8 + 5O_2 \rightarrow 3CO_2 + 4H_2O$
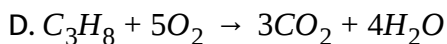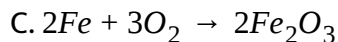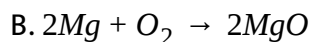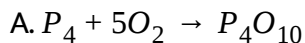
Answer: B

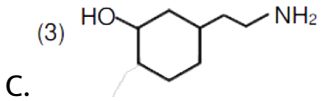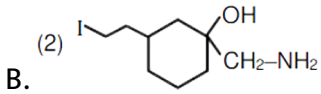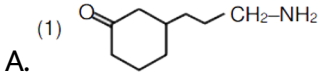85. The synonym for water gas when used in the production of methanol is :

A. Fuel gas

B. Syn gas

C. Natural gas

D. Producer gas

Answer: B

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86. Which of the following is thermosetting polymer?

A. Buna-S

B. PVC

C. Bakelite

D. Plyethylene

Answer: C

---

87. Glucose and galactose differs on which carbon atom.

A. 2nd carbon atom

B. 3rd carbon atom

C. 4th carbon atom

D. 5th carbon atom

Answer: C

---

88. An organic compound 'A' is oxidized with followed by boiling with Na_2O_2 followed by boiling with HNO_3. The resultant solution is then

treated with ammonium molybdate to yield a yellow precipitate. Based on above observation, the element present in the given compound is:

A. Phosphorus

B. Nitrogen

C. Fluorine

D. Sulphur

Answer: A

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89. What will be the work done for expansion of a gas from 1 lit to 10 lit volume agaist constant pressure of 1 bar?

A. $+9KJ$

B. $-9KJ$

C. $+0.9KJ$

D. $-0.9 KJ$

Answer: D

90. Which of the following is an example of disproportionation reaction?

A. $2CuBr \rightarrow CuBr_2 + Cu$

B. $KMnO_4 \rightarrow K_2MnO_4 + MnO_2 + O_2$

C. $MnO_4^- \rightarrow KMnO_2 + Mn^{2+}$

D. $Cl^- + ClO_3^- \rightarrow Cl_2$
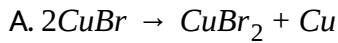
Answer: A

91. Peptization is:

A. formation of colloid from precipitate

B. formation fo precipitate from colloid

C. formation fo colloid from solution

D. addtion of colloid in solvent

Answer: A

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92. 5 moles of AB_2 weight $125 \times 10^{-3}kg$ and 10 moles of A_2B_2 weight $300 \times 10^{-3}kg$. The value of ratio of molar mass of B to molar mass of A, $\dfrac{M_B}{M_A}$ is _____.

A. $A = 5 \times 10^{-3} \& B = 25 \times 10^{-3}$

B. $A = 2.5 \times 10^{-3} \& B = 5 \times 10^{-3}$

C. $A = 2.5 \times 10^{-3} \& B = 10 \times 10$

D. $A = 5 \times 10^{-3} \& B = 10 \times 10^{-3}$

Answer: A

93. The basic structural unit of feldspar, zeolites, mica, and asbestos is:

A. SiO_4^{4-}

B. SiO_2^{4-}

C. SiO_3^{2-}

D.

(4) $R-(\underset{\underset{OH}{|}}{\overset{\overset{OH}{|}}{Si}})_n CH_3$
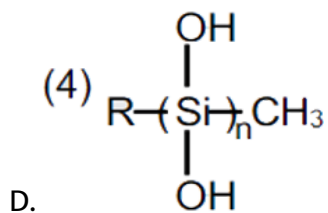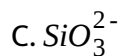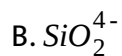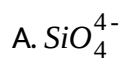
Answer: A

94. A person X discovered froth flotation method which is a type of process Y in metallurgy. Then X and Y are respectively.

A. Fisherman, reduction

B. Washerman, reduction

C. Fisherwoman, concentration

D. Washerwoman, concentration

Answer: D

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95. Which of the following is correct statement regarding $N(CH_3)_3$ and $N(SiH_3)_3$?

A. $N(SiH_3)_3$ is planar and more basic than $N(CH_3)_3$

B. $N(SiH_3)_3$ is planar and less basic than $N(CH_3)_3$

C. $N(CH_3)_3$ is planar and more basic than $N(SiH_3)_3$

D. $N(CH_3)_3$ is pyramidal and less basic than $N(SiH_3)_3$

Answer: B

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96. An element have atomic number 15, its valence electrons group number and valency are respectively

A. 5,15,3

B. 6,15,3

C. 15,6,3

D. 6,16,4

Answer: A

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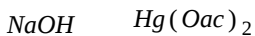
97. 2-Chloro-1-phenylbutane $\xrightarrow[EtOH]{NaOH}$ $\xrightarrow[NaBH_4]{Hg(Oac)_2}$ product is

A.
(1)

B.
(2)

C.
(3)

D.
(4)
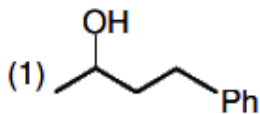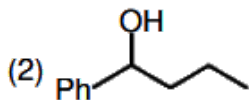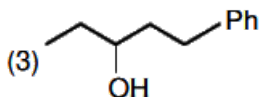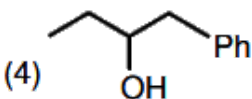
Answer: B

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98. Which is always present in photochemical smog

A. O_3

B. CO_2

C. SO_2

D. NO_2

Answer: D

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99. The longest C–C bond is present in

A. graphite

B. diamond

C. C_{60}

D. C_{70}

Answer: B

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100. 25g of an unknown hydrocarbon upon burning produces 88g of CO_2 and 9 g of H_2O. This unknown hydrocarbon contains:

A. $C = 24g, H = 1g$

B. $C = 20g, H = 5g$

C. $C = 18g, H = 7g$

D. $C = 19g, H = 6g$

Answer: A

101. In sc, bcc and fcc the ratio of number of atoms per unit cell is given by

A. $1:2:3$

B. $4:2:1$

C. $1:2:4$

D. $1:1:3$

Answer: C

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102. Co-ordination number of central atom in $Na_3\left[Al\left(C_2O_4\right)_3\right]$ and $\left[Co(en)_2Cl\right]Cl$ are:

A. 6 and 6

B. 6 and 5

C. 5 and 5

D. 6 and 4

Answer: B

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103. A diatomic gas with rigid molecules does $10J$ of work when expended at constant pressure. What would be the heat energy absorbed by the gas, in this process ?

A. 40J

B. 20J

C. 35J

D. 15J

Answer: C

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104. 6g urea and 1.8g glucose are dissolved in 100 ml H_2O. What is the osmotic pressure at 300K.

A. 27.06 atm

B. 30 atm

C. 45 atm

D. 13.07 atm

Answer: A

105. Compound X is responsible for temporary hardness. On boiling X gives a precipitate of Y then X & Y are

A. $Mg\left(HCO_3\right)_2$, $MgCO_3$

B. $Mg\left(HCO_3\right)_2$, $Mg(OH)_2$

C. $Ca\left(HCO_3\right)_2$, $Ca(OH)_2$

D. $Ca\left(HCO_3\right)_2$, CaO
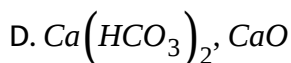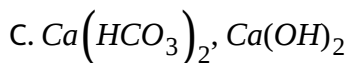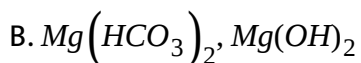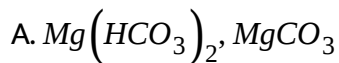
Answer: A

106. In comparison to B, Be has

A. greater nuclear charge, lesser first ionisation energy

B. lesser nuclear charge, greater ionisation energy

C. greater nuclear charge, greater first ionization energy

D. lesser nuclear charge, lesser first ionization energy

Answer: B

107. Half-life of radio active element A is 30 min while B is 20 min. Calculate ratio of number of nuclei decayed of A B after 60 min

A. $\dfrac{7}{6}$

B. $\dfrac{5}{6}$

C. $\dfrac{6}{7}$

D. $\dfrac{1}{1}$

Answer: C

108. For which of the following reaction K_p and K_c are not same?

A. $H_2(g) + Cl_2(g) \Leftrightarrow 2HCl(g)$

B. $2SO_3(g) \Leftrightarrow 2SO_2(g) + O_2(g)$

C. $N_2(g) + O_2(g) \Leftrightarrow 2NO_g$
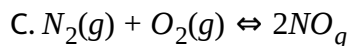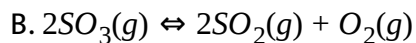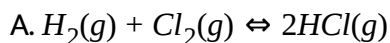
D. none of these

Answer: B

109. Solubility of $Cd(OH)_2$ in pure water is $1.84 \times 10^{-5} mole/L$ Calculate its solubility in a buffer solution of $pH = 12$.

A. $2.7 \times 10^{-9} M$

B. $2.49 \times 10^{-10} M$

C. 2.7×10^{-11}

D. $2.7 \times 10^{-12} M$

Answer: B

110. Which of the following is correct statement?

A. Hall-Heroult's process is used in the extraction of Aluminium & iron.

B. Leaching of Bauxite with NaOH produces sodium meta aluminate

and sodium silicate

C. cast iron is made from Pig Iron.

D. Blister copper occurs due to CO_2

Answer: C

111. Which of the following is incorrect statement?

A. LiCl forms hydrated salt LiCl. $2H_2O$

B. On heating, $LiNO_3$ gives $LiNO_2$ and O_2

C. Li is the strongest reducing agent

D. Among alkali metals Li has the highest melting point.

Answer: B

112. $X \rightarrow$ heat$MnO_2 + Y$

$Y + H_2SO_4 + NaC < oZ$ (pungent smelling gas)

Identify X, Y and Z

A. $X = K_2MnO_4, Y = KMnO_4, Z = Cl_2$

B. $Z = KMnO_4$, $Y = K_2MnO_4$, $Z = Br_2$

C. $X = KMnO_4$, $Y = O_2$, $Z = Cl_2$

D. $X = KMnO_4$, $Y = K_2KnO_4$, $Z = SO_2$
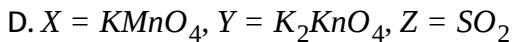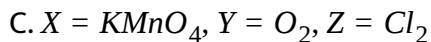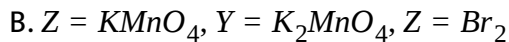
Answer: A

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113. In which of the following, energy of 2s orbital is minimum

A. Li

B. Na

C. K

D. H

Answer: C

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114. An organic compound 'x' showing the following solubility profile is:

water → insoluble

'X' —
5% HCl → insoluble

10% NaOH → soluble

10% NaHCO$_3$ → insoluble
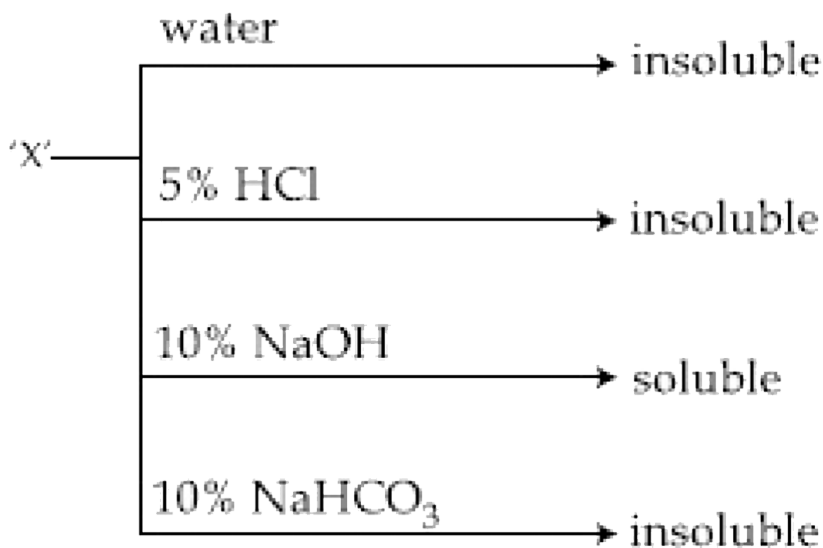
A. o - Toluidine

B. Oleic acid

C. m - Cresol

D. Benzamide

Answer: C

115. Adsorptionof a gas follows Freundlich adsorption isotherm. x is the mass of the gas adsorbed on mass m of the adsorbent.

The plot of $\log\dfrac{x}{m}$ versus $\log p$ is shown in the given graph $\dfrac{x}{m}$ is proportional to :
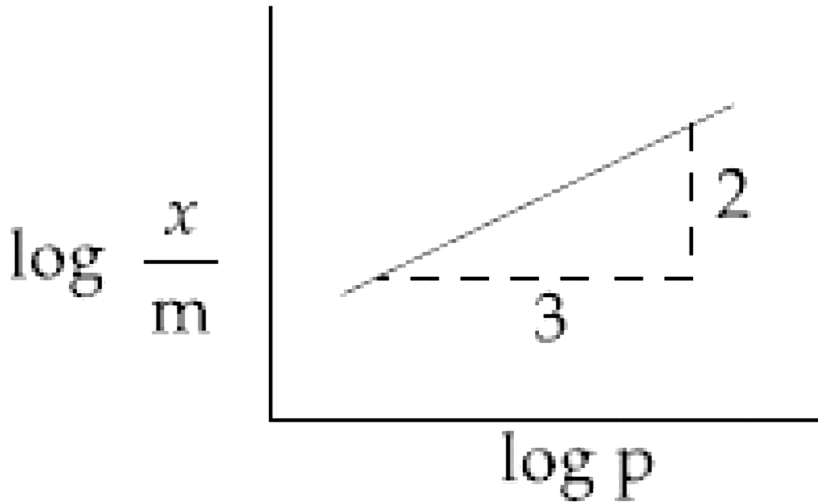
A. $P^{2/3}$

B. $P^{3/2}$

C. P^3

D. P^2

Answer: B

116. An organic compound neither reacts with neutral ferric chloride solution nor with Fehling solution. It however, reacts with Grignard reagent and gives positive iodoform test. The compound is

A.

B.

C.

D.

4.
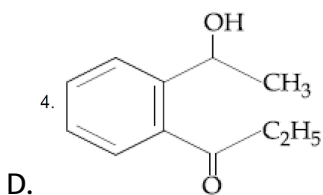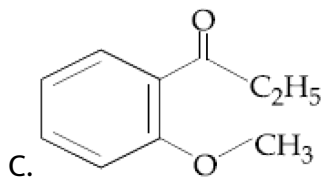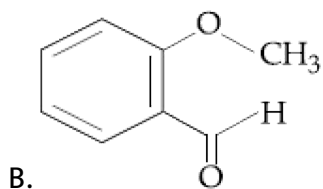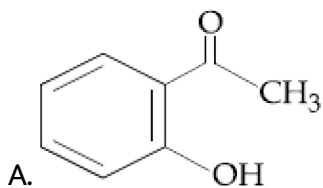
Answer: B

117. The size of the iso-electronic species Cl^-, Ar and Ca^{2+} is affected by:

A. azimuthal quantum number of valence shell

B. electron-electron interaction in the outer orbitals

C. Principal quantum number of valence shell

D. nuclear charge

Answer: B

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118. FeC_2O_4, $Fe_2(C_2O_4)_3$, $FeSO_4$, $Fe_2(SO_4)_3$ one mole each, will react how many moles of $KMnO_4$.

A. 2

B. 1

C. 3

D. 1.5

Answer: B

119. In the following compounds, the decreasing order of basic strength will be :

A. $C_2H_5NH_2 > NH_3 > \left(C_2H_5\right)_2 NH$

B. $\left(C_2H_5\right)_2 NH > NH_3 > C_2H_5NH_2$

C. $\left(C_2H_5\right)_2 NH > C_2H_5NH_2 > NH_3$

D. $NH_3 > C_2H_5NH_2 > \left(C_2H_5\right)_2 NH$
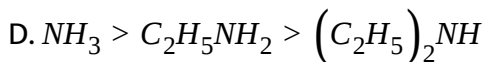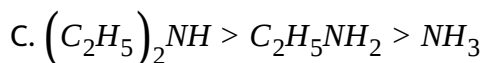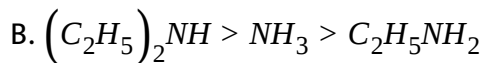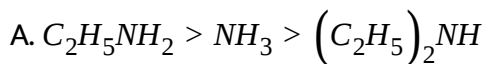
Answer: B

120. The major product of the following reaction is :

Conc HBr (excess) / heat

A.

B.

C.

D.

Answer: B

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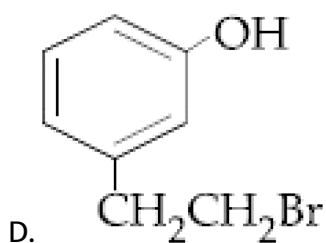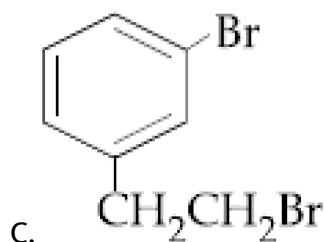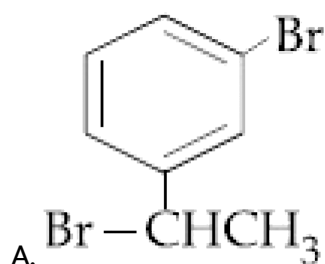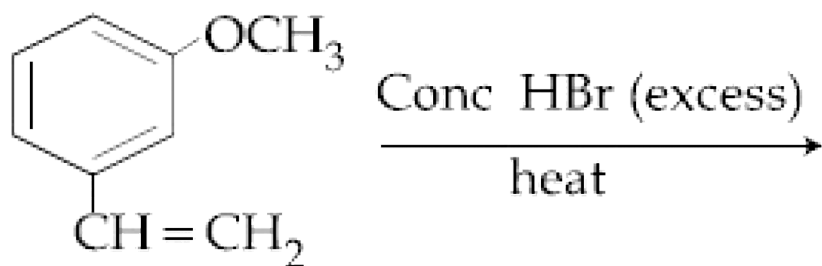
121. The correct order of the spin-only magnetic moment of metal ions in the following low-spin complexes,

$\left[V(CN)_6\right]^{4-}$, $\left[Fe(CN)_6\right]^{4-}$, $\left[Ru(NH_3)_6\right]^{3+}$, and $\left[Cr(NH_3)_6\right]^{2+}$, is :

A. $Cr^{2+} > Ru^{3+} > Fe^{2+} > V^{2+}$

B. $V^{2+} > Cr^2 > Ru^{3+} > Fe^{2+}$

C. $V^{2+} > Ru^{3+} > Cr^{2+} > Fe^{2+}$

D. $Cr^{2+} > V^{2+} > Ru^{3+} > Fe^{2+}$
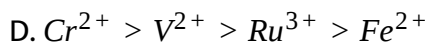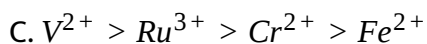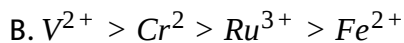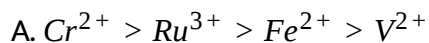
Answer: D

122. The major product of the following reaction is :

(i) $AlCl_3$, heat

(ii) H_2O

A.

B.

C.

D.
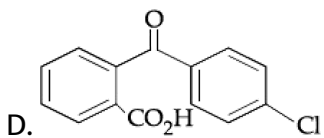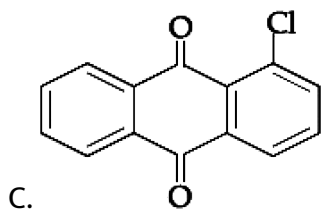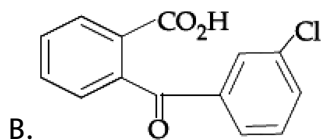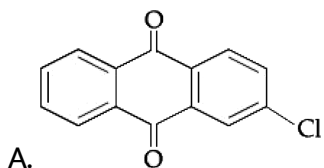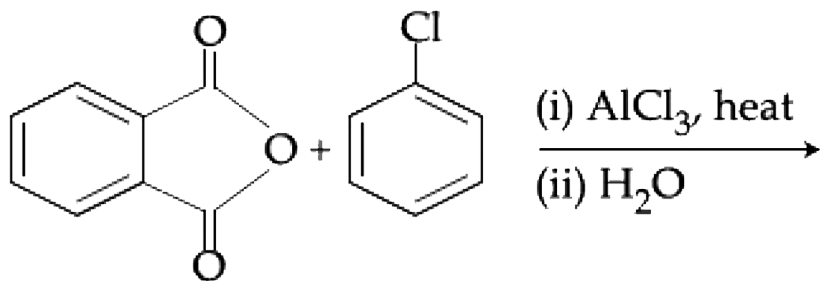
Answer: A

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123. For silver, $C_P\left(JK^{-1}\text{mol}^{-1}\right) = 23 + 0.01T$. If the temperature (T) of 3 moles of silver is raised from $300K$ to $1000K$ at 1 atm pressure, the value of ΔH will be close to :

A. $62kJ$

B. $16kJ$

C. $21kJ$

D. $13kJ$

Answer: A

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124. Which is wrong with respect to our responsibility as a human being to protect our environment?

A. Restricting the use of vehicles

B. Avoiding the use of floodlighted facilites.

C. Setting up compost tin in gardens.

D. Using plastic bags.

Answer: B

125. The following ligand is :
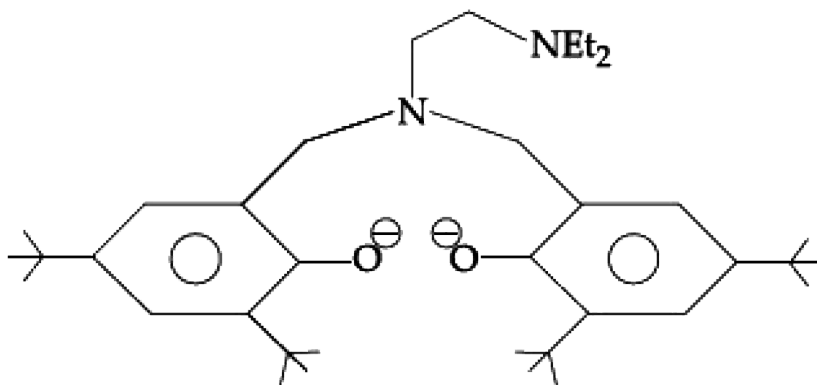
A. hexadentate

B. tetradentate

C. bidentate

D. tridentate

Answer: C

---

126. If solubility product of $Zr_3(PO_4)_4$ is denoted by S, then which of the following relation between S and K_{sp} is correct ?

A. $S = \left(\dfrac{K_{sp}}{144}\right)^{1/6}$

B. $S = \left(\dfrac{K_{sp}}{6912}\right)^{1/7}$

C. $S = \left(\dfrac{K_{sp}}{929}\right)^{1/9}$

D. $S = \left(\dfrac{K_{sp}}{216}\right)^{1/7}$

Answer: B

127. The major product of the following reaction is:

$$\text{(substrate)} \quad \xrightarrow[\text{MeOH, 25°C}]{\text{NaBH}_4}$$

A.

OH, Br

B.

OH, OMe

C.

OMe

D.

O
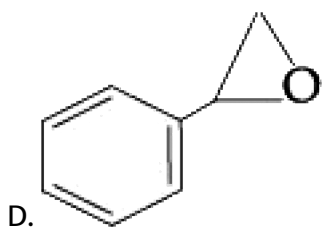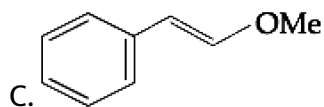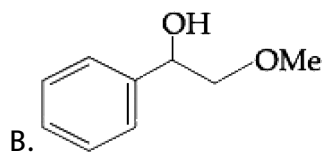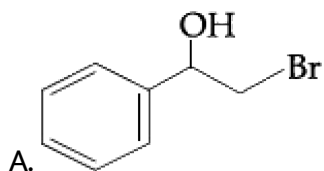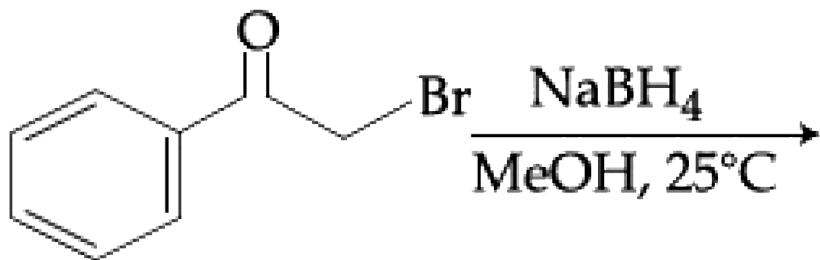
Answer: A

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128. Diborane $\left(B_2H_6\right)$ reacts independently with O_2 and H_2O to produce, respectively:

A. B_2O_3 and H_3BO_3

B. B_2O_3 and $\left[BH_4\right]^-$

C. H_3BO_3 and B_2O_3

D. $HBO_2$and H_3BO_3
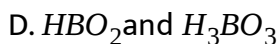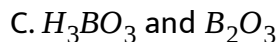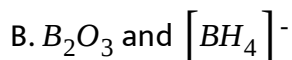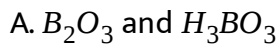
Answer: D

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129. Which one of the following equations does not correctly represent the first law of thermodynamics for the given processes involving an ideal gas ? (Assume non-expansion work is zero)

A. Cyclic process: $q = -w$

B. Adiabatic process: $\Delta U = -w$

C. Isochoric process: $\Delta U = q$

D. Isothermal process: $q = -w$

Answer: C

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130. With respect to an ore, Ellingham diagram helps to predict the feasiblity of its

A. Electrolysis

B. Zone refining

C. Vapour phase refining

D. Thermal reduction

Answer: C

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131. 100 mL of a water sample contains 0.81g of calcium bicarbonate and 0.73g of magnesium bicarbonate. The hardness of this water sample expressed in terms of equivalent of $CaCo_3$ is 10^x ppm. What is numerical value of x? (molar mass of calcium bicarbonate is $162 gmol^{-1}$ and magnesium bicarbonate is $146 gmol^{-1}$)

    A. $5,000p \pm$

    B. $1,000p \pm$

    C. $100p \pm$

    D. $10,000p \pm$

Answer: B

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132. Given that $E^{\ominus}_{O_2/H_2O} = +1.23V$,

$E_{S_2O_8^{2-}/SO_4^{-2}} = 2.05V$

$E_{Br_2^{\ominus}/Br} \equiv +1.09V$,

$E_{Au}{}^{\ominus}{}_{\wedge\,(3+)}/Au = +1.4V$

The strongest oxidizing agent is :

A. Au^{3+}

B. O_2

C. $S_2O_8^{2-}$

D. Br_2
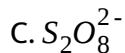
Answer: C

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133. The $IUPAC$ name of the following compound is:

$$\underset{H_3C \,-\, \underset{\displaystyle |}{\underset{\displaystyle CH_3}{C}} H \,-\, \underset{\displaystyle |}{\underset{\displaystyle OH}{C}} H \,-\, CH_2 \,-\, COOH}{}$$
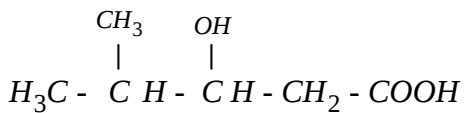
A. 4, 4 - Dimethyl-3 - hydroxy butanoic acid

B. 2 - Methyl-3 - hydroxypentan -5 - oic acid

C. 3 - Hydroxy-4 - methylpentanoic acid

D. 4 - Methy1 - 3 - hydroxypentanoic acid

Answer: B

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134. Element $'B'$ forms p structure and $'A'$ occupies half of the octahedral voids, while oxygen atoms occupy all the tetrahedral voids. The structure of bimetallic oxide is:

A. A_2BO_4

B. AB_2O_4

C. A_2B_2O

D. A_4B_2O
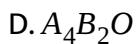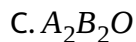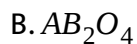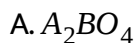
Answer: C

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135. For the reaction $2A + B \rightarrow C$, the values of initial rate at different reactant concentrations are given in the table below. The rate law for the reaction is :

$[A]\left(molL^{-1}\right)$	$[B]\left(molL^{-1}\right)$	Initial Rate $mol^{-1}s^{-1}$
0.05	0.05	0.045
0.10	0.05	0.090
0.20	0.10	0.72

A. Rate $= K[A][B]^2$

B. Rate$=k[A]^2[B]^2$

C. Rate $= K[A][B]$

D. Rate $= k[A]^2[B]$

Answer: B

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136. The lanthanide ion that would show colour is :

A. Gd^{3+}

B. Sm^{3+}

C. La^{3+}

D. Lu^{3+}

Answer: B

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137. Maltose on treatment with dilute HCl gives:

A. D - Glucose and D - Fructose

B. D - Fructose

C. D - Galactose

D. D - Glucose

Answer: C

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138. The vapour pressures of pure liquids A and B are 400 and $600mmHg$, respectively at $298K$. On mixing the two liquids, the sum of their initial volumes is equal to the volume of the final mixture. The mole fraction of liquid B is 0.5 in the mixture. The vapour pressure of the final solution, the mole fractions of components A and B in vapour phase, respectively are:

A. $450mmHg$. 0.4, 0.6

B. $500mmHg$, 0.5, 0.5

C. $450mmHg$, 0.5, 0.5

D. $500mmHg$, 0.4, 0.6

Answer: C

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139. Which of the following amine will be prepared by Gabriel phthalimide reaction?

A. n-butylamine

B. triethylamine

C. t-butylamine

D. neo-pentylamine

Answer: C

140. The quantum number of four electrons are given below:

$n = 4, l = 2, m_l = -2, m_s = -1/2$

$n = 3, l = 2, m_l, m_s = +1/2$

$n = 4, l = 1, m_l = 0, m_s = +1/2$

$n = 3, l = 1, m_l = 1, m_s = -1/2$

The correct order of their increasing energies will be:

A. $IV < II < II < I$

B. $I < II < III < IV$

C. *IV < II < III < I*

D. *I < III < II < IV*

Answer: C

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141. Coupling of benzene diazonium chloride with 1 - naphthol in alkaline medium will give:

A.

B.

C.

D.
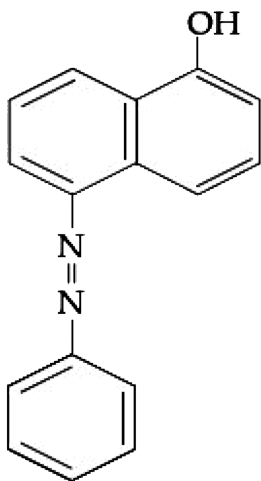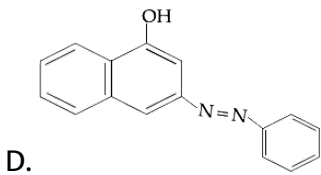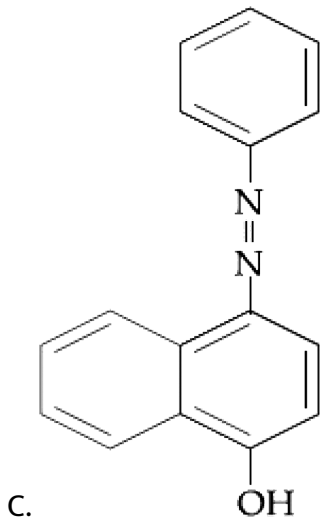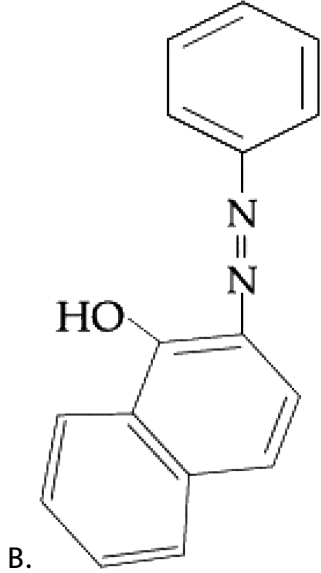
Answer: C

142. Assertion : Ozone is destroyed by $CFCs$ in the upper stratosphere.

Reason : Ozone holes increase the amount of UV radiation reaching the earth.

A. Assertion and reason are incorrect Assertion and reason are both correct.

B.

Assertion and reason are correct, but and the reason is the correct explanation for the assertion.

C. the rason is not the explanation for the assertions.

D. Assertion is false, but the reason is correct.

Answer: C

143. The correct order of hydration enthalpies of alkali metal ions is:

A. $Li^+ > Na^+ > K^+ > Cs^+ > Rb^+$

B. $Na^+ > Li^+ > K^+ > Rb^+ > Cs^+$

C. $Na^+ > Li^+ > K^+ > Cs^+ > Rb^+$

D. $Li^+ > Na^+ > Rb^+ > Cs^+ > K^+$
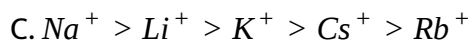
Answer: C

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144. The compound that inhibits the growth of tumors is :

A. trans - $\left[Pt(Cl)_2 (NH_3)_2 \right]$

B. $Cis \left[Pd(Cl)_2 (NH_3)_2 \right]$

C. $cis \left[Pt(Cl)_2 (NH_3)_2 \right]$

D. Trans - $\left[Pd(Cl)_2 (NH_3)_2 \right]$

Answer: A

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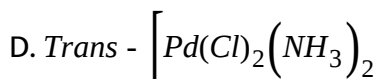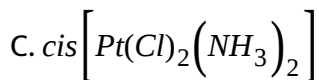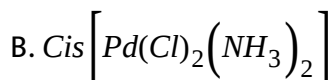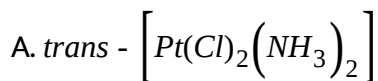
145. The percentage composition of carbon by mole in methane is:

    A. 75 %

    B. 80 %

    C. 25 %

    D. 20 %

Answer: C

---

146. For the solution of the gases w, x, y and z in water at $298K$ the Henry's law constant $\left(K_H\right)$ are 0.5, 2, 35 and $40k$,respectively. The correct plot for the given data is :

A.

B.

C.

D.
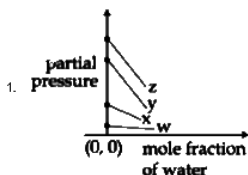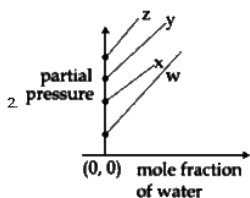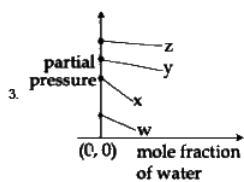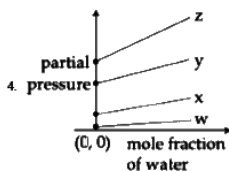
Answer: D

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147. 0.27 g of a long chain fatty acid was dissolved in $100 cm^3$ of hexane.

$10 ml$ of this solution was added dropwise to the surface of water in a

round watch glass . Hexane evaporates and a monolayeer is formed. The distance from edge to center of the watch glass is $10cm$. What is the height of the monolayers?

$$\left[\text{Density of fatty acid} = 0.9gcm^{-3}, \pi = 3 \right]$$

A. $10^{-6}m$

B. 10^{-8}

C. $10^{-2}m$

D. $10^{-4}m$

Answer: A

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148. Among the following molecules/ions $C_2^{2-}, N_2^{2-}, O_2^{2-}, O_2$

Which of one diamagnetic and has the shortest bond length?

A. O_2

B. N_2^{2-}

C. O_2^{2-}

D. C_2^{2-}

Answer: C

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149. The major product obtained in the following reaction is:

A.

2.

B.

C.

D.
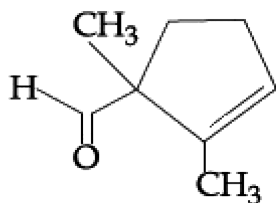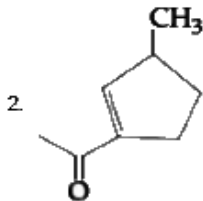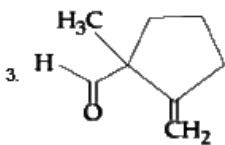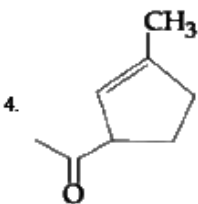
Answer: A

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150. For a reaction scheme $A \xrightarrow{k_1} B \xrightarrow{k_2} D$, If the rate of formation if B is set to be Zero then the concentration of B is given by :

A. $\left(K_1 - K_2\right)[A]$

B. $K_1 K_2[A]$

C. $\left(K_1 + K_2\right)[A]$

D. $\left(\dfrac{K_1}{K_2}\right)[A]$

Answer: C

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151. The correct statement about ICl_5 and ICl_4^- is

A. both are isostructural.

B. ICl_5 is trigonal bipyramidal and ICl_4^- is tetrahedral.

C. ICl_5 is square pyramidal and ICl_4^- is tetrahedral.

D. ICl_5 is square pyramidal and ICl_4^- is square planar.

Answer: B

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152. 5 moles of an ideal gas at 100 K are allowed to undergo reversible compression till its temperature becomes 200 K. If $C_V = 28 JK^{-1}mol^{-1}$, calculate ΔU and ΔpV.

A. $\Delta U = 14Kj, \Delta(pV) = 18kJ$

B. $\Delta U = 14J, \Delta(pV) = 0.8j$

C. $\Delta U = 14kJ, \Delta(p.V) = 4Kj$

D. $\Delta U = 2.8kJ, \Delta(pV) = 0.8kJ$

Answer: B

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153. The structure of Nylon -6 is :

A. $\left[(CH_2)_4 - \overset{\overset{O}{\|}}{C} - \overset{\overset{H}{|}}{N} \right]_n$

B. $\left[\overset{\overset{O}{\|}}{C} - (CH_2)_6 - \overset{\overset{H}{|}}{N} \right]_n$

C. $\left[\overset{\overset{O}{\|}}{C} - (CH_2)_5 - \overset{\overset{H}{|}}{N} \right]_n$

D. $\left[(CH_2)_6 - \overset{\overset{O}{\|}}{C} - \overset{\overset{H}{|}}{N} \right]_n$
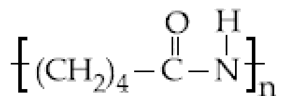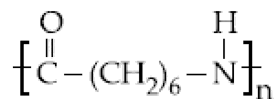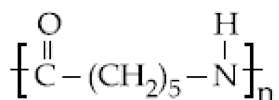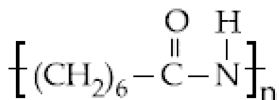
Answer: A

154. Glucose and fructose can be distinguished by

    A. Benedict's test

    B. Fehling test

    C. Barfoed's test

    D. Seliwanoff's test

Answer: C

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155. The Mond process is used for the:

    A. Purification of Ni

    B. extraction of Mo

    C. Purification of Zr and Ti

    D. extraction of Zn

Answer: C

---

156. The covalent alkaline earth metal halide ($X = Cl, Br, I$) is:

A. MgX_2

B. CaX_2

C. BeX_2

D. SrX_2

Answer: A

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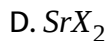
157. The ion that has sp^3d^2 hybridization for the central atom, is:

A. $\left[ICl_4\right]^-$

B. $\left[ICl_2\right]^{-}$

C. $\left[IF_6\right]^{-}$

D. $\left[BrF_2\right]^{-}$
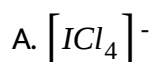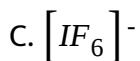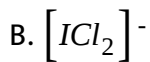
Answer: C

158. If p is the momentum of the fastest electron ejected from a metal surface after the irradiation of light having wavelength i, then for 1.5 p momentum of the photoelectron, the wavelength of the light should be (assume kinetic energy of ejected photoelectron to be very high in comparison to work function):

A. $\dfrac{3}{4}\lambda$

B. $\dfrac{1}{2}\lambda$

C. $\dfrac{2}{3}\lambda$

D. $\dfrac{4}{9}\lambda$

Answer: A

---

159. What is the value of spin only magnetic moment of anionic and cationic part of complex $\left[Fe\left(H_2O\right)_6\right]_2$ $\left[Fe(CN)_6\right]$

A. 0 and 4.9

B. 2.84 and 5.92

C. 4.9 and 0

D. 0 and 5.92

Answer: D

160. The maximum prescribed concentration of copper in drinking water is:

A. 5ppm

B. 0.05ppm

C. 0.5ppm

D. 3oom

Answer: C

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161. The element having greatest difference between its first and second ionization energies, is:

A. Ca

B. Sc

C. Ba

D. K

Answer: D

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162. The increasing order of reactivity of the following compounds towards aromatic electrophilic substitution reaction is :
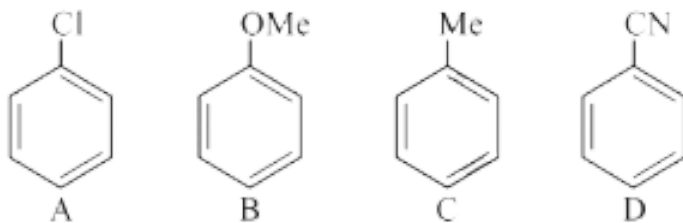
A. $D < A < C < B$

B. $B < C < A < D$

C. $A < B < C < D$

D. $D < B < A < C$

Answer: A

163. Consider the van der Waals' constants, a and b, for the following gases:

gas	Ar	Ne	Kr	Xe
$a/\left(atm\ dm^6 mol^{-2}\right)$	1.3	0.2	5.1	4.1
$b/\left(10^{-2} dm^3 mol^{-1}\right)$	3.2	1.7	1.0	5.0

Which gas is expected to have the highest critical temperature?

A. Kr

B. Ne

C. Xe

D. Ar

Answer: C

164. The given plots represent the variation of the concentration of a reactant R with time for different reactions (i) and (ii). The respective orders of the reactions are:
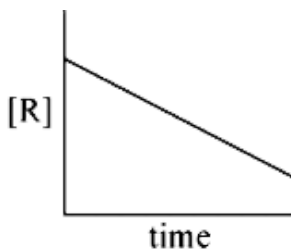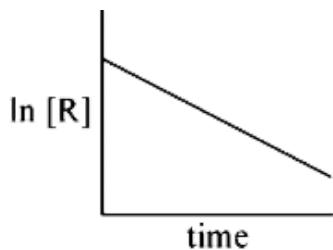
A. 1, 0

B. 1, 1

C. 0, 1

D. 0, 2

Answer: A

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165. Among the following, the set of parameters that represents path

functions is

(A) q + w (B) q (C) w (D) H - TS

A. (B) and (C)

B. (B), (C) and (D)

C. (A) and (D)

D. (A), (B) and (C)

Answer: A

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166. The ore that contains the metal in the form of fuoride is :

A. cryolite

B. malachite

C. magnetite

D. sphalerite

Answer: A

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167. Excessive release of CO_2 into the atmosphere results in :

A. global warming

B. polar vortex

C. formation of smog

D. depletion of ozone

Answer: A

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168. Aniline dissolved in dilute HCL is reacted with sodium nitrate at $0\,^\circ C$. This solution was added dropwise to a solution containing equimolar mixture of aniline and phenol in dil. HCl. The structure of the major product is :

A. $\langle\text{ring}\rangle-N=N-\langle\text{ring}\rangle-OH$

B. $\langle\text{ring}\rangle-N=N-NH-\langle\text{ring}\rangle$

C. $\langle\text{ring}\rangle-N=N-\langle\text{ring}\rangle-NH_2$

D. $\langle\text{ring}\rangle-N=N-O-\langle\text{ring}\rangle$
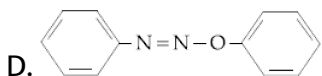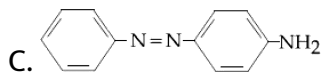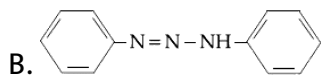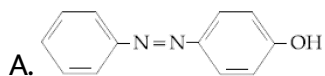
Answer: A

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169. Among the following, the molecule expected to be stabilized by anion formation is :

C_2, O_2, NO, F_2

A. C_2

B. F_2

C. NO

D. O_2
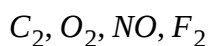
Answer: A

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170. The correct order of the oxidation states of nitrogen in NO, N_2O, NO_2 and N_2O_3 is :

A. $NO_2 < NO < N_2O_3 < N_2O$

B. $NO_2 < N_2O_3 < NO < N_2O$

C. $N_2O < N_2O_3 < NO < NO_2$

D. $N_2O < NO < N_2O_3 < NO_2$
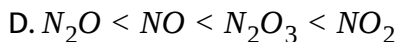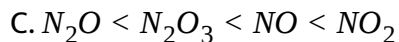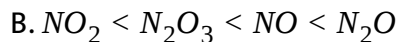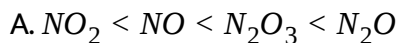
Answer: D

171. Liquid 'M' and liquid 'N' form an ideal solution. The vapour pressures of pure liquids 'M' and 'N' are 450 and 700 mmHg, respectively, at the same temperature. Then correct statement is : $\left(x_M\right.$ = Mole fraction of 'M' in solution, x_N = Mole fraction of 'N' in solution , y_M = Mole fraction of 'M' in vapour phase , y_N = Mole fraction of 'N' in vapour phase)

A. $\dfrac{x_M}{x_N} = \dfrac{y_M}{y_N}$

B. $\left(x_M - y_M\right) < \left(x_N - y_N\right)$

C. $\dfrac{x_M}{x_N} < \dfrac{y_M}{y_N}$

D. $\dfrac{x_M}{x_N} > \dfrac{y_M}{y_N}$

Answer: D

172. The osmotic pressure of a dilute solution of a compound XY in water is four times that of a solution of 0.01 M $BaCl_2$ in water. Assuming complete dissociation of the given ionic compounds in water, the concentration of XY (in $molL^{-1}$) in solution is:

A. 4×10^{-2}

B. 6×10^{-2}

C. 4×10^{-4}

D. 16×10^{-4}

Answer: B

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173. The number of water molecule(s) not coordinated to copper ion directly in $CuSO_4.5H_2O$, is :

A. 2

B. 3

C. 1

D. 4

Answer: B

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174. The major product of the following reaction is :

$$CH_2CH_3$$

$$\dfrac{\text{(i) alkaline } KMnO_4}{\text{(ii) } H_3O^+}$$

$$COOH$$

A.

CH₂CHO

B.

CH₂COOH

C.

COCH₃

D.
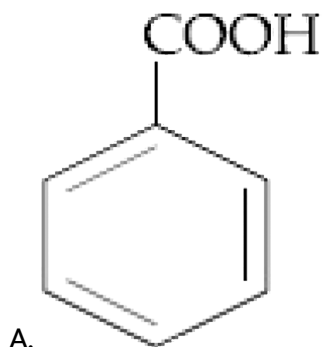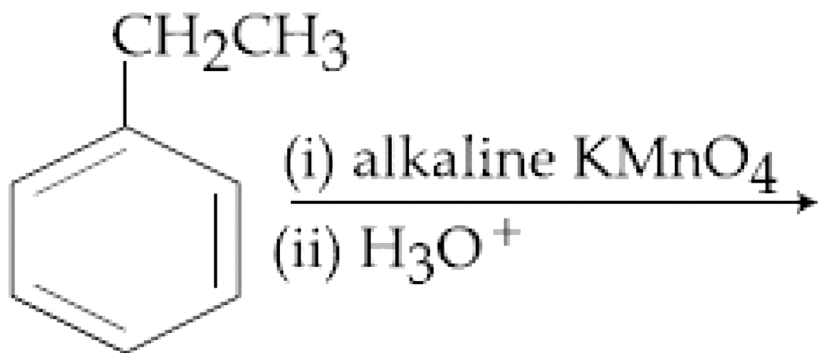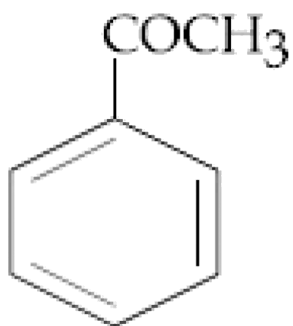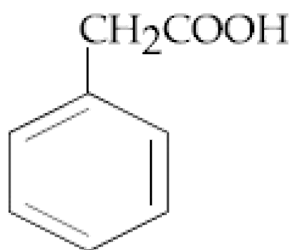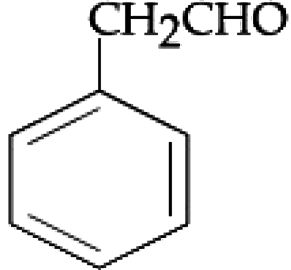
Answer: A

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175. The organic compound that gives following qualitative analysis is :

Test Inference

(a) Dil. HCl Insoluble

(b) NaOH solution soluble

(c) Br_2/ water Decolourization

A.

B.

C.

D.
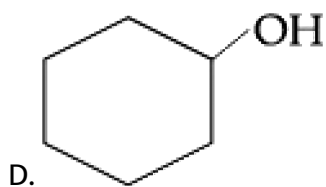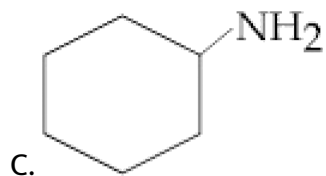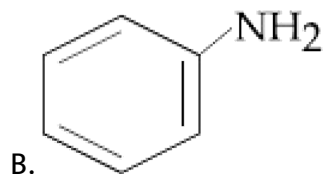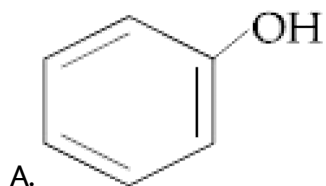
Answer: A

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176. C_{60} an allotrope of carbon contains

    A. 12 hexagons and 20 pentagons.

    B. 18 hexagons and 14 pentagons.

    C. 16 hexagons and 16 pentagons.

    D. 20 hexagons and 12 pentagons.

Answer: D

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177. The one that will show optical activity is : (en = ethane -1, 2 -diamine)

A.

B.

C.

D.
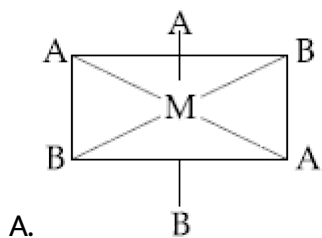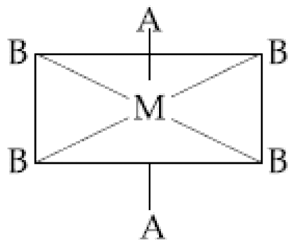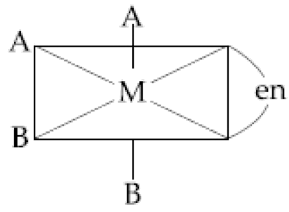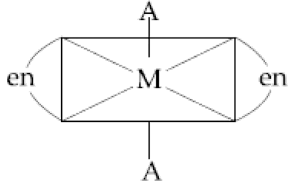
Answer: C

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178. The correct IUPAC name of the following compound is :
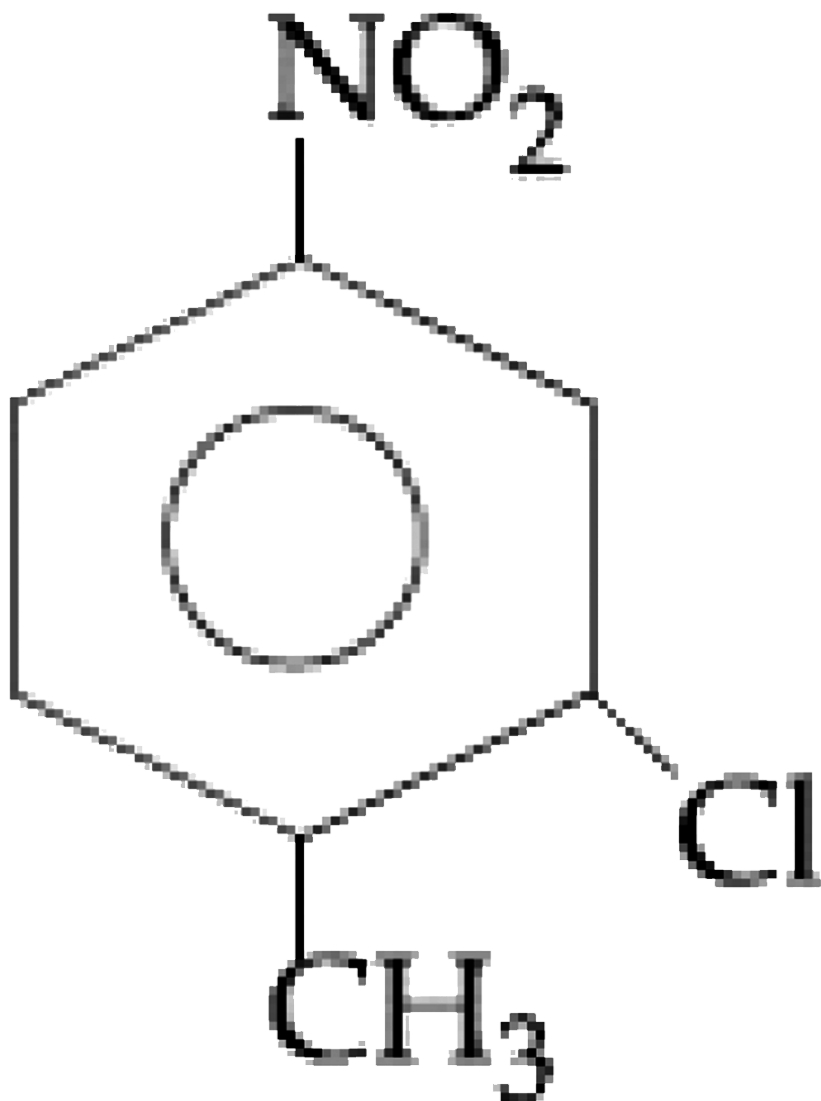
A. 5-chloro-4methyl-1-nitrobenzene

B. 2-chloro-1-methyl-4-nitrobenzene

C. 3-chloro-4methyl-1-nitrozene

D. 2-methyl-5-nitro-1-chlorobenzene

Answer: B

179. Match the cataysts (Column I) with products (Column II).

Column I		Column II
Catalyst		Product
(A) V_2O_5	(i)	Polyethylene
(B) $TiCl_4/Al(Me)_3$	(ii)	ethanal
(C) $PdCl_2$	(iii)	H_2SO_4
(D) Iron Oxide	(iv)	NH_3

A. (A)-(iii), (B)-(iv), (C)-(i), (D)-(ii)

B. (A)-(ii), (B)-(iii), (C)-(i), (D)-(iv)

C. (A)-(iv), (B)-(iii), (C)-(ii), (D)-(i)

D. $(A) - (iv)$, $(B) - (iii)$, $(C) - (ii)$, $(D) - (i)$

Answer: C

180. Which of the following statements is not true about surcose ?

   A. It is a non reducing sugar

      The glycosidic linkage is present

   B. Between C_1 so α-glucose and C_1 of β-fructose

   C. It is also named as invert sugar

   D. On hydrolysis, it produces glucose and fructose

Answer: B

181. Magnesium powder burns in air to give :

A. $Mg(NO_3)_2$ and Mg_3N_2

B. MgO and Mg_3N_2

C. MgO only

D. MgO and $Mg(NO_3)_2$
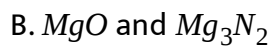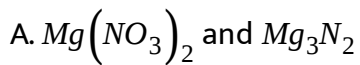
Answer: B

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182. The major product of the following reaction is :

$$-OH \xrightarrow[\text{2. KOH (alc.)}]{\text{1. PBr}_3}$$

A. O —OH
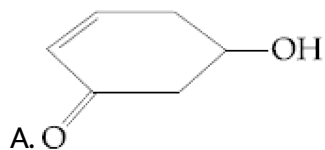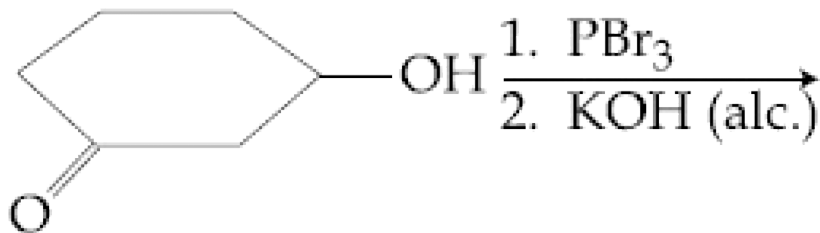
B. HO

C. O

D. O

Answer: C

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183. The major product of the following reaction is :
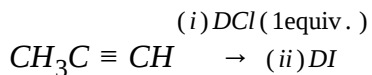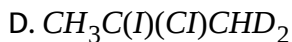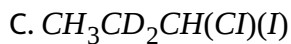
$$CH_3C \equiv CH \quad \xrightarrow{\begin{array}{l}(i)\,DCl\,(1\mathrm{equiv.})\\(ii)\,DI\end{array}}$$

A. $CH_3CD(I)CHD(CI)$

B. $CH_3CD(CI)CHD(I)$

C. $CH_3CD_2CH(CI)(I)$

D. $CH_3C(I)(CI)CHD_2$

Answer: D

184. The major product of the following reaction is :

$$CH_3CH = CHCO_2CH_3 \xrightarrow{LiAlH_4}$$

A. $CH_3CH_2CH_2CO_2CH_3$

B. $CH_3CH = CHCH_2OH$

C. $CH_3CH_2CH_2CH_2OH$

D. $CH_3CH_2CH_2CHO$
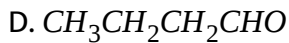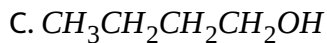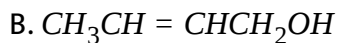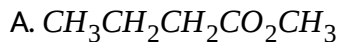
Answer: B

185. The degenerate orbitals of $\left[Cr\left(H_2O \right)_6 \right]^{3+}$ are :

A. d_{xz} and d_{yz}

B. d_{yz} and a_{z^2}

C. d_{z^2} and d_{xz}

D. $d_{x^2-y^2}$ and d_{xy}

Answer: A

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186. The aerosol is a kind of colloid in which :

A. solid is dispered in gas

B. gas is disperesed in solid

C. gas is disperesed in liquid

D. liquid is disperesed in water

Answer: C

187. For a reaction, $N_2(g) + 3H_2(g) \rightarrow 2NH_3(g)$, identify dihydrogen $\left(H_2\right)$ as a limiting reagent in the following reaction mixtures.

A. $56g$ of N_2 + $10g$ of H_2

B. $35g$ of N_2 + $8g$ of H_2

C. $28g$ of N_2 + $6g$ of H_2

D. $14g$ of N_2 + $4g$ of H_2

Answer: A

188. Increasing order of reactivity of the following compounds for S_N1 subsitution is:
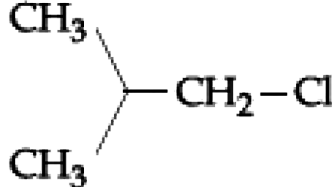
(A)

(B)
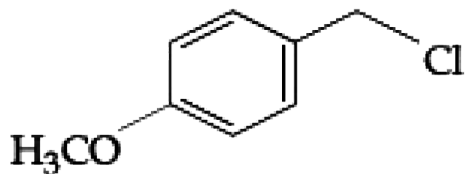
(C)
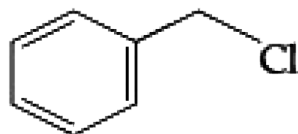
(D)

A. $(B) < (C) < (D) < (A)$

B. $(B) < (C) < (A) < (D)$

C. $(B) < (A) < (D) < (C)$

D. $(A) < (B) < (D) < (C)$

Answer: C

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189. In acid-base titration, 0.1$MHCl$ solution was added to the $NaOH$ solution of unknown strength. Which of the following correctly shown the change of pH of the titration mixture in this experiment?

pH

V (mL)

(A)

pH

V (mL)

(B)

pH

V (mL)

(C)

pH

V (mL)
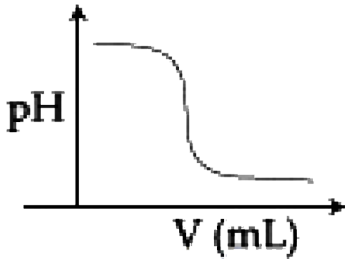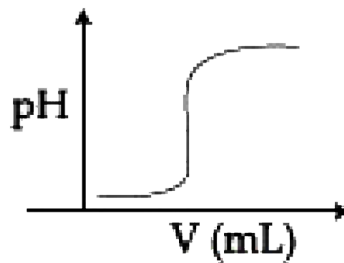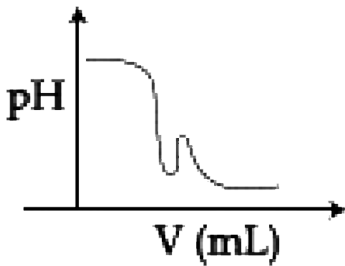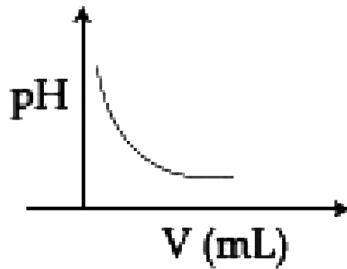
(D)

A. B

B. A

C. C

D. D

Answer: A

190. The peptide that gives positive ceric ammonimum nitrate and carbylamine tests is:

A. Ser-Lys

B. Gln-Asp

C. Lys-Asp

D. Asp-Gln

Answer: A

191. The structures of beryllium chloride in the solid state and vapur phase, respectively, are:

A. chain and chain

B. dimeric and dimeric

C. chain and dimeric

D. dimeric and chain

Answer: A

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192. Hinsberg's reagent is:

A. C_6H_5COCl

B. $SOCl_2$

C. $C_6H_5SO_2Cl$

D. $(COCl)_2$

Answer: C

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193. The maximum number of possible oxidation state of actinoides are shown by:

A. nobelium (No) and lawrencium (Lr)

B. actinium (Ac) and thorium (Th)

C. berkelium (Bk) and califormium (Cf)

D. neptunium (Np) and plautonium (Pu)

Answer: C

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194. Assertion: For the extraction of iron, haematite ore is used. Reasion: Haematite is a carbonate ore of iron.

A. Only the reasion is correct.

Both the assertion and reason are

B. correct, but the reason is not the correct explanation for the

assertion. Both the assertion and reason are

C. correct and the reason is the correct explanation for the assertion.

D. Only the assertion correct .

Answer: D

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195. HF has highest boiling point among hydrogen halides, because it has:

A. strongest van der Waals' interactions

B. lower ionic character

C. strongest hydrogen bonding

D. lowest dissociation enthalpy

Answer: C

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196. $10mL$ of $1mM$ surfactant solution forms a monolayer covering $0.24cm^2$ on a polar substrate. If the polar head is approximated as a cube, what is its edge length ?

    A. $1.0pm$

    B. $2.0pm$

    C. $0.1pm$

    D. 2.0 nm

Answer: A

197. Consider the given plot of enthalpy of the following reaction between A and B. $A + B \rightarrow C + D$. Identify the incorrect statements

Enthalpy (kJ mol^{-1})

Reaction Coordinate
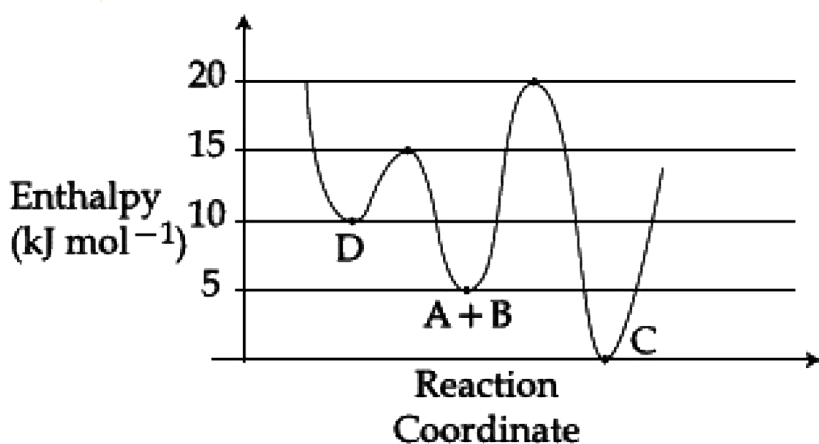
A. Activation enthalpy to from C is 5 kj mol^{-1} less than that to form D.

B. C is the thermodynamics stable product.

C. D is kinetically stable product.

D. Formation A and B from C has highest enthalpy of activation.

Answer: A

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198. Molal depression constant for a solvent is $4.0 kgmol^{-1}$. The depression in the freezing point of the solvent for $0.03 molkg^{-1}$ solution of K_2SO_4 is :

(Assume complete dissociation of the electrolyte)

A. 0.18 K

B. 0.24 K

C. 0.12 K

D. 0.36 K

Answer: A

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199. During compression of a spring the work done is 10 kJ and 2 kJ escaped to the surroundings as heat. The change in internal energy ΔU (in kj) is

A. -12

B. -8

C. 8

D. 12

Answer: A

200. The correct statements among I to III regarding group 13 element oxides are,

(I) Boron trioxide is acidic.

(II) Oxides of aluminium and gallium are amphoteric.

(III) Oxides of indium and thallium are basic.

    A. (I) and (II) only

    B. (I),(II) and (III) only

    C. (I) and (III) only

    D. (II) and (III) only

Answer: D

201. Which one of the following about an electron occupying the 1s orbital in a hydrogen atom is incorrect ? (The Bohr radius is represented by a_0).

    A. The probability density of finding the electron is maximum at the nucleus.

    B. The electron can be found at a distance $2a_0$ from the nucleus.

    C. The magnitude of the potential energy is double that of that's of the its kinetic energy on an average.

    D. The total energy of the electron is maximum when it is at a distance a_0 from the nucleaus.

Answer: A

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202. The amorphous form of silica is

A. tridymite

B. kieselguhr

C. cristobalite

D. quartz

Answer: D

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203. What would be the molality of 20% (mass/mass) aqueous solution of KI?

(molar mass of $KI = 166 gmol^{-1}$)

A. 1.08

B. 1.35

C. 1.48

D. 1.51

Answer: A

---

204. The atmosphere between the heights 10 to 50 kilometer above the Sea level is:

A. troposphere

B. thermosphere

C. stratosphere

D. mesosphere

Answer: A

---

205. Noradernaline is a/an

A. Antacid

B. Neurotransmitter

C. Antidepressant

D. Antihistamine

Answer: C

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206. Among the following species, the diamagnetic molecule is :

A. NO

B. CO

C. B_2

D. O_2

Answer: D

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207. The correct statements amont I to III are :

(I) Valence bond theory cannot explain the color exhibited by transition metal complexes.

(II) Valance bond theory can predict quantitatively the magnetic properties of transition metal complexes.

(III) Valence bond theory cannot distinguish ligands as weak and strong field ones.

   A. (II) and (III) only

   B. (I),(II) and (III)

   C. (I) and (III) only

   D. (I) and (II) only

Answer: A

208. A solution of $Ni(NO_3)_2$ is electrolysed between platinum electrodes using a current of 5 amperes for 20 minutes what mass of Ni is deposited at the cathode?

    A. 0.05

    B. 0.2

    C. 0.15

    D. 0.1

Answer: A

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209. p-Hydroxybenzophenone upon reaction with bromine in carbon tetrachloride gives :

A. HO

B. HO

C. HO

D. HO
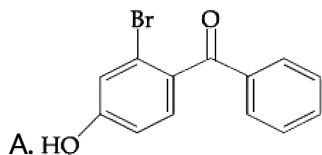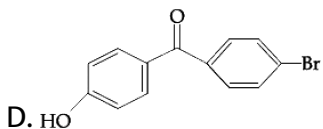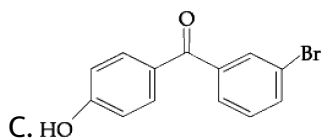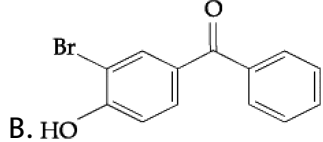
Answer: D

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210. Which of the following compounds is a constituent of the polymer

$$\left[HN - \overset{\overset{\displaystyle O}{\|}}{C} - NH - CH_2 \right]_n ?$$
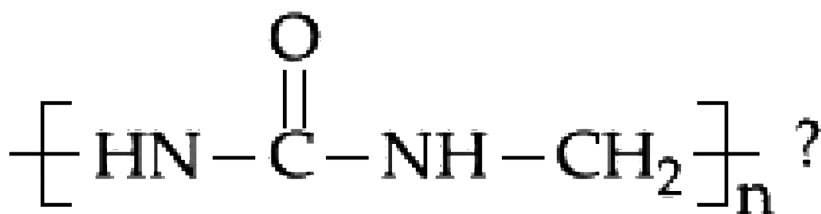
A. N-Methyl urea

B. Formaldehyde

C. Methylamine

D. Ammonia

Answer: A

211. The oxoacid of Sulphur that does not contain bond between Sulphur

atoms is:
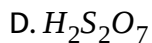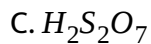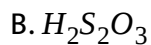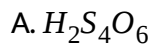
A. $H_2S_4O_6$

B. $H_2S_2O_3$

C. $H_2S_2O_7$

D. $H_2S_2O_7$

Answer: C

212. Major products of the following reaction are :

$$\text{Ph-CHO} + \text{HCHO} \xrightarrow[\text{(ii) } H_3O^+]{\text{(i) 50\% NaOH}}$$

(benzaldehyde with CHO group) + HCHO

A. (benzyl alcohol, CH_2OH) and (benzoic acid, $COOH$)

B. CH_3OH and (benzoic acid, $COOH$)

C. $HCOOH$ and (benzyl alcohol, CH_2OH)

D. CH_3OH and HCO_2H
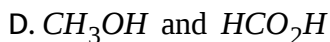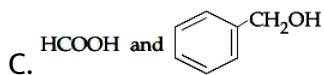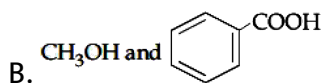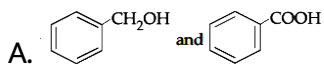
Answer: A

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213. Match the refining methods (Column I) and with metals (Column II).

Column I	Column II
(Refining methods)	(Metals)
(*I*)Liquation	(*a*)*Zr*
(*II*)Zone Refining	(*b*)*Ni*
(*III*)Mond Process	(*c*)*Sn*
(*IV*)Van Arkel Method	(*d*)*Ga*

A. (I)-(c), (II)-(a), (III)-(b), (IV)-(d)

B. (I)-(b), (II)-(c), (III)-(d), (IV)-(a)

C. (I)-(c), (II)-(d), (III)-(b), (IV)-(a)

D. (I)-(b), (II)-(d), (III)-(a), (IV)-(c)

Answer: C

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214. A gas undergoes physical adsorption on a surface and follows the given Freundlich adsorption isotherm equation

$$\frac{x}{m} = kp^0t$$

Adsorption of the gas increases with:

    A. Decrese in p and increase in T

    B. Decrese in p and decrease in T

    C. Increase in p and decrease in T

    D. Increase in p and increase in T

Answer: C

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215. The major product of the following reaction is :

$$\underset{\displaystyle \overset{\displaystyle |}{\displaystyle CH_3\,C\,HCH_2CH_2NH_2}}{\overset{\displaystyle OH}{}} \quad \overset{\text{ethyl formate(1 equiv.)}}{\underset{\text{triethylamine}}{\longrightarrow}}$$

A. $\underset{\displaystyle \overset{\displaystyle |}{\displaystyle CH_3\,C\,H\text{ - }CH = CH_2}}{\overset{\displaystyle OH}{}}$

B. $\underset{\displaystyle \overset{\displaystyle |}{\displaystyle CH_3\,C\,HCH_2CH_2NHCHO}}{\overset{\displaystyle OH}{}}$

C.

$CH_3CHCH_2CH_2NH_2$

D. $CH_3CH = CH - CH_2NH_2$
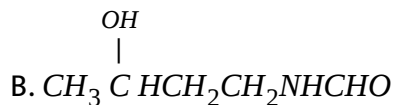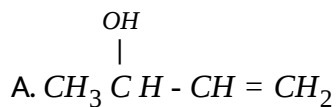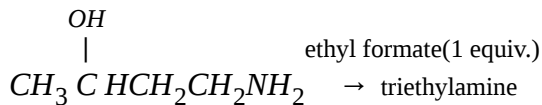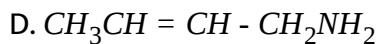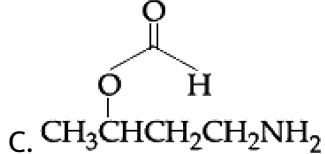
Answer: A

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216. The synonym for water gas when used in the production of methanol is :

A. natural gas

B. fuel gas

C. laughing gas

D. syn gas

Answer: D

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217. In the give complexes

(i). $\left[Co\left(NH_3\right)_5\left(H_2O\right)\right]^{3+}$

(ii). $\left[Co\left(NH_3\right)_5 Cl\right]^{2+}$

(iii). $\left[Co\left(NH_3\right)_6\right]^{3+}$
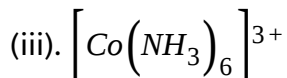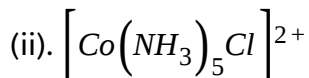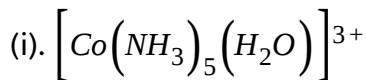
The decreasing order of λ absorbed is

A. $(III) > (I) > (II)$

B. $(III) > (II) > (I)$

C. $(II) > (I) > (III)$

D. $(I) > (II) > (III)$

Answer: A

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218. Which of the following is the correct order regarding catenation property.

A. $C > Sn > Si \approx Ge$

B. $C > Si > Ge \approx Sn$

C. $Si > Sn > C > Ge$

D. $Ge > Sn > Si > C$
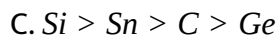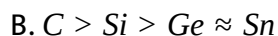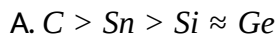
Answer: B

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219. 0.6 g urea is added to 360 g water. Calculate lowering in vapor pressure for this solution (given: vapour pressure of H_2O is 35 mm of Hg)

A. $0.027 mmHg$

B. $0.028 mmHg$

C. $0.017 mmHg$
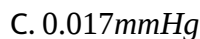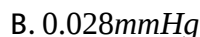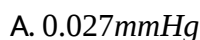
D. $0.031 mmHg$

Answer: A

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220. The principle of column chromatography is :

   A. Gravitational force

   B. Capillary action

   C. Differential absorption of the substances on the solid phase.

   D. Differential adsorption of the substances on the solid phase.

Answer: C

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221. The isoelectronic set of ions is:

A. N^{3-}, O^{2-}, F^- and Na^+

B. N^{3-}, Li^+, Mg^{2+} and O^{2-}

C. F^-, Li^+, Na^+ and Mg^{2+}

D. Li^+, Na^+, O^{2-} and F^-

Answer: A

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222. 10 ml of hydrocarbon requries 55 ml of oxygen for complete combustion producing 40 ml of CO_2. The formula of the hydrocarbon is:

A. C_4H_{10}

B. C_4H_6

C. C_4H_7Cl

D. C_4H_8

Answer: A

223. The increasing order of the reactivity of the following compounds towards electrophilic aromatic substitution reactions is :
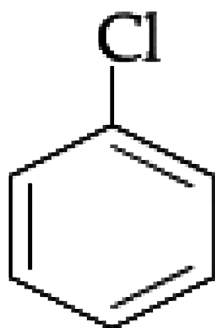
(I)   (II)   (III)
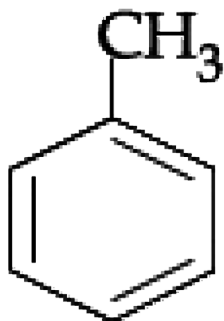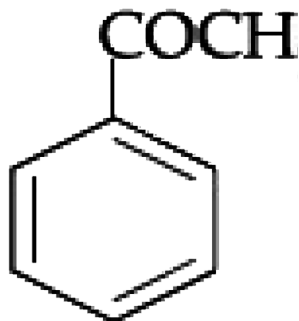
A. $III < I < II$

B. $III < II < I$

C. $II < I < III$

D. $I < III < II$

Answer: A

224. During the change of O_2 to O_2^-, the incoming electron goes to the orbital,

A. $\pi 2p_y$

B. $\sigma \cdot 2p_z$

C. $\pi^{\cdot} 2p_x$

D. $\pi 2p_x$
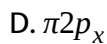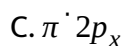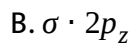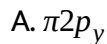
Answer: B

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225. The number of chiral carbon atom present in open chain and cyclic form of glucose -

A. 5 & 4

B. 4&4

C. 5&5

D. 4&5

Answer: D

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226. Which of the following is not a correct method of the preparation of benzylamine from cyanobenzene?

A. H_2/Ni

B. (i). $LiAlH_4$ ltbr. (ii). H_3O^+

C. (i). $SnCl_2 + HCl(gas)$

(ii). $NaBH_4$

D. (i). HCl/H_2O

(ii). $NaBH_4$

Answer: D

227. Maximum oxidation state of uranium and plutonium are respectively

:

A. 6 and 7

B. 6 and 4

C. 7 and 6

D. 4 and 6

Answer: B

228. A hydrated solid X on heating initally gives a monohydrated compound Y. Y upon heating above 373 K leads to an anhydrous white powder Z, X and Z respectively, are:

A. Washing soda and Soda ash

B. Baking soda and dead burnt plaster.

C. Washing soda and dead burnt plaster

D. baking soda and soda ash.

Answer: C

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229. The correct order of the first ionization

A. $Ti < Mn < Zn < Ni$

B. $Ti < Mn < Ni < Zn$

C. $Mn < Ti < Zn < Ni$

D. $Zn < Ni < Mn < Ti$

Answer: A

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230. The correct statements among (a) to (d) are :

(a) Saline hydrides produce H_2 gas when reacted with H_2O

(b) Reaction of $LiAlH_4$ with BF_3 leads to B_2H_6

(c) PH_3 and CH_4 are electron – rich and electron – precise hydrides, respectively

(d) HF and CH_4 are called as molecular hydrides

    A. a,b,c and d

    B. c and d

    C. a,c and d only

    D. a,b and c only

Answer: C

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231. The ratio of the shortest wavelength of two spectral series of hydrogen spectrum is found to be about 9. The spectral series are:

A. Lymann and Paschen

B. Balmer and Brackett

C. Brackett and Pfund

D. Paschen and Pfund

Answer: A

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232. The correct statement is

A. aniline is a froth stabilizer

B. zincite is a carbonate ore

C. sodium cyanide cannot be used in the metallurgy of silver.

D. zone refining process is used for the refining of titanium.

Answer: C

233. The increasing order of nucleophilicity of the following nucleophiles is :

(a). $CH_3CO_2^{\ominus}$

(b). H_2O

(c). $CH_3SO_3^{\ominus}$

(d). $OH^{\ominus}$

    A. $a < d < c < b$

    B. $b < c < d < a$

    C. $d < a < c < b$

    D. $b < c < a < d$
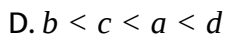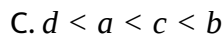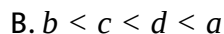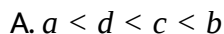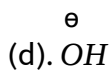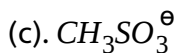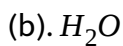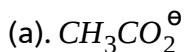
Answer: D

234. The correct option among the following is:

A. Colloidal medicines are more effective because they have small surface area.

B. Addition of alum to water makes it unfit for drinking,

C. colloidal particles in lyophobic sols can be precipitated by electrophoresis.

D. Brownian motion in colloidal solution is fater if the viscosity of the solution is very high.

Answer: C

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235. Which of the following is not responsible for stability of acyclic hydrocarbon.

A. Steric interactions

B. Torsional strain

C. Electrostatic forces of interaction

D. angle strain

Answer: A

236. In chromatography, which of the following statements is INCORRECT for R_f?

A. R_f velue depends on the type of chromatography.

B. The value of R_f can not be more than one.

C. Higher R_f value means higher adsorption.

D. R_f value is dependent on the mobile phase.

Answer: A

237. Find $CFSE$ of $\left[Fe\left(H_2O\right)_6\right]^{2+}$ and $\left[NiCl_4\right]^{2-}$

A. $-0.6 \triangle_o$ and $-0.8 \triangle_t$

B. $-0.4 \triangle_0$ and $-0.8 \triangle_t$

C. $-2.4 \triangle_0$ and $-1.2 \triangle_t$

D. $-0.4 \triangle_o$ and $-1.2 \triangle_t$

Answer: B

238. What is the value of $\Delta H - \Delta U$ for the combustion of Heptane (l) ?

A. $-4RT$

B. $-3RT$

C. $4RT$

D. $3RT$

Answer: D

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239. Which one of the following graphs between molar conductivity Condutivity Λ_m Versus $\sqrt{C}$ si correct?

A.

B.

C.

D.
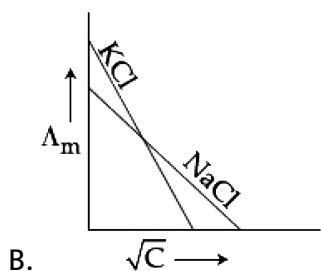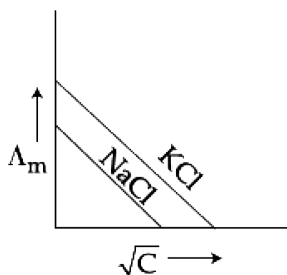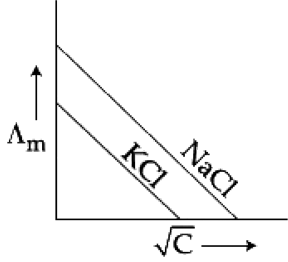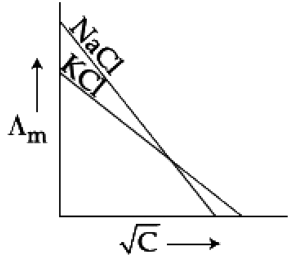
Answer: A

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240. Points I, II and III in the following plot respectively correspond to (

V_{mp} : most probable velocity)

Distribution function, f(v)

Speed, v →

I II III
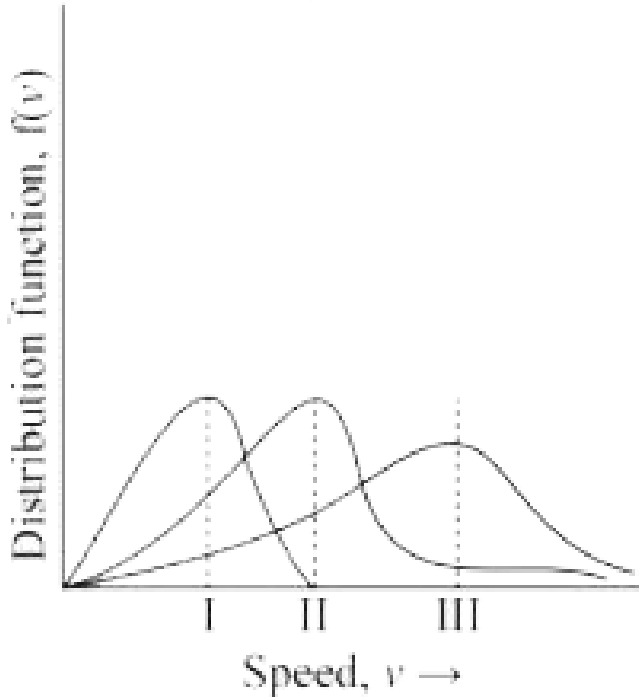
A. V_{mp} of N_2(300K), V_{mp} of O_2(400K), V_{mp} of H_2(300K)

B. V_{mp} of O_2(400K), V_{mp} of N_2(300K), V_{mp} of H_2(300K)

C. V_{mp} of H_2(300K), V_{mp} of N_2(300K), V_{mp} of O_2(400K)

D. 2

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241. The minimum amount of O_2 (g) consumed per gram of reactant is for the reaction:

(Given atomic mass: Fe = 56, O = 16, Mg = 24, P = 31, C = 12, H = 1)

A. $4Fe(s) + 3O_2(g) \rightarrow 2Fe_2O_3(s)$

B. $P_4(s) + 5O_2(g) \rightarrow P_4O_{10}(s)$

C. $C_3H_8(g) + 5O_2(g) \rightarrow 3CO_2(g) + 4H_2O(l)$

D. $2Mgj(sJ) + O_2(g) \rightarrow 2MgO_s$
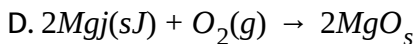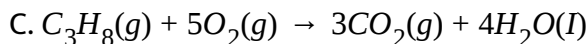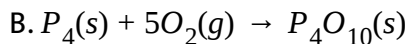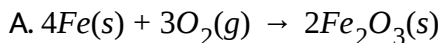
Answer: A

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242. For the reaction, $2SO_2(g) + O_2(g) \rightarrow 2SO_3(g)$

$\Delta H = -57.2 KJmol^{-1} and K_c = 1.7 \times 10^{16}$

.Which of the following statement is INCORRECT?

A. The equilibrium constant is large suggestive of reaction going to completion and so no catalyst is required.

B. The equilibrium will shift in forward direction as the pressure increases.

C. The equilibrium constant decreases as the temperatue increases

D. The addition of inert gas at constant volume will not affect the equilibrium constant.

Answer: C

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243. 1g of a non-volatile non-electrolyte solute is dissolved in 100g of two different solvents A and B whose ebullioscopic constants are in the ratio of 1 : 5. The ratio of the elevation in their boiling points, $\dfrac{\Delta T_b(A)}{\Delta T_b(B)}$ is

A. 5 : 1

B. 10 : 1

C. 1 : 5

D. 1:02

Answer: A

---

244. Compound $\left(C_9H_{10}O\right)$ shows positive iodoform test. Oxidation of A with $KMnO_4/KOH$ gives acid $B\left(C_8H_6O_4\right)$ anhydride of B is used for the preparation of phenolphthalein compound is

A.

B.

C.

D.
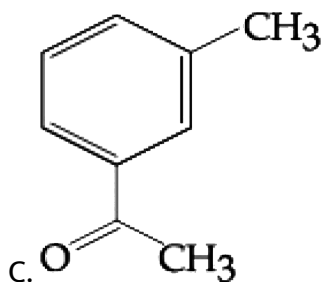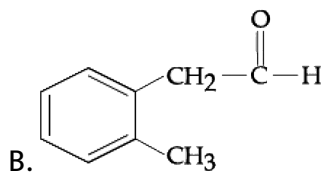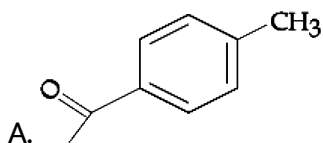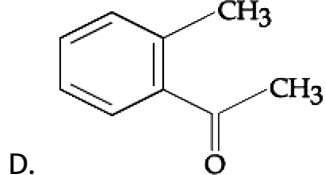
Answer: D

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245. The number of pentagons in C_{60} and trigons (triangles) in white phosphorus, respectively, are :

A. 20 and 3

B. 12 and 4

C. 12 and 3

D. 20 and 4

Answer: A

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246. Air pollution that occurs in sunlight is :

A. reducing smog

B. acid rain

C. oxidising smog

D. fog

Answer: C

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247. Which noble gas is not found in atmosphere?

A. He

B. Kr

C. Ne

D. Ra

Answer: D

248. Which of the following is an example of disproportionation reaction?

A. $2MnO_4^- + 10I^- + 16H^+ \rightarrow 2Mn^{2+} + 5I_2 + 8H_2O$

B. $2NaBr + Cl_2 \rightarrow 2NaCl + Br_2$

C. $2KMnO_4 \rightarrow K_2MnO_4 + MnO_2 + O_2$

D. $2CuBr \rightarrow CuBr_2 + Cu$
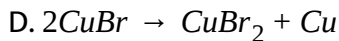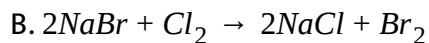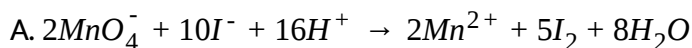
Answer: A

249. Mole fraction fo solvent in an aqueous solution is 0.8. What is the molality of this solution in mol/kg?

A. 13.88×10^{-2}

B. 13.88×10^{-1}

C. 13.88

D. 13.88×10^{-3}

Answer: A

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250. What will be the work done for expansion of a gas from 1 lit to 10 lit volume agaist constant pressure of 1 bar?

A. -9.0

B. +10.0

C. -0.9

D. -2.0

Answer: B

251. Which of the following is thermosetting polymer?

A. Bakelite

B. Buna-N

C. Nylon 6

D. PVC

Answer: A

252. Glucose and galactose differs on which carbon atom.

A. C - 3

B. C - 4

C. C - 2

D. C - 5

Answer: A

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253. The major product of the following addition reaction is

$$H_3C - CH = CH_2 \quad \xrightarrow{Cl_2/H_2O} \quad$$

A. $CH_3 - CH | Cl - CH_2 | OH$

B. $H_3C - CH | OH - CH_2 | Cl$

C.

D.
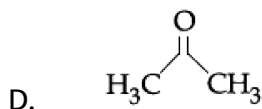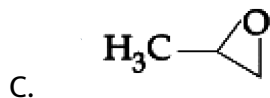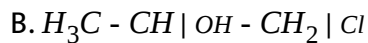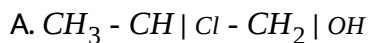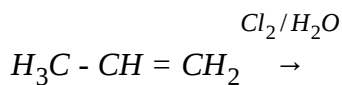
Answer: B

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254. Given :

$$Co^{3+} + e^- \rightarrow Co^{2+}, E^\circ = +1.181V$$

$$Pb^{4+} + 2e^- \rightarrow Pb^{2+}, E^\circ = +1.67V$$

$$Ce^{4+} + e^- \rightarrow Ce^{3+}, E^\circ = +1.61V$$

$$Bi^{3+} + 3e^- \rightarrow Bi, E^\circ = +0.20V$$
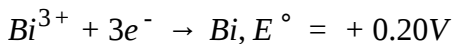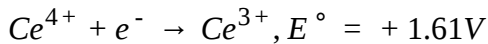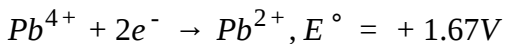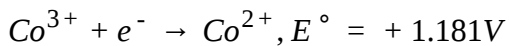
Oxidizing power of the species will increase in the order:

A. $Ce^{4+} < Pb^{4+} < Bi^{3+} < Co^{3+}$

B. $Bi^{3+} < Ce^{4+} < Pb^{4+} < Co^{3+}$

C. $Co^{3+} < Ce^{4+} < Bi^{3+} < Pb^{4+}$

D. $Co^{3+} < Pb^{4+} < Ce^{4+} < Bi^{3+}$
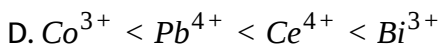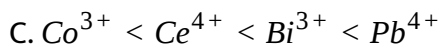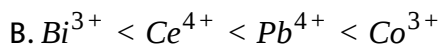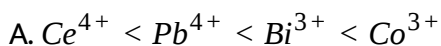
Answer: B

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255. Which of the following statements is not true about RNA?

A. it controls the synthesis of protein

B. it has always double standard α helix structure

C. it usually does not replicate

D. it is present in the nucleus of cell

Answer: B

256. An element have atomic number 15, its valence electrons group number and valency are respectively

A. 16,5 and 2

B. 15,5 and 3

C. 16,6 and 3

D. 15,6 and 2

Answer: B

257. The basic structural unit of feldspar, zeolites, mica, and asbestos is:

A. $\left(SiO_3\right)^{2-}$

B. SiO_2

C. $\left(SiO_4\right)^{4-}$

D.
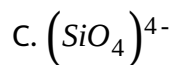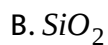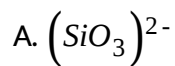
Answer: A

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258. The electrons are more likely to be found:
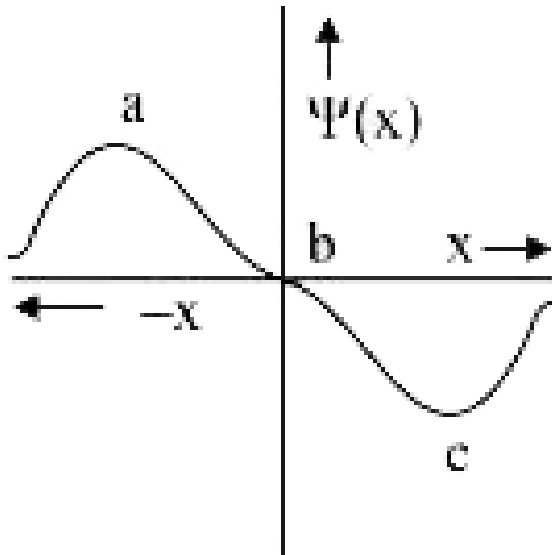
A. in the region a and c

B. in the region a and b

C. only in the region a

D. only in the region c

Answer: A

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259. The complex ion that will lose its crystal field stabilization energy upon oxidation of its metal to +3 state is:
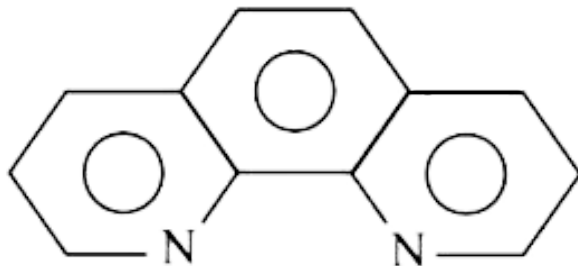
A. $\left[Co(phen)_3 \right]^{2+}$

B. $\left[Ni(phen)_3 \right]^{2+}$

C. $\left[Zn(phen)_3 \right]^{2+}$

D. $\left[Fe(phen)_3 \right]^{2+}$

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260. Which of the following is formed when 2 butene is treated with alkaline $KMnO_4$ higher temperature

A. $CH_3 - CH \mid OH - CH \mid OH - CH_3$

B. one molecule of CH_3CHO and one molecule of CH_3COOH

C. 2 molecules of CH_3COOH

D. 2 molecules of CH_3CHO
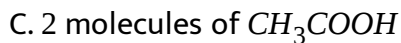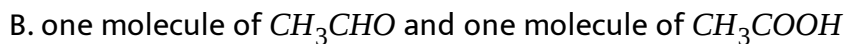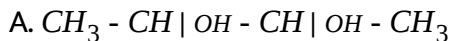
Answer: A

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261. Complete removal of both the axial ligands (along the z-axis) from an octahedral complex leads to which of the following splitting patterns? (relative orbital energies not on scale).

C.

$$\begin{array}{l} \text{———} \quad d_{x^2-y^2} \\ \text{———} \quad d_{z^2} \\ 3.\ E \\ \text{———} \quad d_{xy} \\ \text{═══} \quad d_{xz},\ d_{yz} \end{array}$$

D.

$$\begin{array}{l} \text{———} \quad d_{x^2-y^2} \\ \text{———} \quad d_{z^2} \\ 4.\ E \\ \text{═══} \quad d_{yz},\ d_{xz} \\ \text{———} \quad d_{xy} \end{array}$$
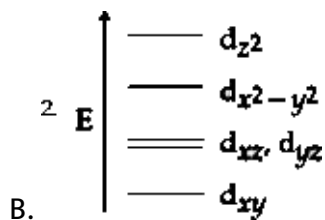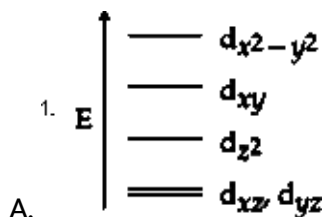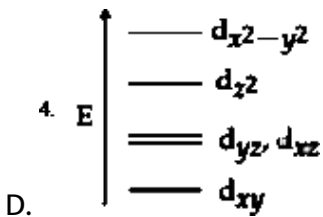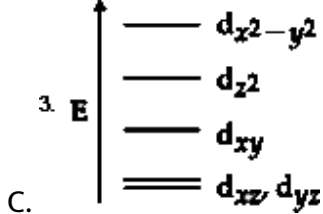
Answer: A

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262. Which is always present in photochemical smog

A. N_2, NO_2 and hydrocarbons

B. CO_2, NO_2, SO_2 and hydrocarbons

C. NO, NO_2, O_3 and hydrocarbons

D. N_2, O_2, O_3 and hydrocarbons

Answer: B

263. Peptization is:

A. process of bringing colloidal molecule into solution

B. process of converting precipitate into colloidal solution

C. process of converting a colloidal solution into precipiate

D. process of converting soluble particles to form colloidal solution

Answer: B

264. The correct statement among the following is:

A. $\left(SiH_3\right)_3N$ is planar and less basic than $\left(CH_3\right)_3N$

B. $\left(SiH_3\right)_3N$ is pyramidal and more basic than $\left(CH_3\right)_3N$

C. $\left(SiH_3\right)_3N$ is pyramidal and less basic than $\left(CH_3\right)_3N$

D. $\left(SiH_3\right)_3N$ is planar and more basic than $\left(CH_3\right)_3N$

Answer: B

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265. Enthalpy of sublimation of iodine is $24 calg^{-1}$ at $200\,^{\circ}C$. If specific heat of $I_2(s)$ and $I_2(vap)$ are 0.055 and $0.031 calg^{-1}K^{-1}$ respectively, then enthalpy of sublimation of iodine at $250\,^{\circ}C$ in cal g^{-1} is :

A. 2.85

B. 5.7

C. 22.8

D. 11.4

Answer: A

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266. 5 moles of AB_2 weight $125 \times 10^{-3} kg$ and 10 moles of A_2B_2 weight $300 \times 10^{-3} kg$. The value of ratio of molar mass of B to molar mass of A, $\dfrac{M_B}{M_A}$ is _____.

A. $M_A = 10 \times 10^{-3}$ and $M_B = 5 \times 10^{-3}$

B. $M_A = 50 \times 10^{-3}$ and $M_B = 25 \times 10^{-3}$

C. $M_A = 25 \times 10^{-3}$ and $M_B = 50 \times 10^{-3}$

D. $M_A = 5 \times 10^{-3}$ and $M_B = 10 \times 10^{-3}$

Answer: D

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267. A person X discovered froth flotation method which is a type of process Y in metallurgy. Then X and Y are respectively.

A. fisher woman and concentration

B. washer woman and concentration

C. fisher man and reduction

D. washer man and reduction

Answer: B

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268. Thermal decomposition of a Mn compound (X) at $513K$ results in compound Y, MnO_2 and a gaseous product. MnO_2 reacts with $NaCl$ and concentrated H_2SO_4 to give a pungent gas Z, X, Y and Z respectively are :

A. K_3MnO_4, K_2MnO_4 and Cl_2

B. K_2MnO_4, $KMnO_4$ and SO_2

C. $KMnO_4$, K_2MnO_4 and Cl_2

D. K_2MnO_4, $KMnO_4$ and Cl_2

Answer: B

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269. The longest C–C bond is present in

   A. graphite

   B. C_{70}

   C. C_{60}

   D. diamond

Answer: D

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270. A solution is prepared by dissolving 0.6 g of urea (molar mass = 60 g

mol^{-1}) and 1.8 g of glucose (molar mass = 180 g $gmol^{-1}$) in 100 mL of

water at 27°C. The osmotic pressure of the solution is :

$\left(R = 0.08206 LatmK^{-1}mol^{-1} \right)$

   A. 8.2 atm

B. 2.46 atm

C. 4.92 atm

D. 1.64 atm

Answer: C

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271. In comparison to B, Be has

A. lesser nuclear charge and lesser first ionisation enthalpy

B. greater nuclear charge and lesser first ionisation enthalpy

C. greater nuclear charge and greater first ionisation enthalpy

D. lesser nuclear charge and greater first ionisation enthalpy

Answer: D

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272. Solubility of $Cd(OH)_2$ in pure water is 1.84×10^{-5} mole/L Calculate its solubility in a buffer solution of $pH = 12$.

A. $1.84 \times 10^{-9}M$

B. $\dfrac{2.49}{1.84} \times 10^{-9}M$

C. $6.23 \times 10^{-11}M$

D. $2.49 \times 10^{-10}M$

Answer: A

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273. Benzene diazonium chloride on reaction with aniline in the presence of dilute hydrochloric acid gives :

A.

B.

C.

D.
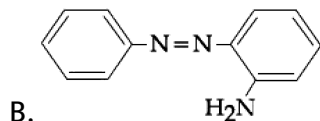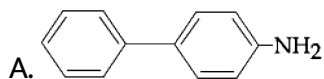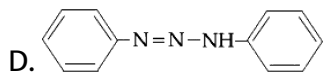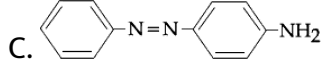
Answer: C

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274. Which is always present in photochemical smog

A. acrolein

B. nitrogen oxides

C. ozone

D. sulphur dioxide

Answer: B

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275. The IUPAC name for the following compound is :
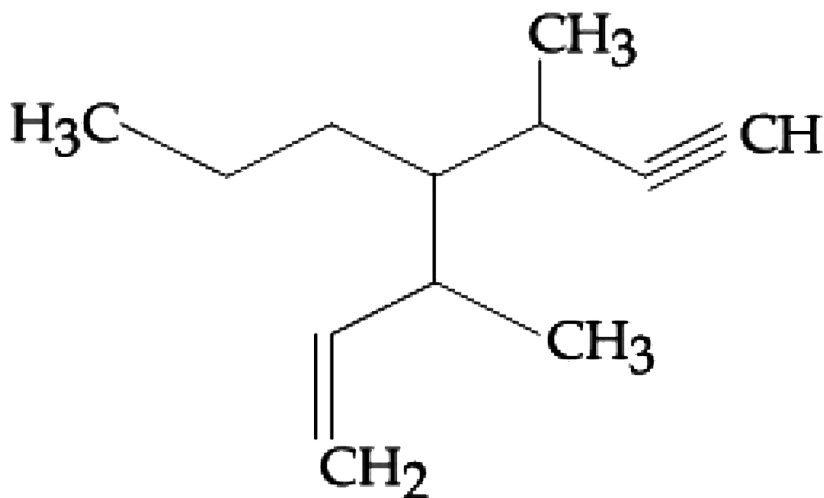
A. 3-methyl-4-(3-methylprop-1-enyl)-1-heptyne

B. 3,5-dimethy 1-4-propylhept-6-en-1-yne

C. 3-methyl-4-(1-methylprop-2-ynyl)-1-heptene

D. 3,5-dimethyl-4-propylhept-1-en-6-yne

Answer: D

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276. The temporary hardness of a water sample is due to compound X. Boiling this sample converts X to compound Y. X and Y, respectively, are :

A. $Mg\left(HCO_3\right)_2$ and $Mg(OH)_2$

B. $Ca\left(HCO_3\right)_2$ and $Ca(OH)_2$

C. $Mg\left(HCO_3\right)_2$ and $MgCO_3$

D. $Ca\left(HCO_3\right)_2$ and CaO
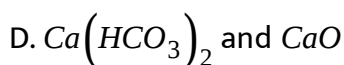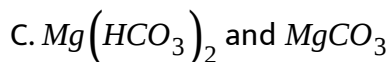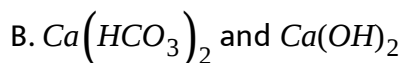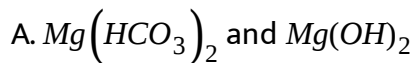
Answer: B

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277. In which of the following, energy of 2s orbital is minimum

A. K

B. H

C. Li

D. Na

Answer: C

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278. Which one of the following is likely to give a precipitate with $AgNO_3$ solution ?

A. $CH_2 = CH - Cl$

B. CCl_4

C. $CHCl_3$

D. $\left(CH_3\right)_3 CCl$

Answer: A

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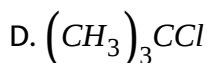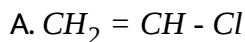
279. 25g of an unknown hydrocarbon upon burning produces 88g of CO_2 and 9 g of H_2O. This unknown hydrocarbon contains:

A. 20g of carbon and 5g of hydrogen

B. 22g of carbon and 3g of hydrogen

C. 24g of carbon and 1g of hydrogen

D. 18g of carbon and 7g of hydrogen

Answer: C

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280. 2-Chloro-1-phenylbutane $\xrightarrow[\text{EtOH}]{NaOH}$ $\xrightarrow[NaBH_4]{Hg(Oac)_2}$ product is

A.

B.

C.

D.

Answer: A

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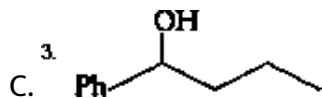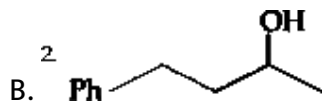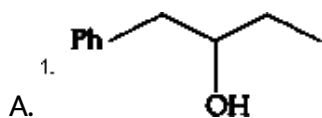
281. The compound used in the treatment of lead poisoning is :

A. D-penicillamine

B. desferrioxime B

C. cis-platin

D. $EDTA$

Answer: C
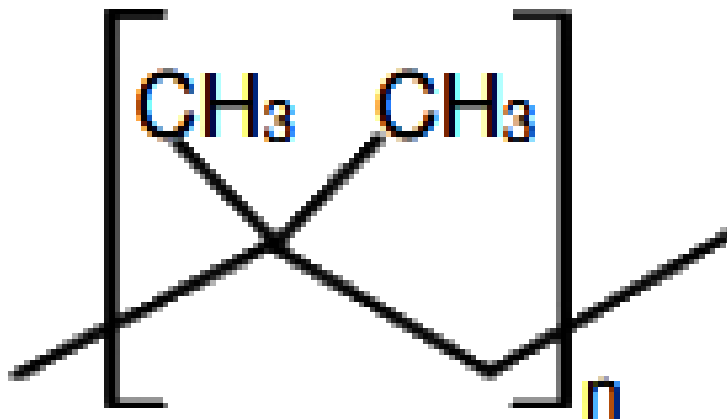
282.

Polymer is named as:

A. Polyisobutane

B. Polytert-butylene

C. Polyisoprene

D. Polyisobutylene

Answer: D

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283. In body centred and face centred arragnement of atoms of an element, what will be the number of atoms present in the respective unit cell ? Justify your answer with calculations.

    A. $8:1:6$

    B. $1:2:4$

    C. $4:2:1$

    D. $4:2:3$

Answer: B

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284. The coordination numbers of Co and Al in $\left[Co\left(Cl(en)_2\right)Cl\right]$ and $K_3\left[Al\left(C_2O_4\right)_3\right]$, respectively are :

(en= ethane-1,-1-diamine).

    A. 5 and 3

B. 3 and 3

C. 6 and 6

D. 5 and 6

Answer: B

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285. The INCORRECT match in the following is

A. $\Delta G^0 < 0, K > 1$

B. $\Delta G^0 = 0, K = 1$

C. $\Delta G^0 > 0, K < 1$

D. $\Delta G^0 < 0, K < 1$

Answer: D

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286. Among the following, the INCORRECT statement about colloids is :

A. They can scatter light

B. They are larger than small molecules and have high molar mass.

C. The osmotic pressure of a colloidal solution is of higher order than

the true solution at the same concentration.

D. The range of diameters of colloidal particles is between 1 and 1000

nm.

Answer: B

287. The correct decreasing order for acid strength is :

A. $NO_2CH_2COOH > FCH_2COOH >$

$CN^2CH_2COOH > ClCH_2COOH$

B. $FCH_2COOH > NCH_2COOH >$

   $NO_2CH_2COOH > ClCH_2COOH$

C. $CNCH_2COOH > O_2NCH_2COOH >$

   $FCH_2COOH > ClCH_2COOH$

D. $NO_2CH_2COOH > NCH_2COOH >$

   $FCH_2CPPJ > ClCH_2COOH$
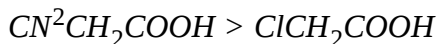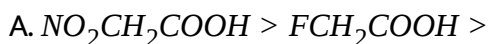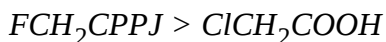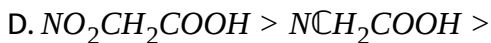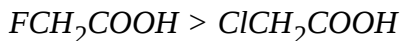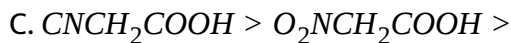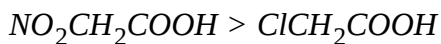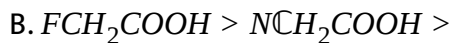
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288. The major product of following reaction is :

$$R\text{-}C \equiv N \quad \xrightarrow[\text{(2)}H_2O]{\text{(1)}AlH(i\text{-}Bu)_2} \quad ?$$

A. RCOOH

B. $RCONH_2$

C. RCHO

D. RCH_2NH_2
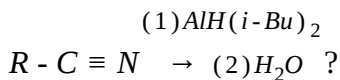
289. The highest value of the calculated spin-only magnetic moment (in BM) among all the transition metal complexes is :

A. 5.92

B. 6.93

C. 3.87

D. 4.9

290. 0.5 moles of gas A and x moles of gas B exert a pressure of 200 Pa in a container of volume $10m^3$ at 1000K. Given R is the gas constant in jk^{-1} ,x is :

A. $\dfrac{2R}{4 + R}$

B. $\dfrac{2R}{4 - R}$

C. $\dfrac{4 + R}{2R}$

D. $\dfrac{4 - R}{2R}$

291. The one that is extensively used as a piezoelectric material is :

A. tridymite

B. amorphous silica

C. quartz

D. mica

292. Correct statements among a to d regarding silicones are : Correct statements among a to d regarding silicones are :

(a) They are polymers with hydrophobic character

(b) They are biocompatible

(c) In general, they have high thermal stability and low dielectric strength

(d) Usually, they are resistant to oxidation and used as greases

   A. (a), (b), (c) and (d)

   B. (a), (b) and (c) only

   C. (a) and (b) only

   D. (a),(b) and (d) only

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293. In general, the properties that decrease and increase down a group in the periodic table, respectively, are :

A. atomic radius and electronegativity.

B. electron gain enthalpy and electronegativity.

C. electronegativity and atomic radius.

D. electronegativity and electron gain enthlpy.

294. A solution of sodium sulfate contains 92 g of Na^+ ions per kilogram of water. The molality of Na^+ ions in that solution in mol Kg^{-1} is:

A. 12

B. 4

C. 8

D. 16

295. A water sample has ppm level concentration of the following metals $Fe = 0.2, Mn = 5.0, Cu = 3.0, Zn = 5.0$ The metal that makes the water sample unsuitable for drinking is

A. Cu

B. Mn

C. Fe

D. Zn

296. The anodic half-cell of lead-acid battery is recharged using electricity of 0.05 Faraday. The amount of $PbSO_4$ electrolyzed g during the process is: (Molar mass of $PbSO_4 = gmol^{-1}$)

A. 22.8

B. 15.2

C. 7.6

D. 11.4

297. Which one of the following statements regarding photochemical smog is not correct?

A. Higher the value of K_H at a given pressure, higher is the solubility of the gas in the liquids.

B. Different gases have different K_H (Henry's law constant) values at the same temperature.

C. The partial pressure of the gas in vapour phase is proportional to the mole fraction of the gas in the solution.

D. The balue of K_H increases with increases of temperature and K_H is

function of the nature of the gas

298. The alkaline earth metal nitrate that does not crystallise with water

molecules, is :

A. $Mg(NO_3)_2$

B. $Sr(NO_3)_2$

C. $Ca(NO_3)_2$

D. $Ba(NO_3)_2$
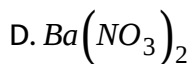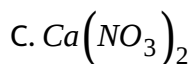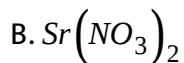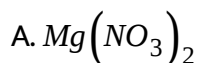
299. 20 mL of $0.1 M H_2SO_4$ solution is added to 30mL of $0.2 M NH_4OH$ solution. The pH of the resultant mixture is : $\left[pK_b of NH_4OH = 4.7 \right]$

A. 5.2

B. 9

C. 5

D. 9.4

300. The ore that contains both iron and copper is: a. malachite b. dolomite c. azurite d. copper pyrites

A. copper pyrites

B. malachite

C. dolomite

D. azurite

301. For emission line of atomic hydrogen from $n_i = 8$ to $n_f = n$, the plot of wave number $(\bar{v})$ against $\left(\dfrac{1}{n^2}\right)$ will be (The Rydberg constant, R_H is in wave number unit) (1) Linear with slope - RH (2) Linear with intercept-RH (3) Non linear (4) Linear with slope RH

A. Linear with intercept $-R_H$

B. Non linear

C. Linear with slope R_H

D. Linear with slope $-R_H$

302. The isotopes of hydrogen are: A. Tritium and protium only B. Deuterium and tritium only C. Protium and deuterum only D. Protium, deuterium and tritium

    A. Tritium and protium only

    B. Protium and deulterium only

    C. Protium, deuterium and tritium

    D. Deuterium and tritium only

303. According to molecular orbital theory, which of the following is true with respect to Li_2^{+} and Li_2^{-} ?

    A. Li_2 + is unstable and Li_2 - is stable

    B. Li_2 + is stable and Li_2 - is unstable

    C. Both are stable

D. Both are unstable

304. The major product of the following reaction is:

(1) KOH (aqueous)

(2) CrO_3/H^+

(3) H_2SO_4/Δ

A.

B.

C.

D.
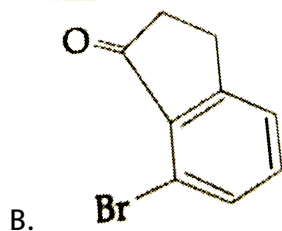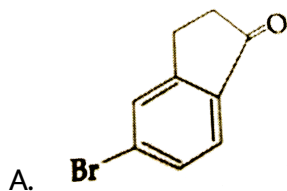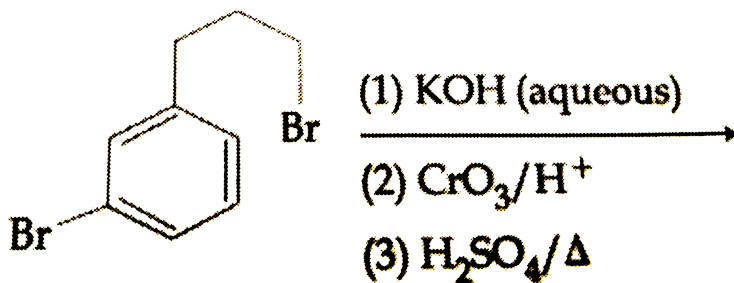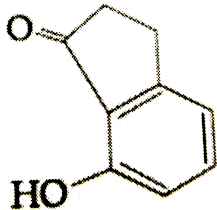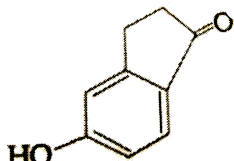
305. Aluminium is usually found in $+3$ oxidation state. In contrast, thallium exists in $+1$ and $+3$ oxidation states. This is due to:

A. inert pair effect

B. diagonal relationship

C. lattice effect

D. lanthanoid contraction

306. The increasing order of pKa of the following amino acids in aqueous

solution is:

Gly Asp Lys Arg

A. Asp lt Gly lt Arg lt Lys

B. Gly lt Asp lt Arg lt Lys

C. Asp lt Gly lt Lys lt Arg

D. Arg lt Lys lt Gly lt Asp

307. Consider the reversible isothermal expansion of an ideal gas in a

closed system at two different temperatures T_1 and $T_2 \left(T_1 < T_2 \right)$. The

correct graphical depiction of the dependence of work done (w) on the final volume (V) is:

A.

$|w|$ T_2 T_1 $\ln V$

B.

$|w|$ T_2 T_1 $\ln V$

C.

$|w|$ T_2 T_1 $\ln V$

D.

$|w|$ T_2 T_1 $\ln V$
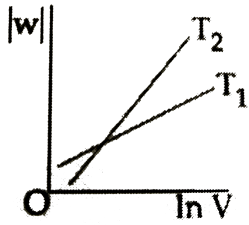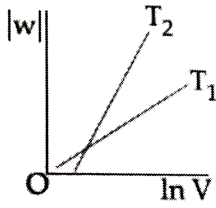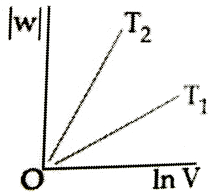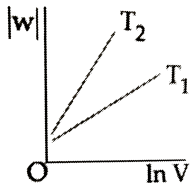
308. Arrange the follwing amines in the decreasing order of basicity :
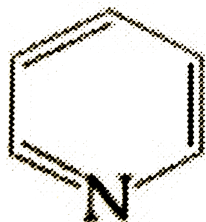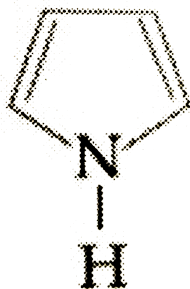
I   II   III

A. I gt II gt III

B. III gt I gt II

C. III gt II gt I

D. I gt III gt II

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309. The compounds A and B in the following reaction are, respectively :

$$\overset{HCHO + HCl}{\longrightarrow} A \overset{AgCN}{\longrightarrow} B$$
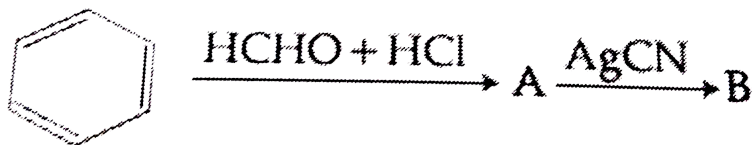
A. A=Benzyl alcohol, B=Benzyl cyanide

B. A=Benzyl chloride, B=Benzyl cyanide

C. A=Benzyl alcohol, B=Benzyl isocyanide

D. A=Benzyl chloride, B=Benzyl isocyanide

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310. The entropy change associated with the conversion of 1 kg of ice at 273 K to water vapours at 383 K is :

(Specific heat of water liquid and water vapour are $4.2 kJK^{-1}kg^{-1}$ and $2.0 kJK^{-1}kg^{-1}$, heat of liquid fusion and vapourisation of water are

$334 kJkg^{-1}$ and $2491 kJkg^{-1}$, respectively). (

$\log 273 = 2.436, \log 373 = 2.572, \log 383 = 2.583$)

A. 7.90 kJ kg^{-1}K^{-1}

B. 2.64 kJ kg^{-1}K^{-1}

C. 8.49 kJ kg^{-1}K^{-1}

D. 9.26 kJ kg^{-1}K^{-1}

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311. For the following reaction, the mass of water produced from 445 g of

$C_{57}H_{110}O_6$ is :

$2C_{57}H_{110}O_6(s) + 163O_2(g) \rightarrow 114CO_2(g) + 110H_2O(l)$
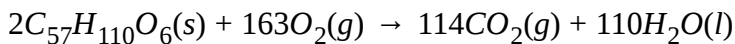
A. 490 g

B. 445 g

C. 495 g

D. 890 g

312. The major product formed in the following reaction is :

$$\text{H}_3\text{C} \overset{\text{O}}{\underset{}{\parallel}} \text{H} + \text{(C}_6\text{H}_5\text{COCH}_3) \xrightarrow{\text{dil. NaOH}}$$

A.

B.

C.

D.
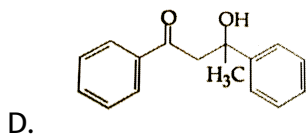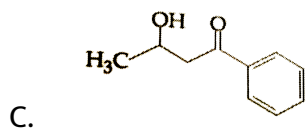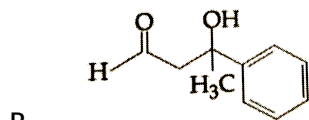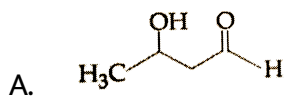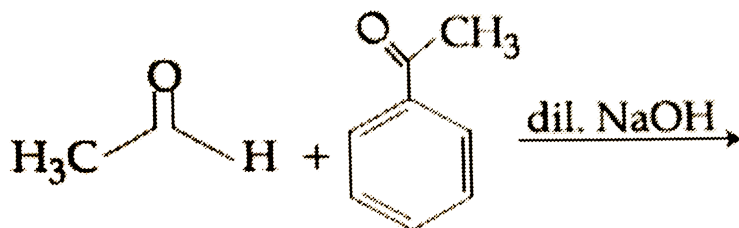
313. Which of the following conditions in drinking water causes methemoglobinemia ?

A. gt50 ppm of lead

B. gt50 ppm of chloride

C. gt50 ppm of nitrate

D. gt100 ppm of sulphate

314. The major product obtained in the following reaction is :

$$\xrightarrow[\text{room temp.}]{(CH_3CO)_2O/\text{pyridine (1 eqv.)}}$$

A.

NHCOCH₃

B.

COCH₃, OH, NH₂

C.

OCOCH₃, NH₂

D.

OH, NHCOCH₃
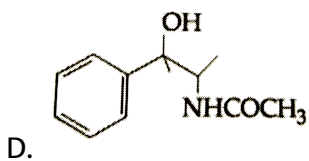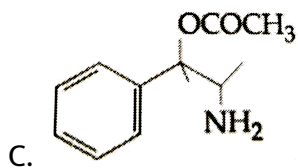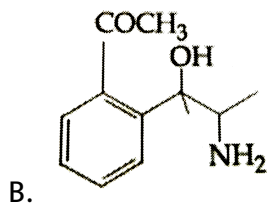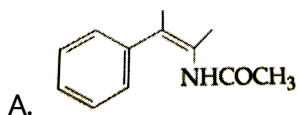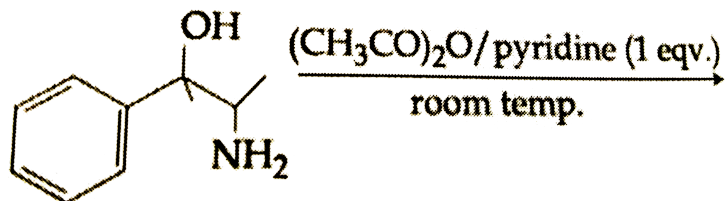
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315. The major product of the following reaction is :

$$\xrightarrow[\text{(ii) KOH (dil)}]{\text{(i) Br}_2/h\nu}$$

A.

B.

C.

D.
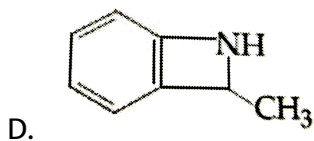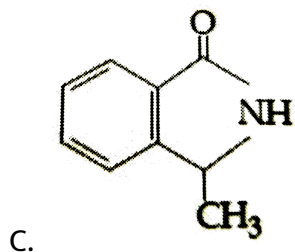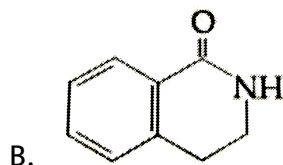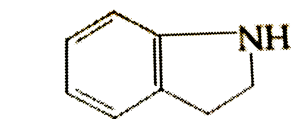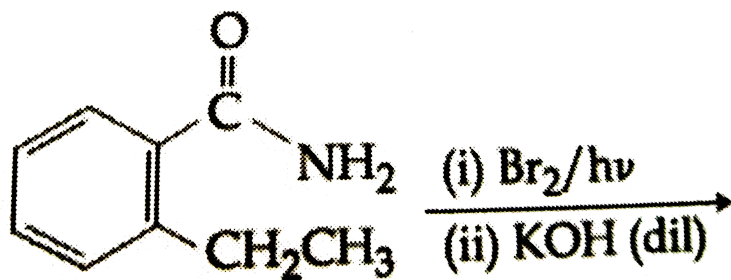
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316. The correct match between Item I and Item II is :

Item I	Item II
(A) Benzaldehyde	(P) Mobile phase
(B) Alumina	(Q) Adsorbent
(C) Acetonitrile	(R) Adsorbate

A. $(A) \rightarrow (Q), (B) \rightarrow (P), (C) \rightarrow (R)$

B. $(A) \rightarrow (R), (B) \rightarrow (Q), (C) \rightarrow (P)$

C. $(A) \rightarrow (Q), (B) \rightarrow (R), (C) \rightarrow (P)$

D. $(A) \rightarrow (P), (B) \rightarrow (R), (C) \rightarrow (Q)$

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317. The alkali metal that reacts with nitrogen directly to form nitride is:

a) Li b) Na c) K d) Rb

A. K

B. Li

C. Rb

D. Cs

318. For coagulation of arsenious sulphide sol, which one of the following salt solution will be most effective ?

A. $BaCl_2$

B. $AlCl_3$

C. NaCl

D. Na_3PO_4

319. The complex that has highest crystal field splitting energy ($\triangle$), is:

A. $\left[Co\left(NH_3\right)_5\left(H_2O\right)\right]Cl_3$

B. $K_2\left[CoCl_4\right]$

C. $\left[Co\left(NH_3\right)_5Cl\right]Cl_3$

D. $K_3\left[Co(CN)_6\right]$
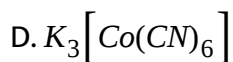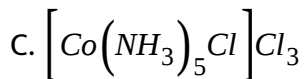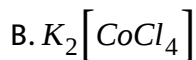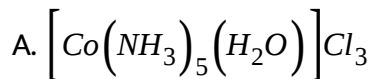
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320. The pH of rain water, is approximately : a) 5.6 b) 7.5 c) 7.0 d) 6.5

A. 5.6

B. 7.5

C. 7.0

D. 6.5

321. Consider the following reversible chemical reactions :

$A_2(g) + B_2(g) \overset{K_1}{\Leftrightarrow} 2AB(g)$.... (1)

$6AB(g) \overset{K_2}{\Leftrightarrow} 3A_2(g) + 3B_2(g)$..... (2)
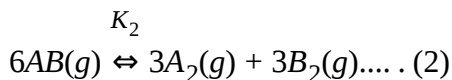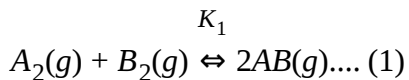
The relation between K_1 and K_2 is :

A. $K_1 K_2 = \dfrac{1}{3}$

B. $K_2 = K_1^3$

C. $K_2 = K_1^{-3}$

D. $K_1 K_2 = 3$

322. The correct sequence of amino acids present in the tripeptide given

below is :
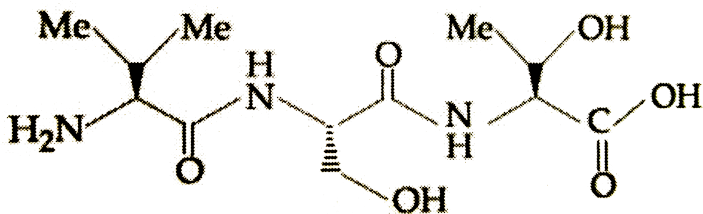
A. Val - Ser - Thr

B. Val - Ser - Val

C. Leu - Ser - Thr

D. Thr - Ser - Leu

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323. For the reaction, $2A + B \rightarrow$ products, when the concentrations of A

and B both were doubled, the rate of the reaction increased from 0.3 mol

$L^{-1}s^{-1}$ to 2.4 mol $L^{-1}s^{-1}$. When the concentration of A alone is doubled,

the rate increased from 0.3 mol $L^{-1}s^{-1}$ to 0.6 mol $L^{-1}s^{-1}$.

Which one of the following statements is correct ?

A. Total order of the reaction is 4

B. Order of the reaction with respect to B is 2

C. Order of the reaction with respect to B is 1

D. Order of the reaction with respect to A is 2

324. The products formed in the reaction of cumene with O_2 followed by treatment with dil. HCl are :

A.

and H_3C—C(=O)—CH_3

B.

and CH_3—OH

C.

and H_3C—C(=O)—CH_3

D.
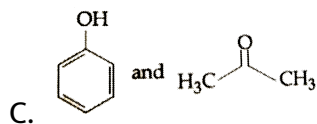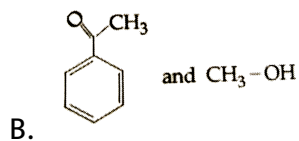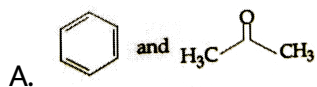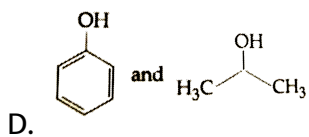
325. The tests performed on compound X and their inferences are :

Test	Inference
(a) 2, 4 - DNP test	Coloured precipitate
(b) Iodoform test	Yellow precipitate
(c) Azo-dye test	No dye formation

Compound 'X' is :

A.

B.

C.

D.

---
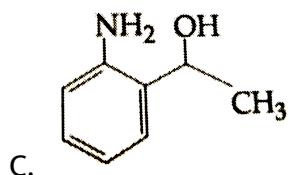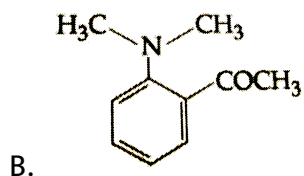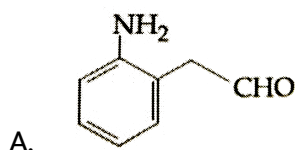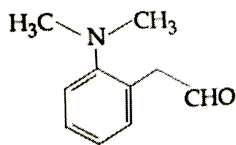
326. In which of the following processes, the bond order has increased and paramagnetic character has changed to diamagnetic ?

A. $NO \rightarrow NO^+$

B. $N_2 \rightarrow N_2^+$

C. $O_2 \rightarrow O_2^+$

D. $O_2 \rightarrow O_2^{2-}$
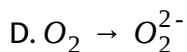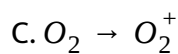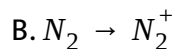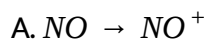
Answer: A

327. Which of the following combination of statements is true regarding the interpretation of the atomic orbitals ?

(a) An electron in an orbital of high angular momentum stays away from the nucleus than an electron in the orbital of lower angular momentum.

(b) For a given value of the principal quantum number, the size of the orbit is inversely proportional to the azimuthal quantum number.

(c) According to wave mechanics, the ground state angular momentum is equal to $\dfrac{h}{2\pi}$.

(d) The plot of ψ Vs r for various azimuthal quantum numbers, shows peak shifting towards higher r value.

A. (a), (d)

B. (a), (b)

C. (a), (c)

D. (b), (c)

328. Which of the following compounds is not aromatic ?

A.

B.

C.

D.
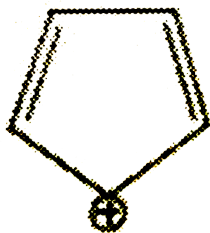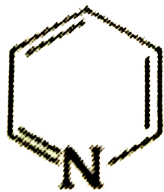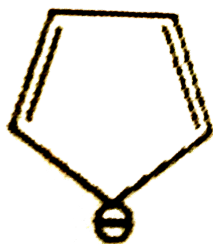
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329. Good reducing nature of H_3PO_2 is attributed to the presence of :

A. Two P - OH bonds

B. One P - H bond

C. Two P - H bonds

D. One P - OH bond

330. The correct statement regarding the given Ellingham diagram is :
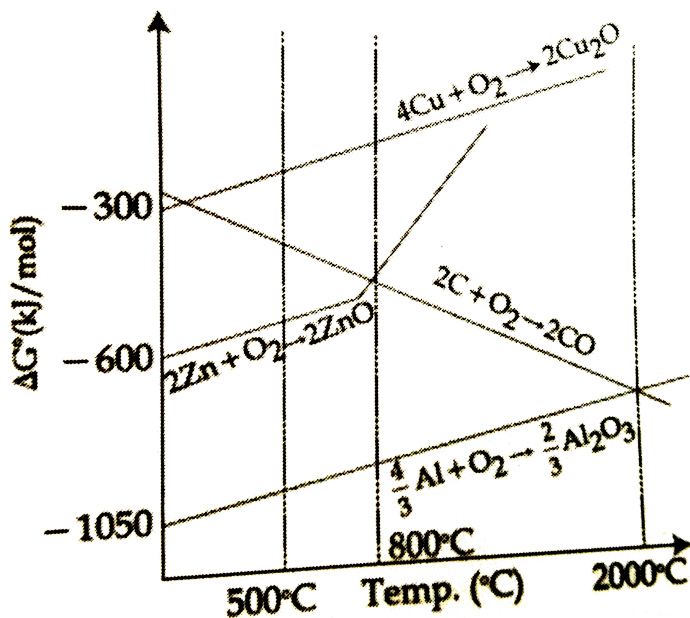
A. At $1400°C$, Al can be used for the extraction of Zn from ZnO

B. At $500°C$, coke can be used for the extraction of Zn from ZnO

C. Coke cannot be used for the extraction of Cu from Cu_2O.

D. At $800°C$, Cu can be used for the extraction of Zn from ZnO.

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331. Water filled in two glasses A and B have BOD value of 10 and 20, respectively. The correct statement regarding them, is :

A. B is more polluted than A

B. A is suitable for drinking, whereas B is not.

C. Both A and B are suitable for drinking.

D. A is more polluted than B.

332. Which premitive unit cell has unequuual edge lengths ($a \neq b \neq c$) and all axial angles different from $90°$?

A. Triclinic

B. Hexagonal

C. Monoclinic

D. Tetragonal

333. The major product of the following reaction is :

$$\xrightarrow[\Delta]{\text{KOH alc (excess)}}$$

A.

B.

C.

D.
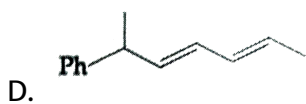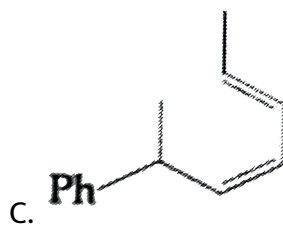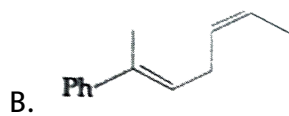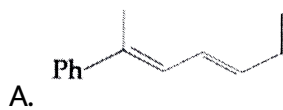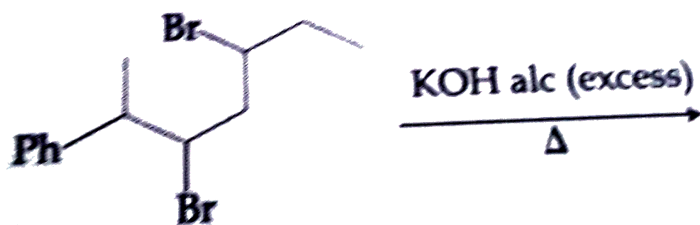
334. Consider the given plots for a reaction obeying Arrhenius equation $\left(0\,^\circ C < T < 300\,^\circ C\right)$: (k and E_a are rate constant and activation energy, respectively)
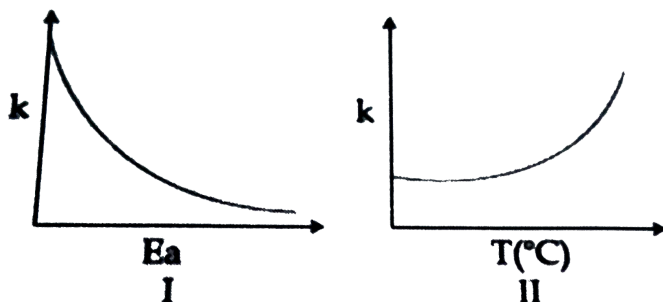
335. The major product of the following reaction given below will be :

A.

NO$_2$

B.

NO$_2$

C.

OH

D.

OH
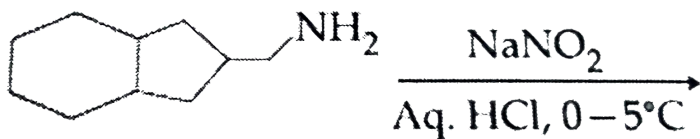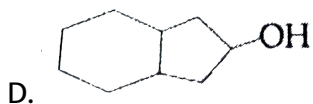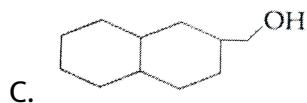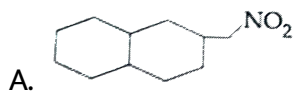
Answer: D

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336. Wilkinson catalyst is :

A. $\left[\left(Ph_3P\right)_3 IrCl\right]$

B. $\left[\left(Et_3P\right)_3 RhCl\right]$

C. $\left[\left(Ph_3P\right)_3 RhCl\right]$

D. $\left[\left(Et_3P\right)_3 IrCl\right]$
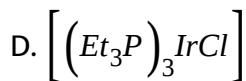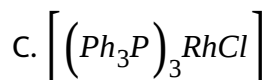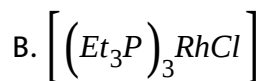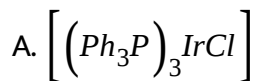
337. If dichloromethane (DCM) and water $\left(H_2O\right)$ are used for differential extraction, which one of the following statements is correct ?

A. DCM and H_2O would stay as lower and upper layer respectively in

the S.F.

B. DCM and H_2O will make turbid/colloidal mixture

C. DCM and H_2O would stay as upper and lower layer respectively in

the separating funnel (S.F.)

D. DCM and H_2O will be miscible clearly

338. Which dicarboxylic acid in presence of a dehydrating agent is least reactive to give an anhydride ?

A.

B.

C.

D.
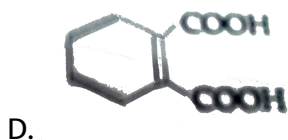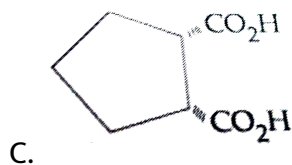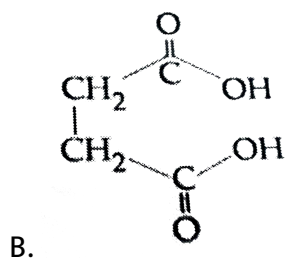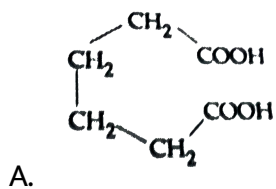
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339. The decreasing order of ease of alkaline hydrolysis for the following esters is

$$-COOC_2H_5$$

I

$$Cl--COOC_2H_5$$

II

$$O_2N--COOC_2H_5$$

III

$$CH_3O--COOC_2H_5$$
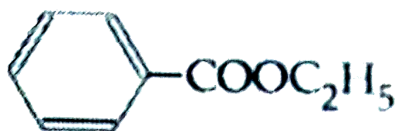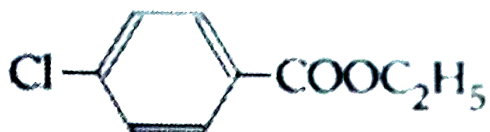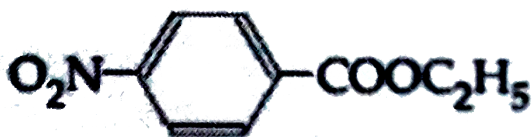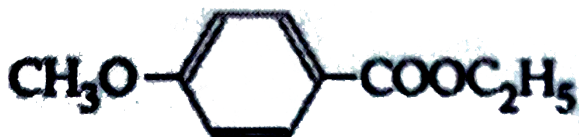
IV

A. III > II > IV > I

B. III > II > I > IV

C. IV > II > III > I

D. II > III > I > IV

340. Which of the graphs shown below does not represent the relationship between incident light and the electron ejected from metal surface ?

A.

K.E. of e's vs energy of Light

B.

number of e's vs Frequency of Light

C.

K.E. of e's vs Frequency of Light

D.
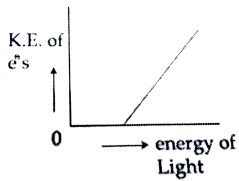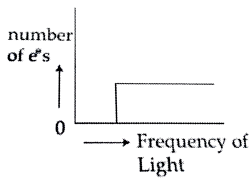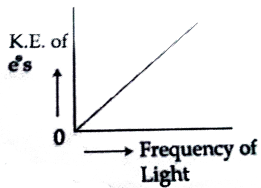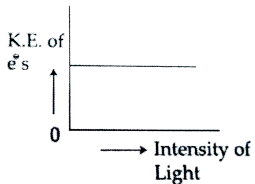
341. Which of the following is not an example of heterogeneous catalytic reaction ?

A. Ostwald's process

B. Combustion of coal

C.

D. Hydrogenation of vegatable oils

Answer: A::B::C

342. The effect of lanthanoid contraction in the lanthanoid series of elements by and large means :

A. increase in both atomic and ionic radii

B. decrease in atomic radii and increase in ionic radii

C. decrease in both atomic and ionic radii

D. increase in atomic radii and decrease in ionic radii

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343. Which hydrogen in compound (E) is easily replaceable during bromination reaction in presence of light ?

$CH_{3\delta}$ - $CH_{2\gamma}$ - $CH\beta = CH_2\alpha(E)$
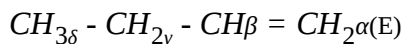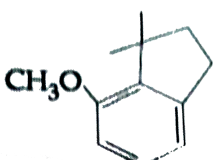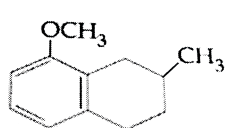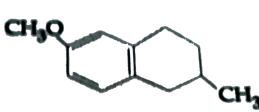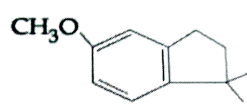
A. α-hydrogen

B. γ-hydrogen

C. δ-hydrogen

D. β-hydrogen

344. The major product of the following reaction is :

$$\xrightarrow[\text{(ii) } H_2O]{\text{(i) AlCl}_3 \text{ (anhyd.)}}$$

A.

B.

C.

D.
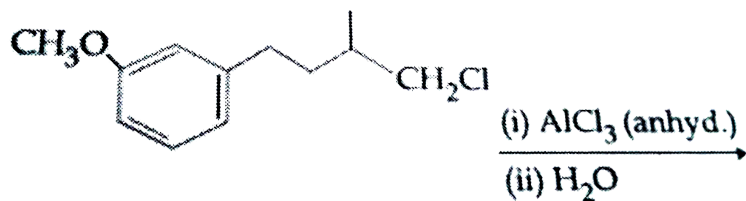
345. The correct structure of product 'P' in the following reaction is :

$$Asn \text{ - } Ser + \left(CH_3CO\right)_2O \xrightarrow{NEt_3} P\text{(excess)}$$

A.

B.

C.

D.
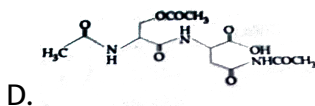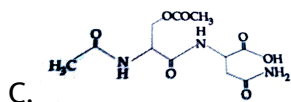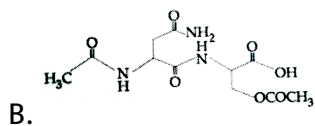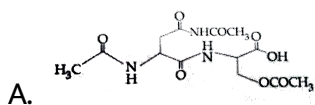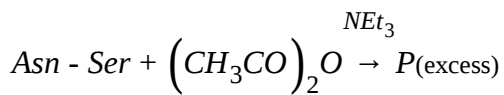
346. The type of hybridisation and number of lone pair(s) of electrons of Xe in $XeOF_4$, respectively, are :

A. sp^3d^2 and 1

B. sp^3d and 2

C. sp^3d^2 and 2

D. sp^3d and 1

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347. The electronegativity of aluminium is similar to :

A. Carbon

B. Beryllium

C. Boron

D. Lithium

348. Consider the following reduction processes :

$Zn^{2+} + 2e^- \rightarrow Zn(s), E^o = -0.76V$

$Ca^{2+} + 2e^- \rightarrow Ca(s), E^o = -2.87V$

$Mg^{2+} + 2e^- \rightarrow Mg(s), E^o = -2.36V$

`Ni^(2+)+2e^(-)toNi(s), E^(o)=-0.25 V
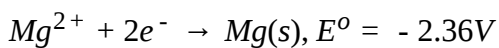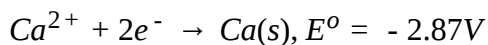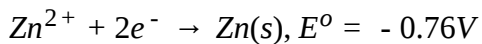
The reducing power of the metals increases in the order :

A. Ca < Zn < Mg < Ni

B. Ni < Zn < Mg < Ca

C. Zn < Mg < Ni < Ca

D. Ca < Mg < Zn < Ni

349. The chemical nature of hydrogen peroxide is :

A. Oxidising agent in acidic medium, but not in basic medium.

B. Reducing agent in basic median, but not in acidic median.

C. Oxidising and reducing agent in acidic median, but not in basic medium.

D. Oxidising and reducing agent in both acidic and basic medium.

350. Liquids A and B form an ideal solution in the entire composition range. At 350K, the vapor pressure of pure A and pure B are 7×10^3 Pa and 12×10^3 Pa, respectively. The composition of the vapor in equilibrium with a solution containing 40 mole percent of A at this temperature is :

A. $x_A = 0.37, x_B = 0.63$

B. $x_A = 0.28, x_B = 0.72$

C. $x_A = 0.4$, $x_B = 0.6$

D. $x_A = 0.76$, $x_B = 0.24$

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351. The major product 'X' formded in the following reaction is :

A.

B.

C.

D.
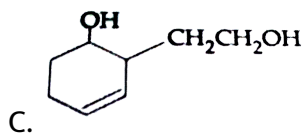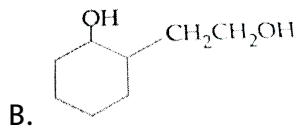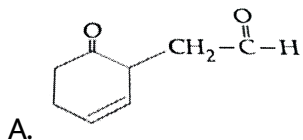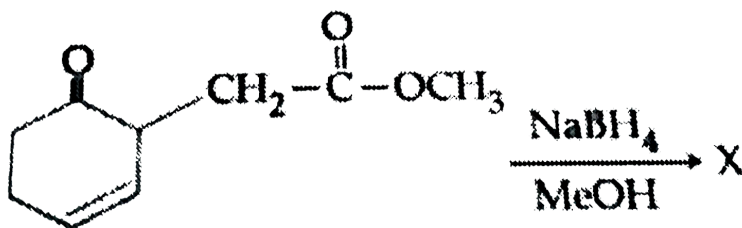
352. The metal used for making X-ray tube window is :

A. Mg

B. Na

C. Be

D. Ca

353. Hall-Heroult's process is given by:

A. $Cu^{2+}(aq) + H_2(g) \rightarrow Cu(s) + 2H^+(aq)$

B. $Cr_2O_3 + 2Al \rightarrow Al_2O_3 + 2Cr$

C. $2Al_2O_3 + 3C \rightarrow 4Al + 3CO_2$

D. $ZnO + C \xrightarrow[\text{Coke, 1673 K}]{} Zn + CO$
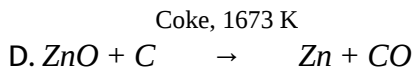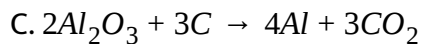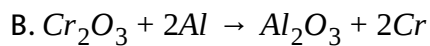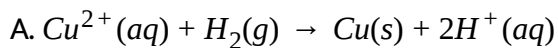
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354. Two pi and half sigma bonds are present in:

A. O_2^+

B. N_2

C. O_2

D. N_2^+

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355. The ground state energy of hydrogen atom is $-13.6eV$. The energy of second excited state He^+ ion in eV is :

A. -54.4

B. -3.4

C. -6.04

D. -27.2

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356. Haemoglobin and gold sol are examples of :

A. positively and negatively charged sols, respectively

B. positively charged sols

C. negatively charged sols

D. negatively and positively charged sols, respectively

357. The amount of sugar $\left(C_{12}H_{22}O_{11}\right)$ required to prepare 2 L of its 0.1 M aqueous solution is:

A. 136.8 g

B. 17.1 g

C. 68.4 g

D. 34.2 g

358. Among the following reactions of hydrogen with halogens, the one that requires a catalyst is

A. $H_2 + I_2 \rightarrow 2HI$

B. $H_2 + Cl_2 \rightarrow 2HCl$

C. $H_2 + Br_2 \rightarrow 2HBr$

D. $H_2 + F_2 \rightarrow 2HF$
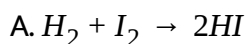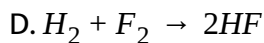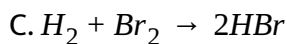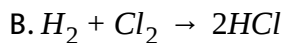
359. 5.1 g NH_4SH is introduced in 3.0 L evacuated flask at $327\,^\circ C$, 30% of the solid NH_4SH decomposed to NH_3 and H_2S as gases. The K_p of the reaction at $327\,^\circ C$ is :

$\left(R = 0.082 Latmmol^{-1}K^{-1}, \text{Molar mass of S} = 32 gmol^{-1}, \text{molar mass of N} = 14 gm\right.$

A. $0.242 \times 10^{-4} atm^2$

B. $1 \times 10^{-4} atm^2$

C. $4.9 \times 10^{-3} atm^2$

D. $0.242 atm^2$

Answer: D

360. The reaction that is NOT involved in the ozone layer depletion mechanism in the stratosphere is

A. $CF_2Cl_2(g) \xrightarrow{uv} \overset{.}{C}l(g) + \overset{.}{C}F_2Cl(g)$

B. $\overset{.}{C}lO(g) + O(g) \rightarrow \overset{.}{C}l(g) + O_2(g)$

C. $CH_4 + 2O_3 \rightarrow 3CH_2 = O + 3H_2O$

D. $HOCl(g) \xrightarrow{hv} \overset{.}{O}H(g) + \overset{.}{C}l(g)$
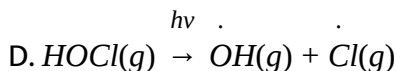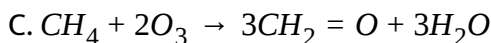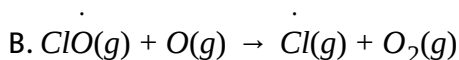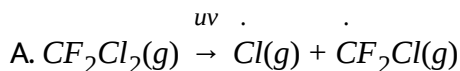
361. In the cell $Pt(s)\left|H_2(g, 1^-)\right|HCl(aq)|AgCl(s)|Ag(S) \mid Pt(s)$ the cell potential is 0.92V when a 10^{-6} mola1 HCl Ssolution is used. The standard electrode potential of $\left(ACl/Ag, Cl^-\right)$ electrode is :

$\left\{given, \dfrac{2.30Rt}{F} = 0.6Vat298K\right\}$

A. 0.94V

B. 0.76V

C. 0.40V

D. 0.20V

362. The 71st electron of an element X with an atomic number of 71 enters into the orbital

A. 6p

B. 4f

C. 5d

D. 6s

363. The correct match between item 'I' and item 'II' is

A. $(A) \rightarrow (Q), (B) \rightarrow (P), (C) \rightarrow (S), (D) \rightarrow (R)$

B. $(A) \rightarrow (Q), (B) \rightarrow (P), (C) \rightarrow (R), (D) \rightarrow (S)$

C. $(A) \rightarrow (R), (B) \rightarrow (P), (C) \rightarrow (Q), (D) \rightarrow (S)$

D. $(A) \rightarrow (Q), (B) \rightarrow (R), (C) \rightarrow (S), (D) \rightarrow (P)$

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364. An aromatic compound 'A' having molecular formula $C_7H_6O_2$ on treating with aqueous ammonia and heating forms compound 'B'. The compound 'B' on reaction with molecular bromine and potassium hydroxide provides compound 'C' having molecular formula C_6H_7N. The structure of 'A' is

A.

B.

C.

D.
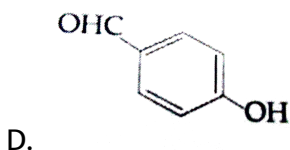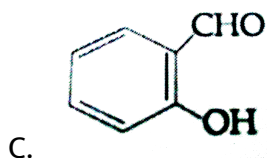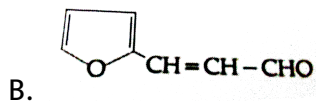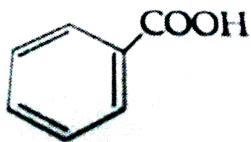
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365. The process with negative entropy change is

A. Dissociation of $CaSO_4(s)$ to $CaO(s)$ and $SO_3(g)$

B. Sublimation of dry ice

C. Dissolution of iodine in water

D. Synthesis of ammonia from N_2 and H_2

366. An ideal gas undergoes isothermal compression from $5m^3$ to $1m^3$ against a constant external pressure of $4Nm^{-2}$. Heat released in this process is used to increase the temperature of 1 mole of Al. If molar heat capacity of Al is 24 J $mol^{-1}K^{-1}$, the temperature of Al increases by

A. $\dfrac{3}{2}K$

B. $2K$

C. $\dfrac{2}{3}K$

D. $1K$

367. Elevation in the boiling point for 1 molal solution of glucose is 2K. The depression in the freezing point for 2 molal solution of glucose in the same solvent is 2K. The relation between K_b and K_f is

A. $K_b = 1.5K_f$

B. $K_b = K_f$

C. $K_b = 0.5K_f$

D. $K_b = 2K_f$

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368. The major product of the following reaction is

CH₃N~~~~~~~~~~~⟶ NaBH₄

A. CH₃N~~~~~~~OH

B. CH₃N

C. CH₃NH

D. CH₃NH
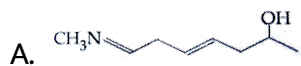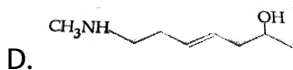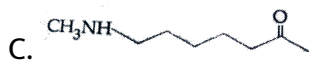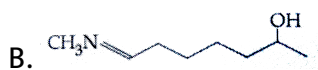
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369. Sodium metal dissolves in liquid ammonia and forms a deep blue solution. The colour is due to absorption of light by :

A. sodium-ammonia complex

B. sodamide

C. sodium ion-ammonia complex

D. ammoniated electrons

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370. Which of the following tests cannot be used for identifying amino acids ?

A. Biuret test

B. Barfoed test

C. Ninhydrin test

D. Xanthoproteic test

371. The differnece in the number of unpaired electrons of a metal ion in its high-spin and low-spin octahedral complexes is two. The metal ion is

A. Ni^{2+}

B. Fe^{2+}

C. Co^{2+}

D. Mn^{2+}

372. The pair that contains two P-H bonds in each of the oxoacids is

A. $H_4P_2O_5$ and $H_4P_2O_6$

B. H_3PO_2 and $H_4P_2O_5$

C. H_3PO_3 and H_3PO_2

D. $H_4P_2O_5$ and H_3PO_3
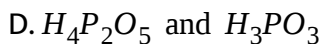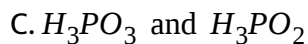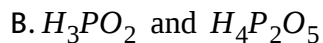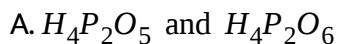
373. Which of the most suitable reagent for the following transformation?

$$CH_3 - CH = CH - CH_2 - \overset{\overset{\displaystyle OH}{\displaystyle |}}{C}H - CH_3 \rightarrow CH_3 - CH = Ch - CH_2C$$
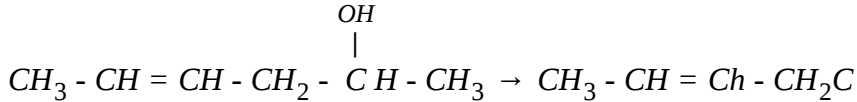
A. Tollen's reagent

B. $I_2/NaOH$

C. CrO_2Cl_2/CS_2

D. alkaline $KMnO_4$

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374. What is the IUPAC name of the following compound ?
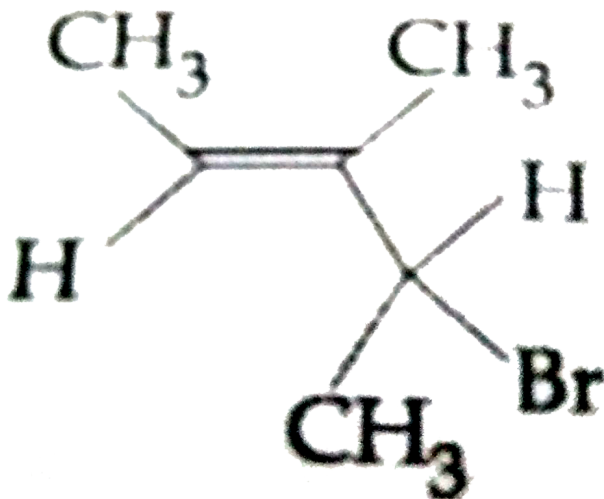
A. 3-Bromo-1, 2-dimethylbut-1-ene

B. 3-Bromo-3-methyl-1

2-dimethylprop-1-ene

C. 2-Bromo-3-methylpent-3-ene

D. 4-Bromo-3-methylpent-2-ene

375. The number of 2-centre-2-electron and 3-centre-2-electron bonds in B_2H_6, respectively, are

A. 2 and 1

B. 4 and 2

C. 2 and 2

D. 2 and 4

376. In the reaction of oxalate with permanganate in acidic medium, the number of electrons involved in producing one molecule of CO_2 is :

A. 1

B. 10

C. 2

D. 5

377. The electrolytes usually used in the electroplating of gold and silver, respectively , are

A. $\left[Au(CN)_2\right]^-$ and $\left[Ag(CN)_2\right]^-$

B. $\left[Au(CN)_2\right]^-$ and $\left[AgCl_2\right]^-$

C. $\left[Au(OH)_4\right]^-$ and $\left[Ag(OH)_2\right]^-$

D. $\left[Au\left(NH_3\right)_2\right]^+$ and $\left[Ag(CN)_2\right]^-$
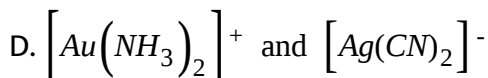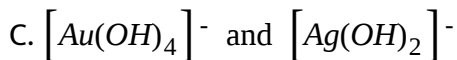
378. A compound of formula A_2B_3 has the hcp lattice. Which atom forms the hcp lattice and what fraction of tetrahedral voids is occupied by the other atoms :

A. hcp lattice -A, $\dfrac{2}{3}$ Tetrahedral voids -B

B. hcp lattice -A, $\dfrac{1}{3}$ Tetrahedral voids -B

C. hcp lattice -B, $\dfrac{2}{3}$ Tetrahedral voids-A

D. hcp lattice -B, $\dfrac{1}{3}$ Tetrahedral voids-A

379. What will be the major product in the following mononitration reaction ?

$$\xrightarrow[\text{Conc. } H_2SO_4]{HNO_3}$$

A.

B.

C.

D.
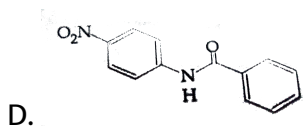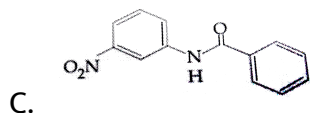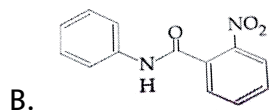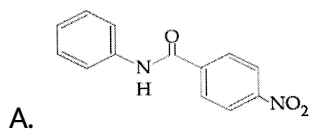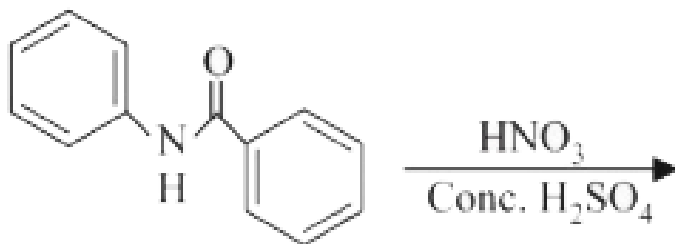
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380. Which compound(s) out of the following is / are not aromatic ?

(A)   (B)   (C)   (D)

A. (B),(C) and (D)

B. (C) and (D)

C. (B)

D. (A) and (D)

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381. A solid having density of $9 \times 10^2 kgm^{-2}$ forms face centred cubic crystals of edge length $200\sqrt{2}$pm. What is the molar mass of the solid? [Avogadro constant $\cong 6 \times 10^{22} mol^{-1}, \pi \cong 3$]

A. $0.0432 kgmol^{-1}$

B. $0.0216 kgmol^{-1}$

C. $0.0305 - kgmol^{-1}$

D. $0.4320 kgmol^{-1}$

382. The correct match between item I and item II is

Item I	Item II
(1) Norethindrone	(P) Anti-biotic
(2) Ofloxacin	(Q) Anti-fertility
(3) Equanil	(R) Hypertension
	(S) Analgesics

A. $(A) \rightarrow (Q), (B) \rightarrow (R), (C) \rightarrow (S)$

B. $(A) \rightarrow (Q), (B) \rightarrow (P), (C) \rightarrow (R)$

C. $(A) \rightarrow (R), (B) \rightarrow (P), (C) \rightarrow (S)$

D. $(A) \rightarrow (R), (B) \rightarrow (P), (C) \rightarrow (R)$

383. NaH an example of :

A. electron-rich hydride

B. metalic hydride

C. salinc hydride

D. molecular hydride

384. An example of solid sol is :

A. Paint

B. Gem stones

C. Butter

D. Hair cream

385. The concentration of dissolved oxygen (DO) in cold water can go up to :

A. 14 ppm

B. 8 ppm

C. 10 ppm

D. 16 ppm

386. The correct statements among (1) to (4) regarding H_2 as a fuel are:

(1) It produces less pollutants than petrol

(2) A cylinder of compressed dihydrogen weighs ~30 times more than a petrol tank producing the same amount of energy.

(3) Dihydrogen is stored in tanks of metal alloys like $NaNi_5$.

(4) On combustion, values of energy released per gram of liquid dihydrogen and LPG are 50 and 142kJ,respectively.

    A. (b) and (d)only

    B. (a) and (c) only

    C. (b), (c) and (d) only

    D. (a) ,(b) and (c) only

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387. The freezing point of a diluted milk sample is found to be-$0.2\,^\circ C$, while it should have been -$0.5\,^\circ C$ for pure milk. How much water has

been added to pure milk to make the diluted sample?

A. 1 cup of water to 2 cups of pure milk

B. 3 cups of water to 2 of pure milk

C. 1 cup of water to 3 cups of pure milk

D. 2 cups of water to 3 cups of pure milk

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388. If a reaction follows the Arrhenius equation, the plot lnk vs $1/(RT)$ gives straight line with a gradient (-y) unit. The energy required to activate the reactant is :

A. y/R unti

B. Y unit

C. yR unity

D. -y unity

389. A 10 mg effervescent tablet containing sodium bicarbonate and oxalic acid release 0.25 ml of CO_2 at T=298.15 K and p=1 bar. If molar volume of CO_2 is 25.0L under such condition, the number of mole of sodium bicarbonate in each tablet is 10^{-x}. What is numerical value of x. [Molar mass of $NaHCO_3 = 84 gmol^{-1}$]

A. 0.84

B. 33.6

C. 16.8

D. 8.4

390. The amphoteric hydroxide is :

A. $Be(OH)_2$

B. $Ca(OH)_2$

C. $Mg(OH)_2$

D. $Sr(OH)_2$
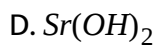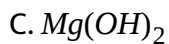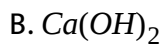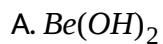
391. Peroxyacetyl nitrate (PAN), an eye irritant is produced by :

A. classical smog

B. acid rain

C. organic waste

D. photochemical smog

392. Anorganic compound id estimated through Duma's method and was found to evolve 6 moles of CO_2 4 moles of H_2O and 1 mole of nitrogen gas .The formula of the compound is :

A. $C_{12}H_8N$

B. $C_{12}H_8N_2$

C. $C_6H_8N_2$
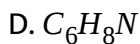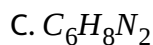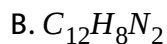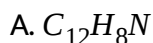
D. C_6H_8N

393. Two blocks of the same metal having same mass and at temperature T_1 and T_2 respectively, are brought in contact with each other and allowed to attain thermal equilibrium at constant pressure. The change in entropy, ΔS for this process is

A. $C_p In \left[\dfrac{(T_1 + T_2)^2}{4T_1 T_2} \right]$

B. $2C_p In \left[\dfrac{(T_1 + T_2)^{\frac{1}{2}}}{4} \right]$

C. $2C_p In \left(\dfrac{T_1 + T_2}{4T_1 T_2} \right)$

D. $2C_p In \left[\dfrac{T_1 + T_2}{2T_1 T_2} \right]$

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394. Match the metals (column I) with the coordination compounds (s) /

enzyme (s) (column II):

(column$I$)		(columnII)	
Metals		Coodination compound (s) /enzyme(s)	
(A)	Co	(i)	Wilkinson catalyst
(B)	Zn	(ii)	Chlorophyll
(C)	Rh	(iii)	VitaminB_{12}
(D)	Mg	(iv)	Carbonic anhydrase

A. (A)-(iii),(B)-(iv),(C)-(i),-(D)-(ii)

B. (A)-(i),(B)-(ii),(C)-(iii),-(D)-(iv)

C. (A)-(iii),(B)-(iv),(C)-(i),-(D)-(ii)

D. (A)-(iv),(B)-(iii),(C)-(i),-(D)-(ii)

395. Match the ores (column A) with the metals (column B) :

(column A)		(column B)
Ores		Metals
(I)	Siderite	(a) Zinc
(II)	Kaolinite	(b) Copper
(III)	Malachite	(c) Iron
(IV)	Calamine	(d) Aluminium

A. (I)-(a),(II)-(b),(III)-(C),(IV)-(d)

B. (I)-(C),(II)-(d),(III)-(b),(IV)-(a)

C. (I)-(c),(II)-(d),(III)-(a),(IV)-(b)

D. (I)-(b),(II)-(c),(III)-(d),(IV)-(a)

396. Heat treatment of muscular pain involves radiation of wavelength of about 900nm. Which spectral line of H-atom is suitable for this purpose ?

$$\left[R_H = 1 \times 10^5 cm^{-1}, h = 6.6 \times 10^{-34} Js, c = 3 \times 10^8 ms^{-1}\right]$$

A. Paschen ,$\infty \rightarrow 3$

B. Paschen ,$5 \rightarrow 3$

C. Balmer $\infty \rightarrow 2$

D. Lyman ,$\infty \rightarrow 1$

397. The chloride that CANNOT get hydrolysed is :

A. $PbCl_4$

B. CCl_4

C. $SnCl_4$

D. $SnCl_4$
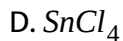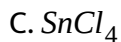
Answer: C::D

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398. The correct order for acid strength of compounds

$CH \equiv CH, CH_3 - C \equiv CH$ and $CH_2 = CH_2$

A. $CH \equiv CH > CH_2 = CH_2 > CH_3 - C \equiv CH$

B. $CH_3 - C \equiv CH > CH \equiv CH > CH_2 = CH_2$

C. $CH_3 - C \equiv CH > CH_2 = CH_2 > HC \equiv CH$

D. $HC \equiv CH > CH_3 - C \equiv CH > CH_2 = CH_2$
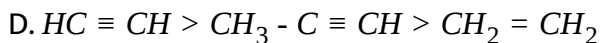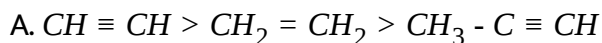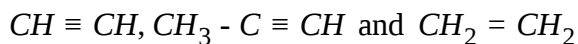
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399. In a chemical reaction, $A + 2B \xrightarrow{K} 2C + D$ the initial concentration of B was 1.5 times of the concentration of A, but the equilibrium concentrations of A and B were found to be equal. The equilibrium constant(K) for the aforesaid chemical reaction is :

A. 4

B. 16

C. $\dfrac{1}{4}$

D. 1

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400. Given

Gas $H_2 CH_2 CO_2 SO_2$

Critical 33 190 304 630

Temperature / K

On the basis of data given above, predict which of the following gases shows least adsorption on a definite amount of charcoal ?

A. SO_2

B. CH_2

C. CO_2

D. H_2
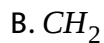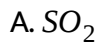
401. $Mn_2(CO)_{10}$. Is an organometallic compound due to the present of :

A. Mn-C bond

B. Mn-Mn bond

C. Mn-Obond

D. C-o bond

402. A metal on combustion in excess air forms X. X upon hydrolysis with water yields H_2O_2 and O_2along with another product. The metal is :

A. Na

B. Rb

C. Mg

D. Li

403. The molecule that has minimum/no role in the formation of photochemical smog, is:

A. N_2

B. $CH_2 = O$

C. O_3

D. NO

404. the pair of metal ions that can give a spin - only magnetic moment

of 3.9 BM for the complex $\left[M\left(H_2O\right)_6\right]Cl_2$is

A. V^{2+} and Co^{2+}

B. V^{2+} and Fe^{2+}

C. Co^{2+} and Fe^{2+}

D. Cr^{2+} and Mn^{2+}

405. For a diatomic ideal gas in a closed system, which of the following plots does not correctly describe the relation between various thermodynamics quantities?

A.

B.

C.

D.
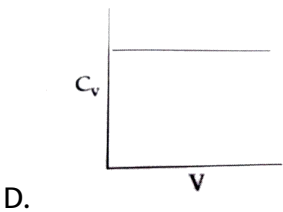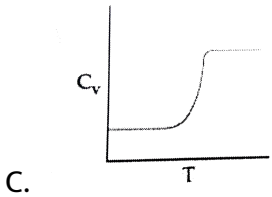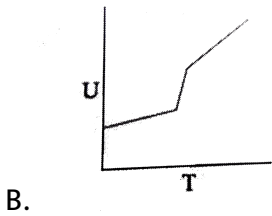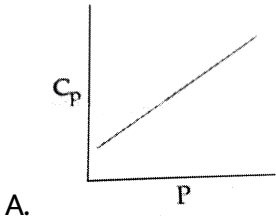
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406. Among the following compounds most basic amino acid is :

A. Asparagine

B. Lysine

C. Serine

D. Histidine

407. The increasing order of reactivity of the following compounds towards reaction with alkyl halides directly is:
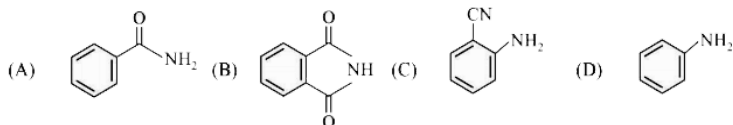
A. $(B) < (A) < (C) < (D)$

B. $(A) < (B) < (C) < (D)$

C. $(B) < (A) < (d) < (C)$

D. $(A) < (C) < (D) < (B)$

408. Among the following four aromatic compounds, which one will have the lowest melting point ?

A.

B.

C.

D.
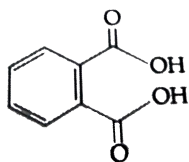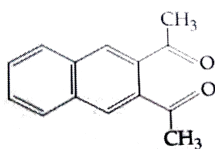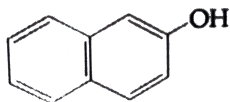
409. 50 mL of 0.5 M oxalic acid is needed to neutralize 25 mL of sodium

hydroxide solution. The amount of NaOH in 50 mL of the given sodium

hydroxide solution is _____.

A. 40g

B. 10g

C. 20g

D. 80g

410. the hardness of a water sample (in terms of Equivalents of $CaCO_3$)

containing $10^{-3} M CaSO_4$ Is :

(Molar mass of $CaSO_4$ = $1365 gmol^{-1}$)

A. 10ppm

B. 50ppm

C. 90ppm

D. 100ppm

$$OH$$
$$|$$
411. $CH_3CH_2 - C \mid ph - CH_3$ cannot be prepared by

A. $CH_3CH_2COCH_3 + PhMgX$

B. $PhCOCH_2CH_3 + CH_3MgX$

C. $PhCOCH_3 + CH_3CH_2MgX$

D. $HCHO + pHCH\left(CH_3\right)CH_2MgX$

412. Freezing point of a 4% aqueous solution of X is equal to freezing point of 12% aqueous solution of Y. If molecular weight of X is A, then molecular weight of Y is :

A. 3A

B. 2A

C. A

D. 4A

413. The metal d-orbitals that are directly facing the ligands in $K_3\left(Co(CN)_6\right)$ are :

A. d_{xy} and $d_{x^2-y^2}$

B. $d_{x^2-y^2}$ and d_{z^2}

C. d_{xz}, d_{yz} and d_{z^2}

D. d_{xy}, d_{xz} and d_{yz}

414. Decomposition of X exhibits a rate constant of $0.05\mu g$ / year. How many years are required for the decomposition of $5\mu g$ of X into $2.5\mu g$?

A. 50

B. 25

C. 20

D. 40

415. In the following reaction

$$\text{Aldehyde} + \text{Alcohol} \xrightarrow{HCl} \text{Acetel}$$

Aldehyde   Alcohol

$HCHO$ $BuOH$

CH_3CHO $MeOH$

The best combination is

A. CH_3CHO and ^tBuOH

B. $HCHO$ and $MeOH$

C. CH_3CHO and $MeOH$

D. $HCHO$ and ^tBuOH

416. Two solids dissociates as follows

$A(s) \rightarrow B(g) + C(g), K_{P_1} = xatm^2$

$D(s) \rightarrow C(g) + E(g), K_{P_2} = yatm^2$
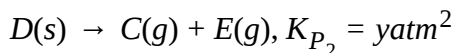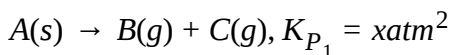
The total pressure when both the solids dissociate simultaneously is :

A. $\sqrt{x} + y\,atm$

B. $2\left(\sqrt{x} + y\right)atm$

C. $(x + y)atm$

D. $x^2 + y^2 atm$

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417. In the following reactions, prodcut A and B are :

$$\text{CH}_3\text{—C(=O)—C(CH}_3\text{)(CH}_2\text{CH}_3\text{)—CH}_2\text{—CHO} \xrightarrow{\text{H, dil. NaOH}} [A] \xrightarrow{\text{H}_2\text{O}, \Delta} [B]$$

A.

B.

C.

D.
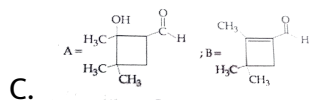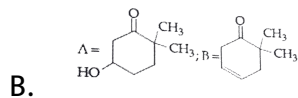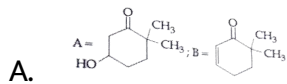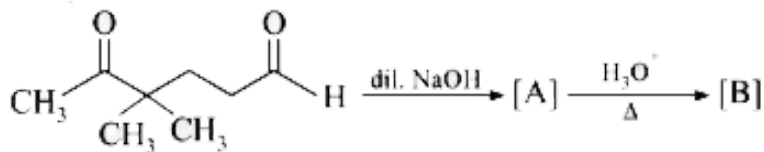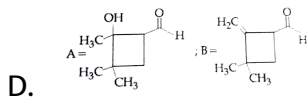
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418. What is the work function of the metal if the light of wavelength $4000Å$ generates photoelectrons of velocity $6 \times 10^5 ms^{-1}$ from it ? (Mass of electron $= 9 \times 10^{-31} kg$, Velocity of light $= 3 \times 10^8 ms^{-1}$, Planck's constant $= 6.626 \times 10^{-34} Js$. Charge of electron $= 1.6 \times 10^{-19} JeV^{-1}$)

A. $0.9 eV$

B. $3.1 eV$

C. $2.1 eV$

D. $2.1 eV$

Answer: D

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419. Iodine reacts with concentrateed HNO_3 to yield Y along with other products. The oxidation state of iodine in Y, is _____.

A. 5

B. 7

C. 3

D. 1

420. Poly -β - hydroxybutyrate - co-β - hydroxyvalerate (PHBV) is a copolymer of _____.

A. 3- hydroxybutanoic acid and 4-hydroxypentanoic acid

B. 2-hydroxybutanoic acid and 3-hydroxybutanpoic acid

C. 3-hydroxybutanoic acid and 2- hydroxybutanoic acid

D. 3-hydrooxybutanoic acid and 3-hydrooxypentanoic acid

421. Water samples with BOD values of 4 ppm and 18 ppm, respectively are:

A. Clean and Clean

B. Highly polluted and clean

C. Clean and Highly polluted

D. Highly polluted and High,ly polluted

422. 8 g of NaOH is dissolved in 18 g of H_2O. Mole fraction of NaOH in solution and molality (in mol kg^{-1}) of the solution respectively are:

A. 0.2,22.20

B. 0.2,11.11

C. 0.167,11.11

D. 0.167,22.20

Answer: A

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423. The magnetic moment of an octahedral homoleptic Mn(II) complex is 5.9 BM. The suitable ligand for this complex is :

A. ethylenediamine

B. CN^-

C. NCS^-

D. CO

Answer: A

424. The element that does NOT show catenation is :

A. Ge

B. Si

C. Sn

D. Pb

Answer: A

425. Among the following, the false statement is :

A. It is possible to cause artificial rain by throwing electrified sand carrying charge opposite to the one on clouds from an aeroplane.

B. Tyndall effect can be used to distinguish between a colloidal

solution and a true solution.

C. Lyophilic sol can be coagulated by adding an electrolyte.

D. Latex is a colloidal solution of rubber particles which are positively

charged.

Answer: A

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426. The correct structure of histidine in a strongly acidic solution (pH =

2) is :

A.

B.

C.

D.
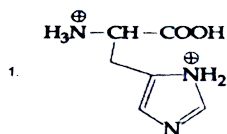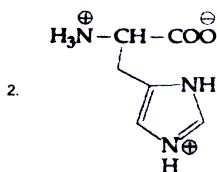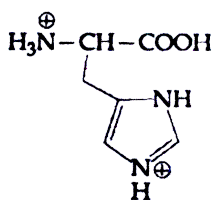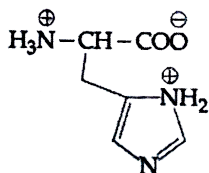
Answer: A

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427. Λ_m^o for NaCl, HCl and NaA are 126.4, 425.9 and $100.58 cm^2 mol^{-1}$, respectively. If the conductivity of is $5 \times 10^{-5} Scm^{-1}$, degree of dissociation of HA is :

A. 0.50

B. 0.25

C. 0.125

D. 0.75

Answer: A

428. Molecules of benzoic acid $\left(C_6H_5COOH\right)$ dimerise in benzene. 'w' g of the acid dissolved in 30g of benzene shows a depression in freezing point equal to 2K. If the percentage association of the acid to form dimer in the solution is 80, then w is : (Given that $K_f = 5KKg\,\mathrm{mol}^{-1}$ Molar mass of benzoic acid $= 122g\,\mathrm{mol}^{-1}$)

A. 2.4 g

B. 1.0 g

C. 1.5 g

D. 1.8 g

Answer: A

429. Chlorine on reaction with hot and concentrated sodium hydroxide gives:

A. CI^- and CIO_3^-

B. CI^- and CIO^-

C. CIO_3^- and CIO_2^-

D. CI^- and CIO_2^-

Answer: A

430. The element that shows greater ability to form p^π - p^π multiple bonds is :

A. Sn

B. C

C. Ge

D. Si

Answer: A

---

431. The two monomers for the synthesis of Nylon 6, 6 are :

A. $HOOC(CH_2)_4COOH, H_2N(CH_2)_6NH_2$

B. $HOOC(CH_2)_6COOH, H_2N(CH_2)_6NH_2$

C. $HOOC(CH_2)_4COOH, H_2N(CH_2)_4NH_2$

D. $HOOC(CH_2)_6COOH, H_2N(CH_2)_4NH_2$

Answer: A

432. The aldehydes which will not form Grignard product with one equivalent Grignard reagents are :

(a) CHO

(b) HO_2C CHO

(c) H_3CO CHO

(d) HOH_2C CHO

A. (A) CHO

B. (B) HO_2C CHO

C. (C) H_3CO CHO

D. (D) HOH_2C CHO
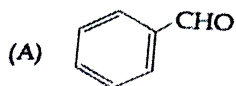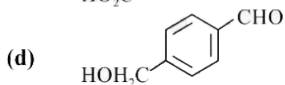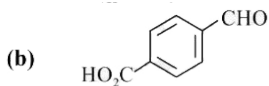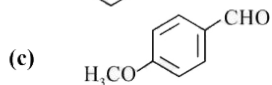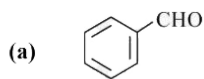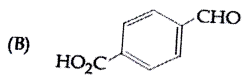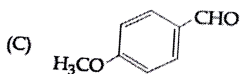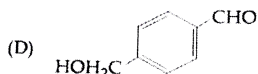
Answer: A

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433. Given :

(i) $C(\text{graphite}) + O_2(g) \rightarrow CO_2(g) \Delta rH^{\ominus} = x \text{ kj } mol^{-1}$

(ii) $C(\text{graphite}) + \dfrac{1}{2}O_2(g) \rightarrow CO(g), \Delta rH^{\ominus} = y \text{ kj } mol^{-1}$

(iii) $CO(g) + \dfrac{1}{2}O_2(g) \rightarrow CO_2(g), \Delta rH^0 = z \text{kj} mol^{-1}$
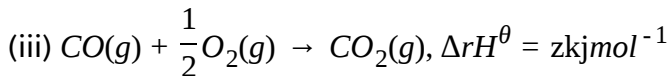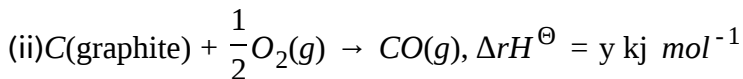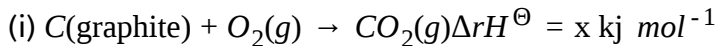
Based on the above thermochemical equations, find out which one of the following algebraic relationships is correct ?

    A. $x = y + z$

    B. $z = x + y$

    C. $y = 2z - x$

    D. $x = y - z$

Answer: A

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434. The volume strength of 1 M H_2O_2 is : (Molar mass of

$H_2O_2 = 34 gmol^{-1}$

A. 5.6

B. 16.8

C. 11.35

D. 22.4

Answer: A

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435. The correct statement(s) among I to III with respect to potassium ions that are abundant within the cell fluids is/ are :

I. They activate many enzymes

II. They participate in the oxidation of glucose to produce ATP

III. Along with sodium ions, they are responsible for the transmission of nerve signals

A. I and III only

B. I and III only

C. I,II and III

D. III only

Answer: A

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436. The compound that is NOT a common component of photochemical smog is :

A. O_3

B. $H_3C - C \mid O - OONO_2$

C. CH_2CHCHO

D. CH_2CI_2

Answer: A

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437. For a reaction, consider the plot of $\ln k$ versus $1/T$ given in the figure. If the rate constant of this reaction at 400 K is $10^{-5}\,s^{-1}$, then the rate constant at 500 K is $10^{-x}\,s^{-1}$. The numerical value of x is _____.

$\ln k$ Slope $= -4606$ K

$1/T$
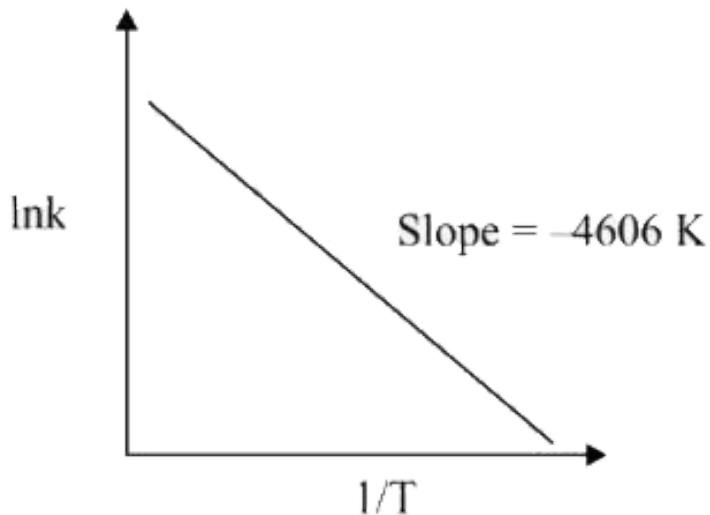
A. $10^{-6}s^{-1}$

B. $2 \times 10^{-4}s^{-1}$

C. $10^{-4}s^{-1}$

D. $4 \times 10^{-4}s^{-1}$

Answer: A

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438. An open vessel at $27\,^{\circ}C$ is heated until two fifth of the air(assumed as an ideal gas) in it has escaped from the vessel. Assuming that the volume of the vessel remains constant, the temperature at which the vessel has been heated is :

A. $500\,^{\circ}C$

B. $500K$

C. $750\,^{\circ}C$

D. $750K$

Answer: A

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439. The increasing order of the reactivity of the following with $LiAIH_4$ is :

(A) C_2H_5 — C(=O) — NH_2

(B) C_2H_5 — C(=O) — OCH_3

(C) C_2H_5 — C(=O) — Cl

(D) C_2H_5 — C(=O) — O — C(=O) — C_2H_5
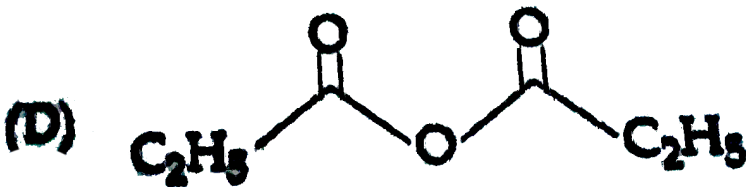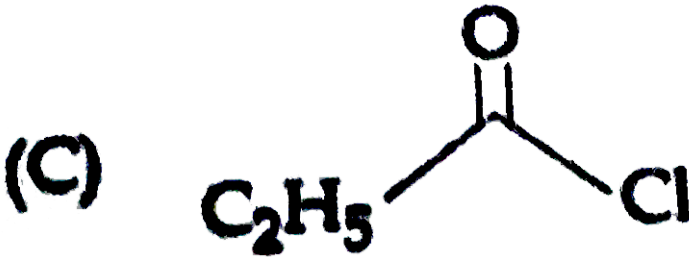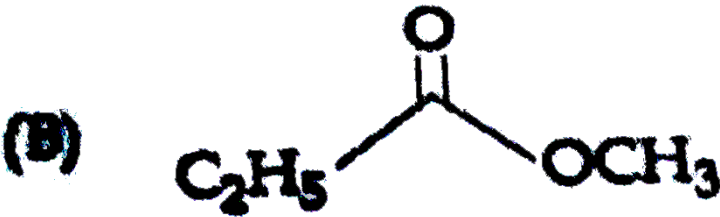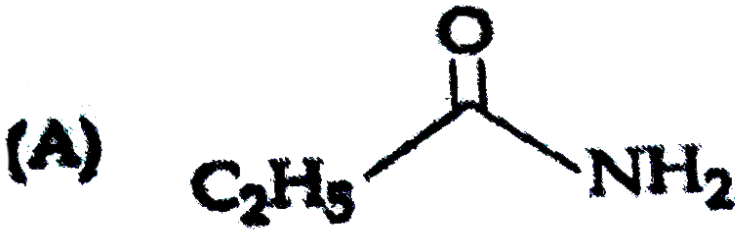
A. (B) < (A) < (C) < (D)

B. (B) < (A) < (D) < (C)

C. $(A) < (B) < (D) < (C)$

D. $(A) < (B) < (C) < (D)$

Answer: A

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440. The pair that does not require calcination is

A. ZnO and MgO

B. ZnO and Fe_2O_3, Xh_2O

C. $ZnCO_3$ and CaO

D. Fe_2O_3 and $CaCO_3$, $MgCO_3$

Answer: A

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441. The major product of the following reaction is :

$$CH_3CH_2C \,|\, BrH - C \,|\, BrH_2 \quad \xrightarrow[\text{II} . NaNH_2 \text{in liq.} NH_3]{\text{I} . KOHalc.}$$

A. $CH_3CH = C = CH_2$

B. $CH_3CH_2CH \,|\, NH_2 - CH_2 \,|\, NH_2$

C. $CH_3CH = CHCH_2NH_2$

D. $CH_3CH_2C \equiv CH$
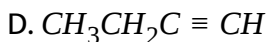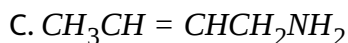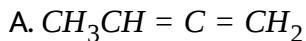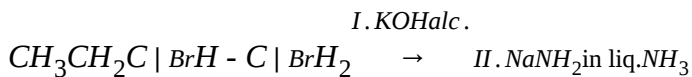
Answer: A

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442. If K_{sp} of Ag_2CO_3 is 8×10^{-12}, the molar solubility of Ag_2CO_3 in 0.1 M

$AgNO_3$ is $x \times 10^{-10}M$. The numerical value of x is _____.

A. $8 \times 10^{-12}M$

B. $8 \times 10^{-11}M$

C. $8 \times 10^{-10}M$
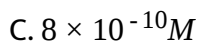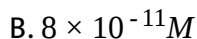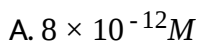
D. $8 \times 10^{-13} M$

Answer: A

443. The upper stratosphere consisting of the ozone layer protects us from the sun's radiation that falls in the wavelength region of :

A. $200 - 315 nm$

B. $400 - 550 nm$

C. $0.8 - 1.5 nm$

D. $600 - 750 nm$

Answer: A

444. If the de Broglie wavelength of the electron in nth Bohr orbit in a hydrogenic atom is equal to $1.5\pi a_0$ (a_0 is Bohr radius), then the value of n/z is :

A. 0.40

B. 1.50

C. 1.0

D. 0.75

Answer: A

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445. The reaction $MgO(s) + C(s) \rightarrow Mg(s) + CO(g)$, for which $\Delta_r H^\circ = +491.1 kJmol^{-1}$ and $\Delta_r S^\circ = 198.0 JK^{-1}mol^{-1}$, is not feasible at 298 K. Temperature abvoe which reaction will be feasible is:

A. 2040.5K

B. 1890.0K

C. 2480.3 K

D. 2380.5K

446. The correct match between item I and Item II

Item-I			Item-II
(A)	Allosteric effect	(P)	Molecule binding to the active site of enzyme
(B)	Competitive inhibitor	(Q)	Molecule crucial for communication in the body
(C)	Receptor	(R)	Molecule binding to a site other than the active site of enzyme
(D)	Poison	(S)	Molecule binding to the enzyme covalently

A. $(A) \rightarrow (R), (B) \rightarrow (P), (C) \rightarrow (Q), (D) \rightarrow (S)$

B. $(A) \rightarrow (P), (B) \rightarrow (R), (C) \rightarrow (Q), (D) \rightarrow (S)$

C. $(A) \rightarrow (R), (B) \rightarrow (P), (C) \rightarrow (S), (D) \rightarrow (Q)$

D. $(A) \rightarrow (P), (B) \rightarrow (R), (C) \rightarrow (S), (D) \rightarrow (Q)$

447. The coordination number of Th is $K_4\left[Th(C_2O_4)_4(OH_2)_2\right]$ is

A. 14

B. 6

C. 8

D. 10

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448. The major product obtained in the following reaction is :

A.

B.

C.

D.
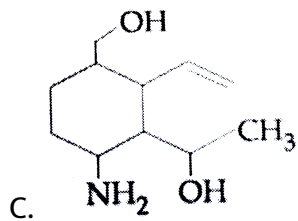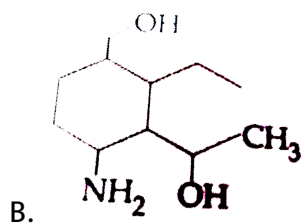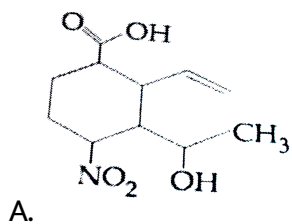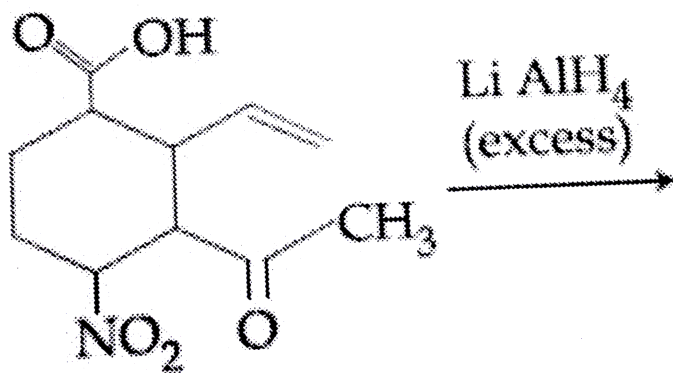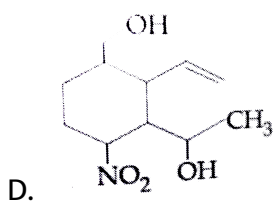
449. The standard reaction Gibbs energy for a chemical reaction at an absolute temperature T is given by $\Delta_r G^{-1} = A - BT$. Where A and B are non-zero constants. Which of the following is True about this reaction?

A. Endothermic if $A > 0$

B. Exothermic if $A > 0$ and $B < 0$

C. Endothermic if $A < 0$ and $B > 0$

D. Exothermic if $B < 0$

450. The radius of the largest sphere which fits properly at the centre of the edge of a body centred cubic unit cell is : (Edge length is represented by 'a')

A. $0.027a$

B. $0.047a$

C. $0.134a$

D. $0.067a$

451. Which of the following hydrides is electron deficient ?

A. SiH_4

B. B_2H_6

C. GaH_3

D. AIH_3
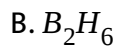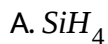
452. Given the equilibrium constant :

K_c of the reaction : $Cu(s) + 2Ag^+(aq) \rightarrow Cu^{2+}(Aq) + 2Ag(s)$ is 10×10^{15},

calculate the E°_{cell} of this reaction at 298K . $\left(\left[2.303\dfrac{RT}{Ft}\,at298K = 0.059V\right]\right)$

A. $0.04736mV$

B. $0.4736mV$

C. $0.4736V$

D. $0.04736V$

453. The correct option with respect to the Pauling electronegativity values of the elements is:

A. $Te > Se$

B. $Ge > Ga$

C. $Si < Al$

D. $P > S$

454. Which of the following compounds will produce a precipitate with $aGno_3$?

1.

A.

B.

2.

C.

D.
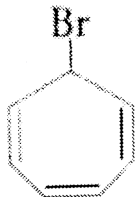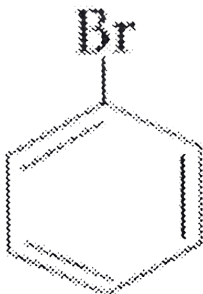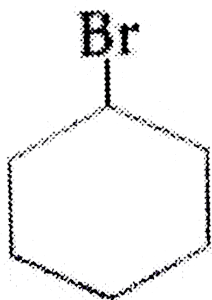
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455. The de Broglie wavelength (λ) associated with a photoelectron varies

with the frequency of the incident radiation as [v_0 is threshold frequency]

:

A. $\lambda \propto \dfrac{1}{\left(v - v_0\right)}$

B. $\lambda \propto \dfrac{1}{\left(v - v_0\right)^{\frac{1}{4}}}$

C. $\lambda \propto \dfrac{1}{\left(v - v_0\right)^{\frac{3}{2}}}$

D. $\lambda \propto \dfrac{1}{\left(v - v_0\right)^{\frac{1}{2}}}$

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456. Which of the following compounds reacts with ethylmagnesium bromide and also decolourizes bromine water solution:

A.

1.

B.

2.

C.

D.
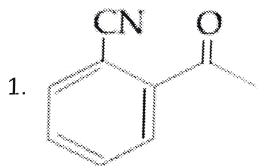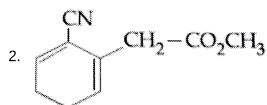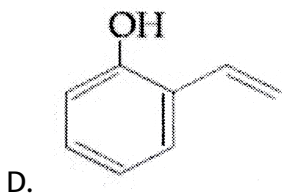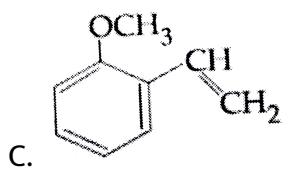
Answer: D

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457. In the following compounds,
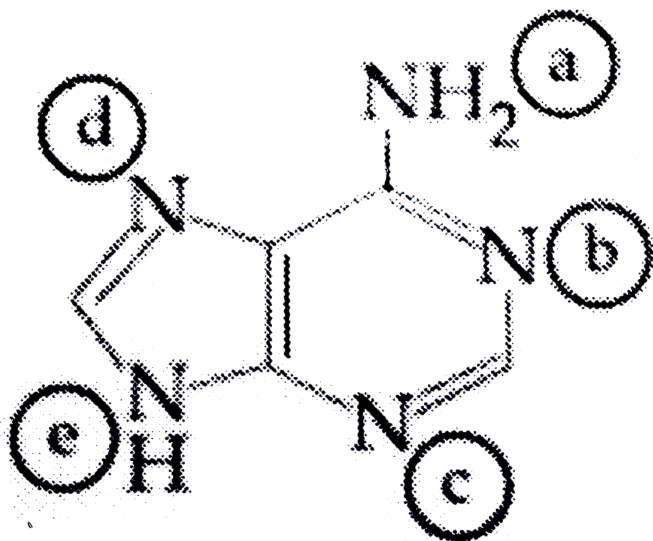
the favourable site/s for protonation is /are.

A. (a) and (e)

B. (b),(c) and (d)

C. (a) and (d)

D. (a)

458. Taj Mahal is being slowly disfigured and discoloured. This is primarily due to :

A. global warming

B. acid rain

C. water pollution

D. soil pollution

459. The relative stability of +1 oxidation state of group 13 elements follows the order:

A. $Al < Ga < TI < In$

B. $TI < In < Ga < Al$

C. $Ga < Al < In < TI$

D. $Al < Ga < In < TI$
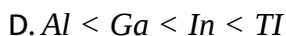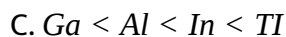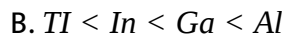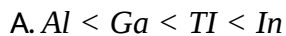
460. For the equilibrium $2H_2O \rightarrow H_3O^+ + OH^-$, the value of ΔG^0 at 298 K is approximately $x \times 10 kJmol^{-1}$. Numerical value of x is _____.

A. $100 kJmol^{-1}$

B. $-80 kJmol^{-}$

C. $80kJmol^{-1}$

D. $-100kJmol^{-1}$

461. The reaction that does not define calcination is:

A. $Fe_2O_3 \cdot XH_2O \xrightarrow{\Delta} Fe_2O_3 + XH_2O$

B. $2Cu_2S + 3O_2 \xrightarrow{\Delta} 2Cu_2O + 2SO_2$

C. $ZnCO_3 \xrightarrow{\Delta} ZnO + CO_2$

D. $CaCO_3 \cdot MgCO_3 \xrightarrow{\Delta} CaO + MgO + 2CO_2$
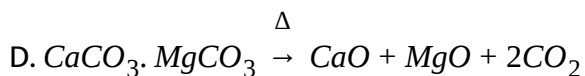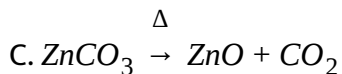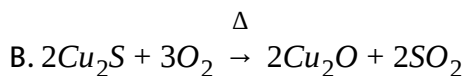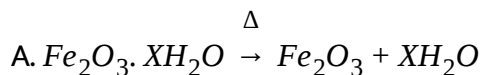
462. A compound 'X' on treatment with $Br_2/NaOH$, provided C_3H_9N, which gives positive carbylamine test. Compound 'X' is :

A. $CH_3COCH_2NHCH_3$

B. $CH_3CH_2COCH_2NH_2$

C. $CH_3CH_2CH_2CONH_2$

D. $CH_3CON\left(CH_3\right)_2$
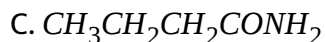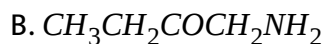
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463. Among the colloids cheese (C), milk (M) and smoke (S), the correct combination of the dispersed phase and dispersion medium, respectively is:

A. C: liquid in solid, M liquid in solid , S: solid in gas

B. C: liquid in solid, M: liquid in liquid, S: solid in gas

C. C: solid in liquid, M: liquid in liquid , S: gas in solid

D. C: solid in liquid, M : solid , S: solid in gas

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464. The homopolymer formed from 4-hydroxy-butanoic acid is

A.
$$\left[\begin{array}{c} O \\ \| \\ OC(CH_2)_3-O \end{array} \right]_n$$

B.
$$\left[\begin{array}{c} O \quad\quad O \\ \| \quad\quad \| \\ C(CH_2)_2C \end{array} \right]_n$$

C.
$$\left[\begin{array}{c} O \quad\quad O \\ \| \quad\quad \| \\ C(CH_2)_2C-O \end{array} \right]_n$$

D.
$$\left[\begin{array}{c} O \\ \| \\ C(CH_2)_3-O \end{array} \right]_n$$
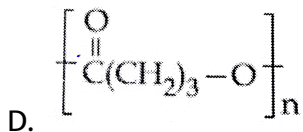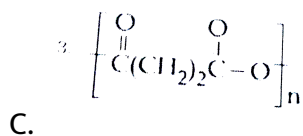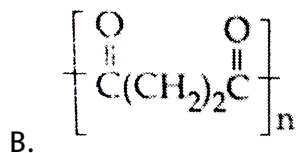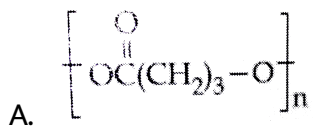
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465. K_2HgI_4 is 40% ionized in aqueous solution. The value of its van't Hoff factor (i) is

   A. 1.6

   B. 1.8

   C. 2

   D. 2.2

466. 30ml of the given HCl solution requires 30mL of 1 M sodium carbonated solution. What is the volume of this HCl solution required to titrate 30mL of 0.2M aqueous NaOH solution?

   A. $25mL$

   B. $75mL$

C. $50 mL$

D. $12.5 mL$

467. The reactin $2X \rightarrow B$ is a zeroth order reaction. If the initial concentration of X is 0.2 M, the half-life is 3h. When the initial concentration of X is 0.5 M, the time required to reach its final concentration of 0.2 M will be:

A. $9.0h$

B. $12.0h$

C. $18.0h$

D. $7.2h$

468. Match the following item in column I with the corresponding items in Column II.

	Column-I		Column-II
(i)	$Na_2CO_3 \cdot 10H_2O$	(A)	Portland cement ingredient
(ii)	$Mg(HCO_3)_2$	(B)	Castner-Kellner process
(iii)	$NaOH$	(C)	Solvay process
(iv)	$Ca_3Al_2O_6$	(D)	Temporary hardness

A. $(i) \rightarrow (B), (ii) \rightarrow (C), (iii) \rightarrow (A), (iv) \rightarrow (D)$

B. $(i) \rightarrow (C), (ii) \rightarrow (B), (iii) \rightarrow (D), (iv) \rightarrow (A)$

C. $(i) \rightarrow (D), (ii) \rightarrow (A), (iii) \rightarrow (B), (iv) \rightarrow (C)$

D. $(i) \rightarrow (C), (ii) \rightarrow (D), (iii) \rightarrow (B), (iv) \rightarrow (A)$

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469. A liquid was mixed with ethanol and a drop of concentrated H_2SO_4 was added. A compound with a fruity smell was formed. The liquid was

A. CH_3OH

B. $HCHO$

C. CH_3COCH_3

D. CH_3COOH
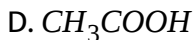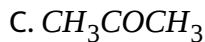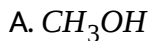
Answer: D

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470. Arrange the carbanions, $(CH_3)_3\bar{C}, \bar{C}Cl_3, (CH_3)_2\bar{C}H, C_6H_5\bar{C}H_2$, in order of their decreasing stability

A. $C_6H_5\bar{C}H_2 > \bar{C}Cl_3 > (CH_3)_3\bar{C} > (CH_3)_2\bar{C}H$

B. $(CH_3)_2\bar{C}H > \bar{C}Cl_3 > C_6H_5\bar{H}_2 > (CH_3)_3\bar{C}$

C. $\bar{C}Cl_3 > C_6H_5\bar{C}H_2 > (CH_3)_2\bar{C}H > (CH_3)_3\bar{C}$

D. $(CH_3)_3\bar{C} > (CH_3)_2\bar{C}H > C_6H_5\bar{C}H_2 > \bar{C}Cl_3$
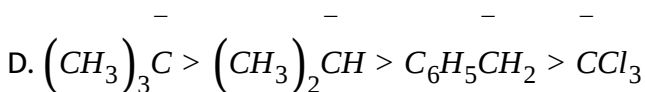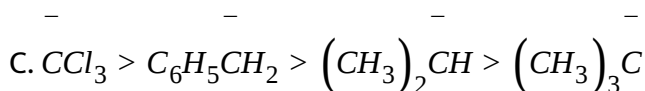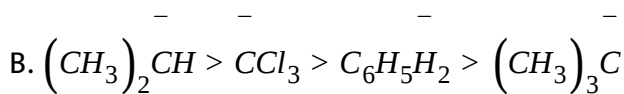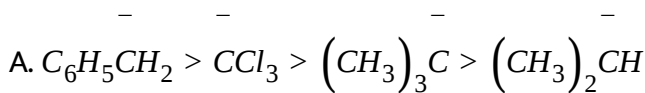
Answer: C

471. The alkene that exhibits geometrical isomerism is

A. propene

B. 2-methyl propene

C. 2-butene

D. 2-methyl-2-butene

Answer: C

472. In which of the following arrangements, the sequence is not strictly according to the property written against it ?

A. $CO_2 < SiO_2 < SnO_2 < PbO_2$: increasing oxidising power

B. $HF < HCl < HBr < HI$: increasing acid strength

C. $NH_3 < PH_3 < AsH_3 < SbH_3$: increasing basic strength

D. $B < C < O < N$: increasing first ionization enthalpy

Answer: C

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473. The major product obtained on interaction of phenol with sodium hydroxide and carbon dioxide is

A. benzoic acid

B. salicylaldehyde

C. salicylic acid

D. phthalic acid

Answer: C

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474. Which of the following statements regarding ozone is incorrect ?

    A. It occurs because of vander Waal's forces

    B. More easily liquefiable gases are adsorbed readily

    C. Under high pressure it results into multi molecular layer on adsorbent surface

    D. Enthalpy of adsorption $\left(\Delta H_{adsorption} \right)$ is low and positive.

Answer: D

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475. Solid $Ba(NO_3)$ is gradually dissolved in a $1.0 \times 10^{-4} M Na_2CO_3$ solution. At what concentrations of Ba^{2+}, will a precipitate begin to form?

$(K_{SP}$ for $BaCO_3 = 5.1 \times 10^{-9})$

    A. $4.1 \times 10^{-5} M$

B. $5.1 \times 10^{-5} M$

C. $8.1 \times 10^{-8} M$

D. $8.1 \times 10^{-7} M$

Answer: B

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476. Which one of the following reactions of xenon compounds is not feasible ?

A. $XeO_3 + 6HF \Rightarrow XeF_6 + 3H_2O$

B. $3XeF_4 + 6H_2O \rightarrow 2Xe + XeO_3 + 12HF + 1.5O_2$

C. $2XeF_2 + 2H_2O \rightarrow 2Xe + 4HF + O_2$

D. $XeF_6 + RbF \rightarrow Rb\left(XeF_7\right)$
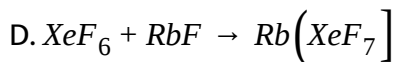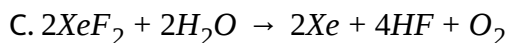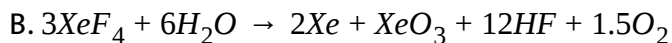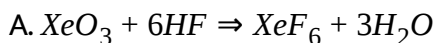
Answer: A

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477. Using MO theory predict which of the following sepcies has the shortest bond length ?

A. O_2^{2+}

B. O_2^+

C. O_2^-

D. O_2^{2-}
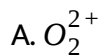
Answer: A

478. In context with the transition elements, which of the following statements is incorrect?

A. In addition to the normal oxidation states, the zero oxidation state is also shown by these elements in complexes

B. In the highest oxidation states, the transition metal show basic character and form cationic complexes.

C. In the highest oxidation states of the first five transition elements (Sc to Mn), all the 4s and 3d electrons are used for bonding.

D. Once the d^5 configuration is exceeded, the tendency to involveall the 3d electrons in bonding decreases.

Answer: B

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479. Calculate the wavelength (in nanometer) associated with a proton moving at 1.0×10^3 m/s (Mass of proton $= 1.67 \times 10^{-27} kg$ and $h = 6.63 \times 10^{-34} is$):

A. 0.032 nm

B. 0.40 nm

C. 2.5 nm

D. 14.0 nm

Answer: B

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480. A binary liquid solution is prepared by mixing n-heptane and ethanol. Which one of the following statements is correct regarding the behaviour of the solution?

A. The solution formed is an ideal solution

B. The solution is non-ideal, showing +ve deviation from Raoult's law

C. The solution is non-ideal, showing -ve deviation from Raoult's law

D. n-heptane shows +ve deviation while ethanol shows - ve deviation from Raoult's law

Answer: B

481. The number of stereoisomers possible for a compound of the molecular formula $CH_3 - CH = CH - CH(OH) - Me$ is

A. 3

B. 2

C. 4

D. 6

Answer: C

482. The $IUPAC$ name of neopentane is

A. 2-methylbutane

B. 2, 2-dimethylpropane

C. 2-methylpropane

D. 2, 2-dimethylbutane

Answer: B

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483. The set representing the correct order of ionic radius is

A. $Li^+ > Be^{2+} > Na^+ > Mg^{2+}$

B. $Na^+ > Li^+ Mg^{2+} > Be^{2+}$

C. $Li^+ > Na^+ > Mg^{2+} > Be^{2+}$

D. $Mg^{2+} > Be^{2+} > Li^+ > Na^+$
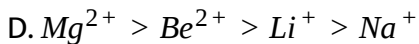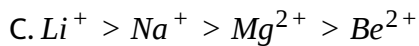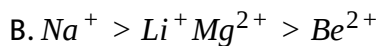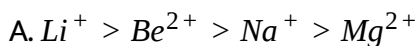
Answer: B

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484. The two function groups present in a typical carbohydrate are

A. $-OH$ and $-COOH$

B. $-CHO$ and $-COOH$

C. $>C=O$ and $-OH$

D. $-OH$ and $-CHO$

Answer: C

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485. The bond dissociation energy of B-F in BF_3 is 646 kJ mol^{-1} whereas that of C-F in CF_4 is 515 kJ mol^{-1}. The correct reason for higher B-F bond dissociation energy as compared to that of C-F bond is

A. smaller size of B-atom as compared to that C -atom

B. stronger σ bond between B and F in BF_3 as compared to that between C and F in CF_4

C. significant $p\pi$ - $p\pi$ interaction between B and F in BF_3 whereas there is no possibility of such interaction between C and F in CF_4

D. lower degree of $p\pi$ - $p\pi$ interaction between B and F in BF_3 than that between C and F in CF_4

Answer: C

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486. In the Cannizzaro reaction given below:

$$2Ph - CHO \xrightarrow{\overset{\ominus}{OH}} Ph - CH_2OH + PhCO_2^- \text{ the slowest step is:}$$
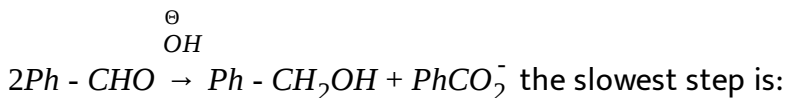
A. the attack of $\overset{(-)}{OH}$ at the carboxyl group

B. the transfer of hydride to the carbonly group

C. the abstraction of proton from the carboxylic group

D. the deportonation of $Ph \quad CH_2OH$

Answer: B

487. Which of the following pairs represents linkage isomers?

A. $\left[Cu\left(NH_3\right)_4\right]\left[PtCl_4\right]$ and $\left[Pt\left(NH_3\right)_4\right]\left[CuCl_4\right]$

B. $\left[Pb\left(P\ Ph_3\right)_2(NCS)_2\right]$ and $\left[Pb\left(PPh_3\right)_2(SCN)_2\right]$

C. $\left[Co\left(NH_3\right)_5NO_3\right]SO_4$ and $\left[CO\left(NH_3\right)_5SO_4\right]NO_3$

D. $\left[PtCl_2\left(NH_3\right)_4Br_2\right]$ and $\left[PtBr_2\left(NH_3\right)_4\right]Cl_2$

Answer: B

488. Buna-N synthetic rubber is a copolymer of:

A. $H_2C = CH - \overset{\overset{\displaystyle Cl}{\displaystyle |}}{C} = CH_2$ and $H_2C = CH - CH = CH_2$

B. $H_2C = CH - CH = CH_2$ and $H_5C_6 - CH = CH_2$

C. $H_2C = CH - CN$ and $H_2C = CH - CH = CH_2$

D. $H_2C = CH - CN$ and $H_2C = CH - C \mid CH_3 = CH_2$
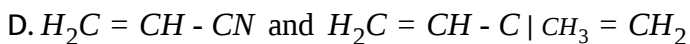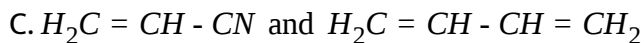
Answer: C

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489. Which among the following will be named as dibromidobis-(ethylenediamine) chromium (III) bromide?

A. $\left[Cr(en)_3 \right] Br_3$

B. $\left[Cr(en)_2 Br_2 \right] Br$

C. $\left[Cr(en) Br_4 \right]^-$

D. $\left[Cr(en) Br_2 \right] Br$
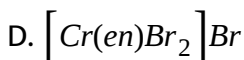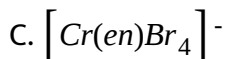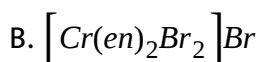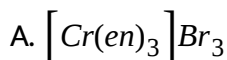
Answer: B

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490. Which process of purification is represented by the following reaction ?

$$T_{\text{Impure}}i + 2I_2 \xrightarrow{250\,^\circ C} TiI_4 \xrightarrow{1400\,^\circ C} T_{\text{Pure}}i + 2I_2$$
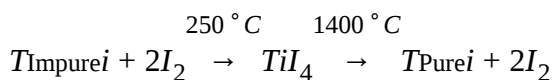
A. zone refining

B. cupellation

C. Poling

D. Van Arkel

Answer: D

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491. Lithium forms body centred cubic structure .The length of the side of its unit cells is 351 pm.A tomic radius of lithium will be :

A. 75 pm

B. 300 pm

C. 240 pm

D. 152 pm

Answer: D

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492. The molecule having smallest bond angle is

A. NCI_3

B. $AsCI_3$

C. $SbCI_3$

D. PCl_(3)`

Answer: C

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493. Which of the following compound can be detected by Molisch's test?

A. (a) Nitro compounds

B. (b) Sugars

C. (c) Amines

D. (d) Primary alcohols

Answer: B

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494. The incorrect expression among the following is

A. $\dfrac{\Delta G_{system}}{\Delta S_{total}} = -T$

B. In isothermal process $w_{reversible} = -nRT \ln \dfrac{V_f}{V_i}$

C. $\ln K = \dfrac{\Delta H^0 - T\Delta S^0}{RT}$

D. $K = e^{-\Delta G^0/RT}$

Answer: C

495. The density of a solution prepared by dissolving 120 g of urea (mol. Mass=60 u) in 1000 g of water is 1.15 g/mL. The molarity if this solution is

A. 0.50 M

B. 1.78 M

C. 1.02 M

D. 2.05 M

Answer: D

496. The species which can best serve as an initiator for the cationic polymerization is:

A. $LiAIH_4$

B. HNO_3

C. $AICI_3$

D. BuLi

Answer: C

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497. Which of the following on thermal decomposition yields a basic as wel as acidic oxide?

A. $NaNO_3$

B. $KCIO_3$

C. $CaCO_3$

D. NH_4NO_3
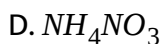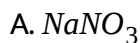
Answer: C

498. The standard reduction potential for Zn^{2+}/Zn, Ni^{2+}/Ni and Fe^{2+}/Fe are -0.76, - 0.23 and -0.44V respectively. The reaction $X + Y^2 \rightarrow X^{2+} + Y$ will be spontaneous when:

A. X = Ni, Y = Fe

B. X = Ni, Y = Zn

C. X = Fe, Y = Zn

D. X = Zn, Y = Ni

Answer: D

499. According to Freundlich adsorption isotherm, which of the following is correct?

A. $\dfrac{x}{m} \propto P^0$

B. $\dfrac{x}{m} \propto P^1$

C. $\dfrac{x}{m} \propto P^{1/n}$

D. All the above are correct for different ranges of pressure

Answer: D

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500. The equilibrium constant for the reaction

$N_2(g) + O_2(g) \Leftrightarrow 2NO(g)$
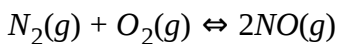
at temperature T is 4×10^{-4}.

The value of K_c for the reaction

$NO(g) \Leftrightarrow \dfrac{1}{2}N_2(g) + \dfrac{1}{2}O_2(g)$
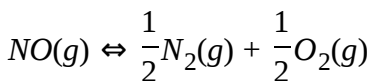
at the same temperature is

A. 0.02

B. 2.5×10^2

C. 4×10^{-4}

D. 50.0

Answer: D

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501. The compressibility factor for a real gas at high pressure is .

A. 1 + RT/pb

B. 1

C. 1 + pb/RT

D. 1-pb/RT

Answer: C

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502. Which one of the following statements is correct ?

A. (a) All amino acids except lysine are optically active

B. (b) All amino acids are optically active

C. (c) All amino acids except glycine are optically active

D. (d) All amino acids except glutamic acid are optically active

Answer: C

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503. Aspirin is known as

A. Acetyl salicylic acid

B. Phenyl salicylate

C. Acetyl salicylate

D. Methyl salicylic acid

Answer: A

504. Ortho -nitrophenol is less soluble in water than p-and m-nitrophenols because

A. o-Nitrophenol is more volatile in stem than those of m- and p-isomers

B. o-Nitrophenol shows Intramolecular H-bonding

C. o-Nitrophenol shows Intermolecular H-bonding

D. Melting point of o-Nitrophenol is lower than those of m- and p-isomers.

Answer: B

505. How many chiral compounds are possible on monochlorination of 2-methyl butane

A. 8

B. 2

C. 4

D. 6

Answer: B

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506. Very pure hydrogen (99.9 %) can be made by which of the following processes ?

A. Reaction of methane with steam

B. Mixing natural hydrocarbons of high molecular weight

C. Electrolysis of water

D. Reaction of salt like hydrides with water

Answer: C

507. The electrons, identified by quantum numbers n and l

(i) $n = 4l = 1$

(ii) $n = 4l = 0$

(iii) $n = 3l = 2$

(iv) $n = 3l = 1$

can be placed in increasing order of energy from the lowest to highest as

    A. n = 4, l = 1

    B. n = 4, l = 0

    C. n = 3, l = 2

    D. n = 3, l = 1

Answer: B

508. For a first order reaction , $A \rightarrow$ Products, the concentrations of A changes from 0.1 M to 0.025 M in 40 minutes. The rate of reaction when the concentration of A is 0.01 M is:

A. 1.73×10^{-5} M/min

B. 3.47×10^{-4} M/min

C. 3.47×10^{-5} M/min

D. 1.73×10^{-10} M/min

Answer: B

509. Iron exhibits $+2$ and $+3$ oxidation states. Which of the following statements about iron is incorrect?

A. Ferrous oxide is more basic in nature than the ferric oxide.

B. Ferrous compounds are relatively more ionic than the corresponding ferric compounds

C. Ferrous compounds are less volatile than the corresponding ferric compounds.

D. Ferrous compounds are more easily hydrolysed than the corresponding ferric compounds.

Answer: D

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510. The pH of a 0.1 molar solution of the acid HQ is 3. The value of the ionisation constant, K_a of the acid is

A. 3×10^{-1}

B. 1×10^{-3}

C. 1×10^{-5}

D. 1×10^{-7}

Answer: C

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511. Which branched chain isomer of the hydrocarbon with molecular mass $72u$ gives only one isomer of mono substituted alkyl halide ?

A. Tertiary butyl chloride

B. Neopentane

C. Isohexane

D. Neohexane

Answer: B

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512. K_f for water is $1.86 K kgmol^{-1}$. If your automobile radiator holds $1.0kg$ of water, how many grams of ethylene glycol $\left(C_2H_6O_2\right)$ must you add to get the freezing point of the solution lowered to $-2.8\,^\circ C$?

A. 72g

B. 93g

C. 39g

D. 27g

Answer: B

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513. What is DDT among the following ?

A. Greenhouse gas

B. A fertilizer

C. Biodegradable pollutant

D. Non-biodegradable polllutant

Answer: D

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514. The increasing order of the ionic radii of the given isoelectronic species is :-

A. $Cl^-, Ca^{2+}, K^+, S^{2-}$

B. $S^{2-}, Cl^-, Ca^{2+}, K^+$

C. $Ca^{2+}, K^+, Cl^-, S^{2-}$

D. $K^+, S^{2-}, Ca^{2+}, Cl^-$
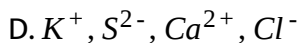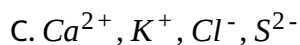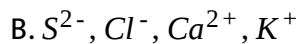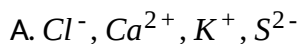
Answer: C

515. 2-Hexyne gives trans-2-hexene on treatment with :

A. Pt/H_2

B. Li/NH_3

C. $Pd/BaSO_4$

D. $LiAlH_4$

Answer: B

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516. Iodoform can be prepared from all except

A. Ethyl methyl ketone

B. Isopropyl alcohol

C. 3-Methyl-2-butanone

D. Isobutyl alcohol

Answer: D

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517. In which of the following pairs, the two species are not isostructural?

A. CO_3^{2-} and NO_3^{-}

B. PCl_4^{+} and $SiCl_4$

C. PF_5 and BrF_5

D. AlF_6^{3-} and SF_6

Answer: C

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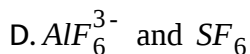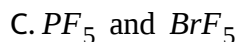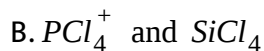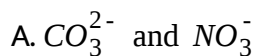
518. In the given transformation, which of the following is the most appropriate reagent ?

$$CH=CHCOCH_3$$

HO

Reagent

$$CH=CHCH_2CH_3$$

HO
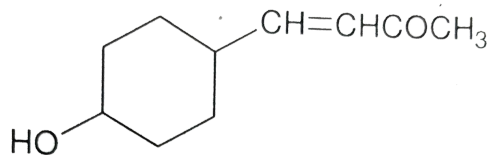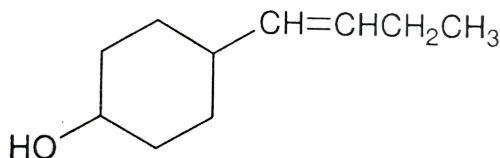
A. NH_2NH_2, $\overset{(-)}{O}H$

B. $Zn - Hg/HCI$

C. $Na, Liq. NH_3$

D. $NaBH_4$

Answer: A

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519. An unknown alcohol is treated with the "Lucas reagent" to determine whether the alcohol is primary, secondary or tertiary. Which alcohol reacts fastest and by what mechanism:

A. tertiary alcohol by S_N1

B. secondary alcohol by S_N2

C. tertiary alcohol by S_N2

D. secondary alcohol by S_N1

Answer: A

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520. The first ionisation potential of Na is $5.1eV$. The value of electron gain enthalpy of Na^+ will be

A. $-5.1eV$

B. $-10.2eV$

C. $+2.55eV$

D. $-2.55eV$

Answer: A

521. Stability of the species Li_2, Li_2^- and Li_2^+ increases in the order of

A. $Li_2^- < Li_2^+ < Li_2$

B. $Li_2 < Li_2^- < Li_2^+$

C. $Li_2^- < Li_2 < Li_2^+$

D. $Li_2 < Li_2^+ < Li_2^-$
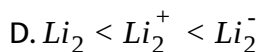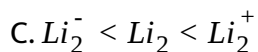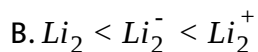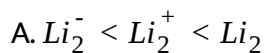
Answer: A

522. The molarity of a solution obtained by mixing $750mL$ of $0.5(M)HCl$ with $250mL$ of $2(M)HCl$ will be:

A. 1.00 M

B. 1. 75 M

C. 0.975 M

D. 0.875 M

Answer: D

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523. Which of the following is the wrong statement ?

A. O_3 molecule is bent

B. Ozone is violet-black in solid state

C. Ozone is diamagnetic gas

D. $ONCl$ and ONO^- are not isoelectronic

Answer: A::B::C::D

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524. Four successive members of first row transition element are listed below. Which one of them is expected to have highest $E\frac{M^{3+}}{\left(M^{2+}\right)}^{\ominus}$ value?

A. Mn(Z = 25)

B. Fe(Z = 26)

C. Co(Z = 27)

D. Cr(Z = 24)

Answer: C

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525. A solution of (+)-1-chloro-1-phenylethane in toluene racemises slowly in the presence of a small amount of $SbCl_5$ due to the formation of

A. carbene

B. carbocation

C. free radical

D. carbanion

Answer: B

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526. The coagulating power of electrolytes having ions $Na^{\oplus}$, Al^{3+} and Ba^{2+} for arsenic sulphide sol increases in the order

A. $Na^+ < Ba^{2+} < Al^{3+}$

B. $Ba^{2+} < Na^{2+} < Al^{3+}$

C. $Al^{3+} < Na^+ < Ba^{2+}$

D. $Al^{3+} < Ba^{2+} < Na^+$

Answer: A

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527. How many litres of water must be added to $1L$ of an aqueous solution of HCl with a pH of 1 to create an aqueous solution with pH of 2 ?

A. 0.9 L

B. 2.0 L

C. 9.0 L

D. 0.1 L

Answer: C

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528. Which one of the following molecules is expected to exhibit diamagnetic behaviour?

A. N_2

B. O_2

C. S_2

D. C_2

Answer: A::B::C::D

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529. Which one of the following arrangements does not represent the correct order of the property stated against it?

A. $Ni^{2+} < Co^{2+} < Fe^{2+} < Mn^{2+}$: ionic size

B. $Co^{3+} < Fe^{3+} < Cr^{3+} < Sc^{3+}$: stability in aqueous solution

C. $Sc < Ti < Cr < Mn$: number of oxidation states

D. $V^{2+} < Cr^{2+} < Mn^{2+} < Fe^{2+}$: paramagnetic behaviour

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530. Experimentally it was found that a metal oxide has formula $M_{0.98}O$. Metal M is present as M^{2+} and M^{3+} in its oxide ,Fraction of the metal which exists as M^{3+} would be

A. 0.0408

B. 0.0605

C. 0.0508

D. 0.0701

Answer: A

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531. An organic compound A (mol wt = 180) is acylated with CH_3COCl to get acylated compound of mol wt. 390. What is the number of amino groups present per molecule of the compound A?

A. 5

B. 4

C. 6

D. 2

Answer: A

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532. Given

$$E^0_{cr^{3+}/Cr} = -0.74V, E^0_{MnO_4/Mn^{2+}} = 1.51cm$$

$$E^0_{Cr_2O_7^{2-}/Cr^{3+}} = 1.33V, E^0_{Cl/Cl^-} = 1.36V$$

Based on the data given above, strongest oxidising agent will be:

A. Cr^{3+}

B. Mn^{2+}

C. MnO_4^-

D. CI^-

Answer: C

533. Arrange the following compounds in order of decreasing acidity:

OH	OH	OH	OH
Cl	CH_3	NO_2	OCH_3
(I)	(II)	(III)	(IV)
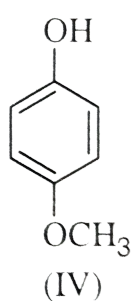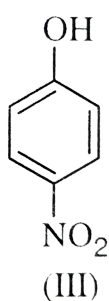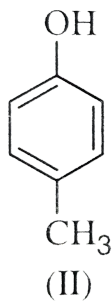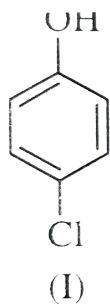
A. $I > II > III > IV$

B. $III > I > II > IV$

C. $IV > III > I > II$

D. $II > IV > I > III$

Answer: B

534. The rate of a reaction doubles when its temperature changes from 300K to 310K. Activation energy of such a reaction will be:
$\left(R = 8.314 JK^{-1}mol^{-1} \text{ and } \log 2 = 0.301\right)$

A. $48.6 kJmol^{-1}$

B. $58.5 kJmol^{-1}$

C. $60.5 kJmol^{-1}$

D. $53.6 kJmol^{-1}$

Answer: D

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535. Synthesis of each molecule of glucose in photosynthesis involves :

A. 10 molecules of ATP

B. 8 molecules of ATP

C. 6 molecules of ATP

D. 18 molecules of ATP

Answer: D

536. Which of the following complex species is not expected to exhibit optical isomerism ?

A. $\left[Co(en)_2 Cl_2 \right]^+$

B. $\left[Co(NH_3)_3 Cl_3 \right]$

C. $\left[Co(en)(NH_3)_2 Cl_2 \right]^+$

D. $\left[Co(en)_3 \right]^{3+}$
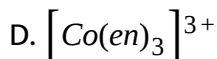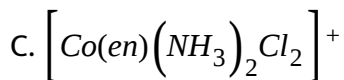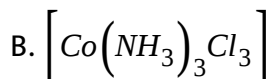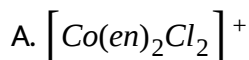
Answer: B

537. A piston filled with 0.04 mole of an ideal gas expands reversibly from $50.0mL$ at a constant temperature of $37.0\degree C$. As it does so, it absorbs $208J$ of heat. The value of q and W for the process will be $(R = 8.314J/molK$, $1n7.5 = 2.01)$

A. q = - 208 J, w = - 208 J

B. q = - 208 J, w = + 208 J

C. q = + 208 J, w = + 208 J

D. q = + 208 J, w = - 208 J

Answer: D

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538. A gaseous hydrocarbon gives upon combustion, 0.72 g of water and 3.08 g of CO_2. The empirical formula of the hydrocarbon is

A. C_3H_4

B. C_6H_5

C. C_7H_8

D. C_2H_4

Answer: C

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539. The order of stability of the following carbocations:

$$H_2C=CH-\overset{+}{C}H_2 \; ; \; H_3C-CH_2-\overset{+}{C}H_2 \; ;$$

I

II

III

A. $II > III > I$
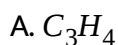
B. $I > II > III$

C. $III > I > II$

D. $III > II > I$

Answer: C

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540. Which of the following represent the correct order of increasing first ionisation enthalpy for Ca, Ba, S, Se and Ar

A. $S < Se < Ca < Ba < Ar$

B. $Ba < Ca < Se < S < Ar$

C. $Ca < Ba < S < Se < Ar$

D. $Ca < S < Ba < Se < Ar$

Answer: B

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541. For gaseous state, if most probable speed is denoted by C^* average speed by $\bar{C}$ and root square speed by C, then for a large number of molecules, the ratios of these speeds are

A. $C^* : \bar{C} : C = 1.128 : 1.\,225 : 1$

B. $C^* : \bar{C} : C = 1 : 1.\,128 : 1.225$

C. $C^* : \bar{C} : C = 1 : 1.125 : 1.128$

D. $C^* : \bar{C} : C = 1.225 : 1.128.1$

Answer: B

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542. The gas leaked from a storage tank of the Union Carbide plant in Bhopal gas tragedy was

A. Methylamine

B. Ammonia

C. Phosgene

D. Methylisocyanate

Answer: D

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543. Consider the following reaction

$$xMnO_4^- + C_2O_4^{2-} + zH^+ \rightarrow xMn^{2+} + 2yCO_2 + \frac{z}{2}H_2O$$
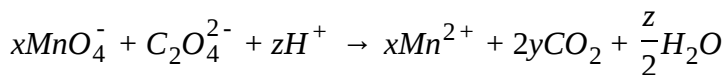
The value of x, y and z in the reaction are respectively

A. 2, 5 and 8

B. 2, 5 and 16

C. 5, 2 and 8

D. 5, 2 and 16

Answer: B

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544. Which of the following exists as covalent crystals in the solid state?

A. Silicon

B. Sulphur

C. Phosphorous

D. Iodine

Answer: A

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545. Compound (A) C_8H_9Br. Gives a white precipitate when warmed with alcoholic $AgNO_3$. Oxidation of (A) gives an acid (B). $C_8H_6O_4$. (B) easily forms anhydride on heating. Identify the compound (A)

(1)

A.

B.

C.

(4)

D.
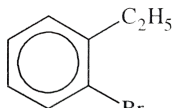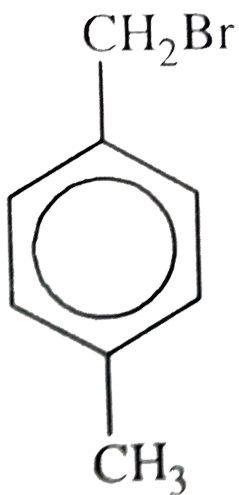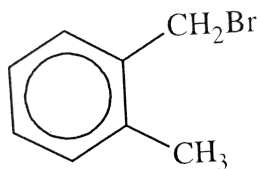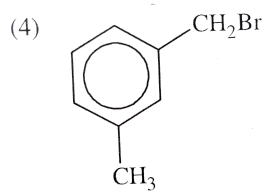
Answer: C

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546. Energy of an electron is givem by $E = -2.178 \times 10^{-18} J \left(\dfrac{Z^2}{n^2} \right)$.

Wavelength of light required to excited an electron in an hydrogen atom from level $n = 1$ to $n = 2$ will be

$\left(h = 6.62 \times 10^{-34} Js \text{ and } c = 3.0 \times 10^8 ms^{-1} \right).$

A. 2.816×10^{-7} m

B. 6.500×10^{-7} m

C. 8.500×10^{-7} m

D. 1.214×10^{-7} m

Answer: D

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547. An orgainc compound A upon reacting with NH_3 gives B On heating B give C. C in presence KOH reacts with Br_2 to yield $CH_3CH_2NH_2 A$ is .

A. $CH_3CH_2CH_2COOH$

B. $H_3C - CH \,|\, CH_3 - COOH$

C. CH_3CH_2COOH

D. CH_3COOH
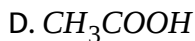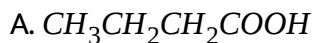
Answer: C

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548. In the of the following pairs of molecules /ions both the species are

not likely to exist?

A. H_2^-, He_2^{2-}

B. H_2^{2+}, He_2

C. $H_2^- He_2^{2+}$

D. H_2^+, He_2^{2-}
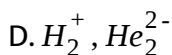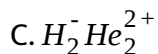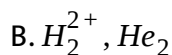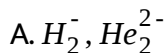
Answer: B

549. Which one of the following properties is not shown by NO ? .

A. It combines with oxygen to form nitrogen dioxide

B. It's bond order is 2.5

C. It is diamagnetic in gaseous state

D. It is neutral oxide

550. If Z is a compressibility factor, van der Waals' equation at low pressure can be written as

A. $Z = 1 - \dfrac{Pb}{RT}$

B. $Z = 1 + \dfrac{Pb}{RT}$

C. $Z = 1 + \dfrac{RT}{Pb}$

D. $Z = 1 - \dfrac{a}{VRT}$

551. The metal that cannot be obtained by electrolysis of an aqueous solution of its salts is :

A. Cu

B. Cr

C. Ag

D. Ca

552. Resistance of $0.2M$ solution of an electrolyte is $50 ohm$. The specific conductance of the solution is $1.4 Sm^{-1}$. The resistance of $0.5M$ solution of the same electrolyte is 280Ω. The molar conductivity of $0.5M$ solution of the electrolyte in $Sm^2 mol^{-1}$ id

A. 5×10^3

B. 5×10^2

C. 5×10^{-4}

D. 5×10^{-3}

553. $CsCl$ crystallizes in body centred cubic lattice .If $'a'$ is its edge length then which of the following expression is correct?

A. $r_{Cs^+} + r_{Cl^-} = \dfrac{\sqrt{3}}{2} a$

B. $r_{Cs^+} + r_{Cl^-} = \sqrt{3} a$

C. $r_{Cs^+} + r_{Cl^-} = 3a$

D. $r_{Cs^+} + r_{Cl^-} = \dfrac{3a}{2}$

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554. Consider separate solutions of $0.500 M C_2H_5OH(aq)$, $0.100 M Mg_3(PO_4)(aq)$, $0.250 M KBr(aq)$, and $0.125 M Na_3PO_4(aq)$ at $25\,^\circ C$. Which statement is true about these solutions, assuming all salts to be strong electrolytes?

A. $0.125 M Na_3PO_4(aq)$ has the highest osmotic pressure.

B. $0.500 M C_2H_5OH(aq)$ has the highest osmotic pressure.

C. They all have the same osmotic pressure.

D. $0.100 M Mg_3(PO_4)_2(aq)$ has the highest osomotic pressure.

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555. In which of the following reactions, H_2O_2 acts as a reducing agent ?

A. (a) , (c)

B. (b), (d)

C. (a), (d)

D. (c),(d)

556. In S_N2 reactions the corect order of reactivity for the following compound :

A. $CH_3CH_2Cl > CH_3Cl > \left(CH_3\right)_2CHCl > \left(CH_3\right)_3CCl$

B. $\left(CH_3\right)_2CHCl > CH_3CH_2Cl > CH_3Cl > \left(CH_3\right)_3CCl$

C. $CH_3Cl > \left(CH_3\right)_2CHCl > CH_3CH_2Cl > \left(CH_3\right)_3CCl$

D. $CH_3Cl > CH_3CH_2Cl > \left(CH_3\right)_2CHCl > \left(CH_3\right)_3CCl$
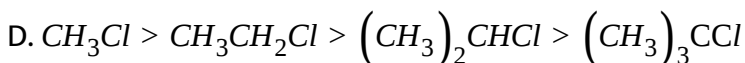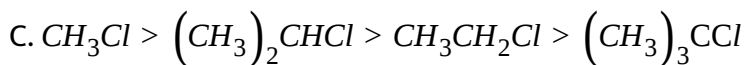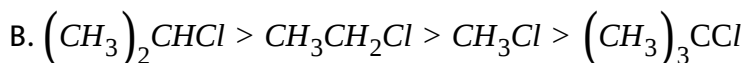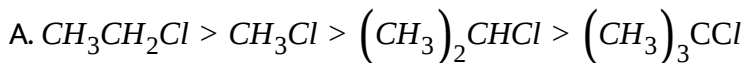
557. Homoleptic octahedral complexes of a metal ion 'M^{3+}' with three monodentate ligands L_1, L_2 and L_3 absorb wavelengths in the region of green, blue and red respectively. The increasing order of the ligand strength is :

A. $L_3 < L_2 < L_4 < L_1$

B. $L_1 < L_2 < L_4 < L_3$

C. $L_4 < L_3 < L_2 < L_1$

D. $L_1 < L_3 < L_2 < L_4$

558. For the estimation of nitrogen, 1.4 g of an organic compound was digested by Kjeldahl's method and the evolved ammonia was absorbed in 60 mL of $M/10$ sulphuric acid. The unreacted acid required 20 mL of $M/10$ sodium hydroxide for complete neutralisation. The percentage of nitrogen in the compound is

A. 3 %

B. 5 %

C. 6 %

D. 10 %

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559. The equivalent conductance of NaCl at concentration C and at infinite dilution are λ_C and λ_∞, respectively. The correct relationship between λ_C and λ_∞ is given as (where, the constant B is positive)

A. $\lambda_C = \lambda_\infty - (B)\sqrt{C}$

B. $\lambda_C = \lambda_\infty + (B)\sqrt{C}$

C. $\lambda_C = \lambda_\infty + (B)C$

D. $\lambda_C = \lambda_\infty - (B)C$

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560. For the reaction, $SO_2(g) + \dfrac{1}{2}O_2(g) \Leftrightarrow SO_3(g)$ if $K_p = K_C(RT)^x$ where, the symbols have usual meaning, then the value of x is (assuming ideality)

A. $\dfrac{1}{2}$

B. 1

C. -1

D. $-\dfrac{1}{2}$

561. In the reaction

$$CH_3COOH \xrightarrow{LiAlH_4} A \xrightarrow{PCl_4} B \xrightarrow{Alc.KCN} C$$
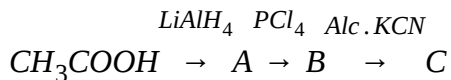
The product C is

A. Ethylene

B. Acetyl chlorid

C. Acetaldehyde

D. Acetylene

562. Sodium phenoxide when heated with CO_2 under pressure at $125\degree C$

yield a product which on acetylation gives product C

$$\text{(C}_6\text{H}_5\text{ONa)} + CO_2 \xrightarrow[\text{5 atm}]{125°C} B \xrightarrow[Ac_2O]{H^+} C$$

(1)

A.

OH
COOCH₃

(2)

B.

OCOCH₃
COOH

(3)

C.

OCOCH₃
COOH

(4)

D.

OH
COCH₃
COCH₃
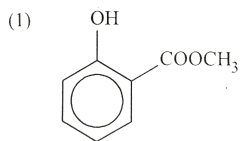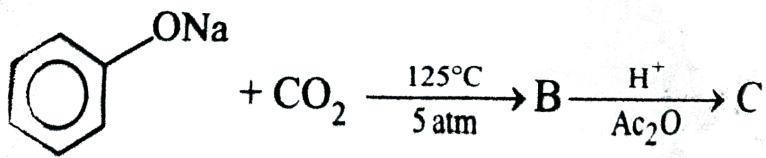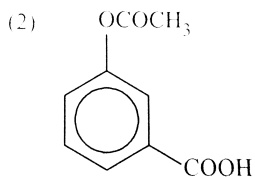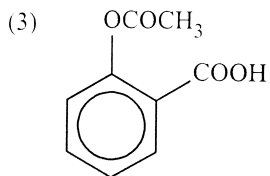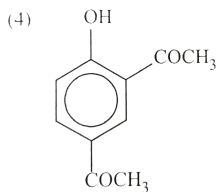
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563. On heating an aliphatic primary amine with chloroform and enthanolic potassium hydrozide, the organic compound formed is

A. an alkyl cyanide

B. an alkyl isocyanide

C. an alkanol

D. an alkanediol

564. The correct statement for the molecule, CsI_3 is

A. It contains Cs^{+3} is I^- ions

B. it contains Cs^+, I^- not lattice I_2 molecule

C. it is a covalent molecule.

D. it contains Cs^+ and I_3^- ions.

565. The equation which is balanced and represents the correct product(s) is .

A. $\left[Mg\left(H_2O\right)_6\right]^{2+} + (EDTA)^{4-} \xrightarrow{\text{excess NaOH}} [Mg(EDTA)]^{2+} + 6H_2O$

B. $CuSO_4 + 4KCN \rightarrow K_2\left[Cu(CN)_4\right] + K_2SO_4$

C. $Li_2O + 2KCl \rightarrow 2LiCl + K_2O$

D. $\left[CoCl\left(NH_3\right)_5\right]^{+} 5H^{+} \rightarrow Co^{2+} + 5NH_4^{+} + Cl^{-}$
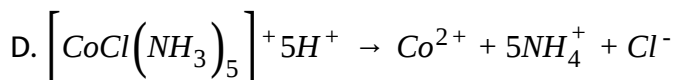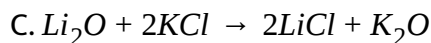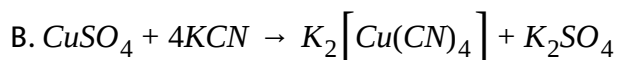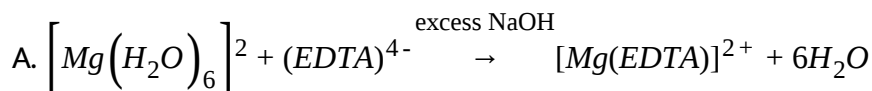
566. Considering the basic strength of amines in aqueous sloution which one has the smallest pk_b value .

A. $(CH_3)_3N$

B. $C_6H_5NH_2$

C. $(CH_3)_2NH$

D. CH_3NH_2
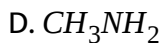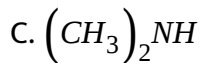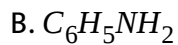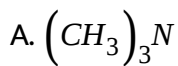
567. Which of the following bases is not present in DNA ?

A. Cytosine

B. Thymine

C. Quinoline

D. Adenine

568. Correct set of four quantum numbers for the valence (outermost) electron of rubidium ($Z = 37$) is

A. $5, 1, 1, +\dfrac{1}{2}$

B. $5, 0, 1, +\dfrac{1}{2}$

C. $5, 0, 0, +\dfrac{1}{2}$

D. $5, 1, 0, +\dfrac{1}{2}$

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569. The major organic compound formed by the reaction of 1,1,1-trichloroethane with silver power is .

A. 2- Butyne

B. 2- Butene

C. Acetylene

D. Ethene

570. Given below are half-cell reaction:

$Mn^{2+} + 2e^- \rightarrow Mn, , E° = -1.18V$

$2\left(Mn^{3+} + e^- \rightarrow Mn^{2+}\right), , E° = +1.51V$
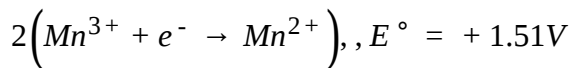
The $E°$ for $3Mn^{2+} \rightarrow Mn + 2Mn^{3+}$ will be:

A. $-0.33V$, the reaction will not occur

B. $-0.33V$, the reaction will occur

C. $-2.69V$, the reaction will not occur

D. $-2.69V$, the reaction will occur

571. A gaseous mixture contains oxygen and nitrogen in the ratio $1:4$ by weight. Therefore, the ratio of the number of molecules is:

A. $1:8$

B. $3:16$

C. $1:4$

D. $7:32$

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572. Which one is classified as a condensation polymer ?

A. Teflon

B. Acrylonitrile

C. Dacron

D. Neoprene

---

573. Among the following oxioacids, the correct decreasing order of acid

strength is

A. $HClO_4 > HClO_3 > HClO_2 > HOCl$

B. $HClO_2 > HClO_4 > HClO_3 > HOCl$

C. $HOCl > HClO_2 > HClO_3 > HClO_4$

D. $HClO > HOCl > HClO_2 > HClO_3$

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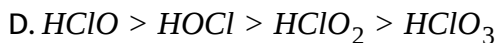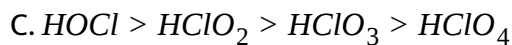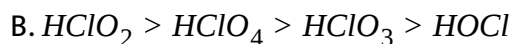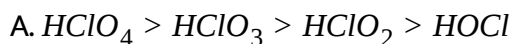
574. For the complete combustion of ethanol,

$C_2H_5OH(l) + 3O_2(g) \rightarrow 2CO_2(g) + 3H_2O(l)$ the amount of heat produced

as measured in bomb calorimeter is $1364.47 KJmol^{-1}$ at $25\,°C$. Assuming

ideality, the enthalpy of combustion, ΔH_C, for the reaction will be

$$\left[R = 8.314 JK^{-1}mol^{-1}\right]$$

A. $-1460.50 kJmol^{-1}$

B. $-1350.50 kJmol^{-1}$

C. $-1366.95 kJmol^{-1}$

D. $-1361.95 kJmol^{-1}$

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575. The most suitable reagent for the conversion of

$R - CH_2 - OH \rightarrow R - CHO$ is

A. CrO_3
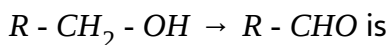
B. PCC (Pyridinium Chlorochromate)

C. $KMnO_4$

D. $K_2Cr_2O_7$
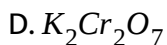
576. A stream of electrons from a heated filament was passed between two charged plates kept at a potential difference V esu. If c and m are charge and mass of an electron repectively, then the value of h/λ (where λ is wavelength associated with electron wave) is given by :

A. 2meV

B. $\sqrt{meV}$

C. $\sqrt{2meV}$

D. meV

Answer: C

577. 2-chloro-2-methylpentane on reaction with sodium methoxide in methanol yields:

(a) $C_2H_5CH_2C\underset{|}{\overset{CH_3}{|}}CH_3 - OCH_3$ (b) $C_2H_5CH_2C|CH_3 = CH_2$ (c)

$C_2H_5CH_2 = C|CH_3 - CH_3$
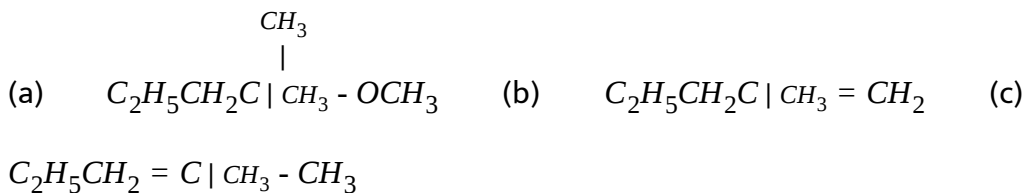
A. (a) and (c)

B. (c) only

C. (a) and (b)

D. All of these

Answer: D

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578. Which of the following compounds is metallic and ferromagnetic ?

A. CrO_2

B. VO_2

C. MnO_2

D. TiO_2

Answer: A

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579. Which of the following statements about low density polythene is false ?

A. It is a poor conductor of electricity.

B. Its synthesis requires dioxygen or a peroxide initiator as a catalyst.

C. It is used in the manufacture of buckets, dust-bins etc.

D. Its synthesis requires high pressure.

Answer: C

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580. For a linear plot of log (x/m) versus log [in a Freundlich adsorption isotherm, which of the following statements is correct ? (k and n are consists)

A. 1/n appears as the intercept.

B. Only 1/n appears as the slope

C. log (1/n) appears as the intercept.

D. Both k and 1/n appear in the slope term.

Answer: B

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581. The enthalpies of combustion of carbon and carbon monoxide are -393.5 and -283 kJ mol^{-1} respectively. The enthaly of formation of carbon monoxide per mole is :

A. 676.5

B. -676.5

C. -110.5

D. 110.5

Answer: C

582. The hottest region of Bunsen flame shown in the figure below is :

region 4

region 3
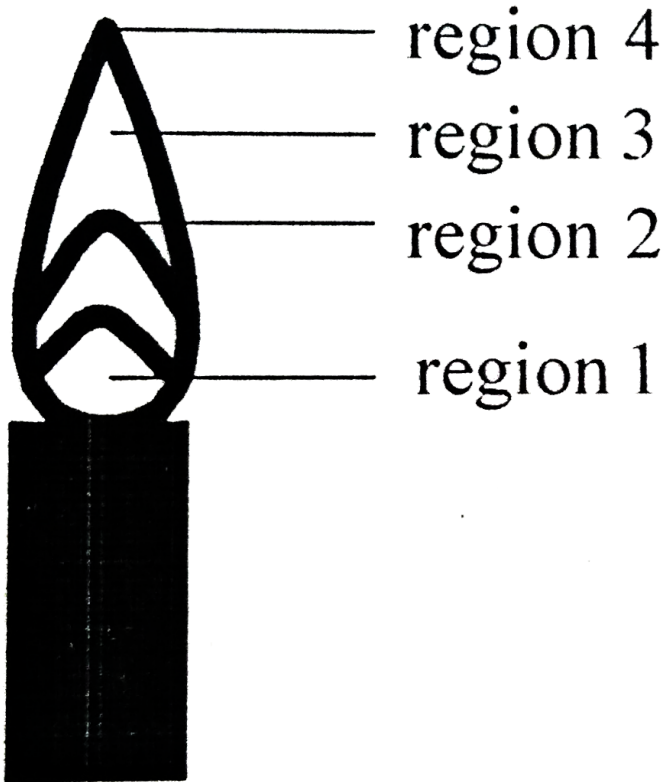
region 2

region 1

A. region 2

B. region 3

C. region 4

D. region 1

Answer: A

583. Which of the following is an anionic detergent ?

A. Sodium lauryl sulphate

B. Cetyltrimethyl ammonium bromide

C. Glyceryl oleate

D. Sodium stearate

Answer: A

584. 18g of glucose $\left(C_6H_{12}O_6\right)$ is added to 178.2 g of water. The vapour pressure of water for this aqueous solution at $100\,°C$ is :

A. 76.0

B. 752.4

C. 759.0

D. 7.6

Answer: B

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585. The distillation technique most sited for separating glycerol from spent lye in the soap industry is

A. Fractional distillation

B. Steam distillation

C. Distillation under reduced pressure

D. Simple distillation

Answer: C

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586. The species in which the N-atom is in a state of sp hybridisation is

A. NO_2^-

B. NO_3^-

C. NO_2

D. NO_2^+
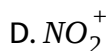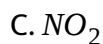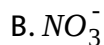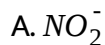
Answer: D

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587. Decompsition of H_2O_2 follows a frist order reactions. In 50 min the concentrations of H_2O_2 decreases from 0.5 to 0.125 M in one such decomposition . When the concentration of H_2O_2 reaches 0.05 M, the rate of fromation of O_2 will be

A. $6.93 \times 10^{-4} mol \ min^{-1}$

B. $2.66L \ min^{-1}$ at STP
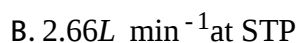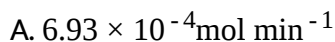
C. 1.34×10^{-2} mol min^{-1}

D. 6.93×10^{-2} mol min^{-1}

Answer: A

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588. The pair having the same magnetic moment is

[at. No. $Cr = 24$, $Mn = 25$, $Fe = 26$ and $Co = 27$]

A. $\left[Cr(H_2O)_6\right]^{2+}$ and $\left[Fe(H_2O)_6\right]^{2+}$

B. $\left[Mn(H_2O)_6\right]^{2+}$ and $\left[Cr(H_2O)_6\right]^{2+}$

C. $\left[CoCl_4\right]^{2-}$ and $\left[Fe(H_2O)_6\right]^{2+}$

D. $\left[Cr(H_2O)_6\right]^{2+}$ and $\left[CoCl_4\right]^{2-}$
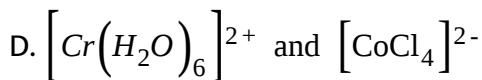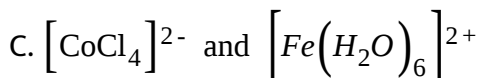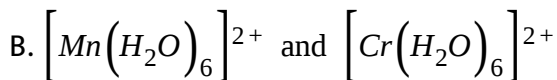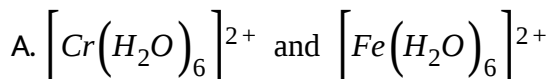
Answer: A

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589. The absolute configuration of

$$CO_2H$$

$$H \text{———} OH$$

$$H \text{———} Cl$$

$$CH_3$$
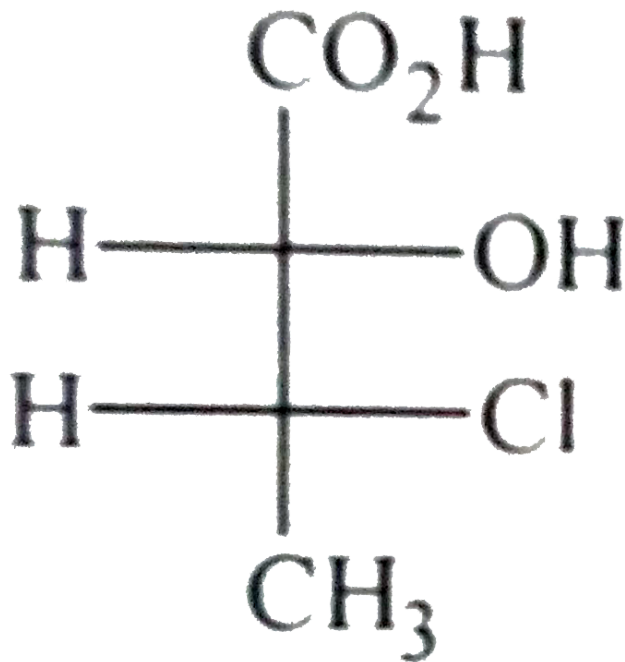
A. (2S, 3R)

B. (2S, 3S)

C. (2R, 3R)

D. (2R, 3S)

Answer: A

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590. The equilibrium constant at $298K$ for a reaction, $A + B \Leftrightarrow C + D$ is 100. If the initial concentrations of all the four species were 1M each, then equilibirum concentration of D (in $molL^{-1}$) will be

A. 0.818

B. 1.818

C. 1.182

D. 0.182

Answer: B

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591. Which one of the following ores is best concentrated by froth flotation method:

A. cassiterite

B. Galena

C. Malachite

D. Magnetite

Answer: B

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592. At $300K$ and $1atm$, $15mL$ of a gaseous hydrocarbon requires $375mL$ air containing $20\%\,O_2$ by volume for complete combustion. After combustion, the gases occupy $330mL$. Assuming that the water formed is in liquid form and the volumes were measured at the same temperature and pressure, the formula of the hydrocarbon is

A. C_3H_8

B. C_4H_8

C. C_4H_{10}

D. C_3H_6

593. The pair in which phosphorus atoms have a formal oxidation state of $+3$ is

    A. Pyrophosphorous and hypophosphoric acids

    B. Orthophosphorus and hypophosphoric acids

    C. Pyrophosphorous and pyrophosphoric acids

    D. Orthophosphorous and pyrophosphorous acids

Answer: D

594. Which one of the following complexes shows optical isomerism ?

    A. $cis\left[Co(en)_2Cl_2\right]Cl$

    B. $trans\left[Co(en)_2Cl_2\right]Cl$

C. $\left[Co\left(NH_3 \right)_4 Cl_2 \right] Cl$

D. $\left[Co\left(NH_3 \right)_3 Cl_3 \right]$
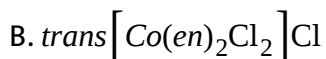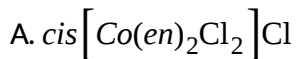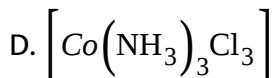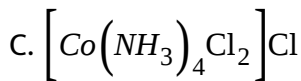
Answer: A

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595. Which one of the following statements about water is false ?

A. Water can act both as an acid and as a base.

B. There is extensive intramolecular hydrogen bonding in the condensed phase.

C. Ice formed by heavy water sinks in normal water

D. Water is oxidized to oxygen during photosynthesis

Answer: B

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596. The concentration of fluoride, lead, nitrate and iron in a water sample from an underground lake was found to be 1000 ppb,40 ppb,100 ppm and 0.2 ppm, respectively. This water is unsuitable for drinking due to high concentration of

A. Lead

B. Nitrate

C. Iron

D. Fluoride

Answer: B

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597. The main oxides formed on combustion of Li,Na and K in excess of air respectively are

A. LiO_2, Na_2O_2 and K_2O

B. Li_2O_2, Na_2O_2 and KO_2

C. Li_2O, Na_2O_2 and KO_2

D. Li_2O, Na_2O and KO_2

Answer: C

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598. Thiol group is present in

A. Cystine

B. Cysteine

C. Methionine

D. Cytosine

Answer: B

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599. Galvanisation is applying a coating of

A. Cr

B. Cu

C. Zn

D. Pb

Answer: C

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600. Which of the following atoms has the highest first ionisation energy ?

A. Na

B. K

C. Sc

D. Rb

Answer: C

601. Assertion : Among the carbon allotropes, diamond is an insulater, wherea, graphite is a good conductor of electricity.

Reason : Hybridization of carbon in diamond and graphite are sp^3 and sp^2, respectively.

A. Assertion is incorec statement, but the reson is correct.

B. Both assertion and reson are incorrect

C. but the reason is not the correct explanation for the assertion.

D. Both assertion and reason are correct, and the reson is the correct explanation for the assertion.

602. The rate law for the reaction below is given by the expresssion $K[A][B]$.

$A + B \rightarrow$ product
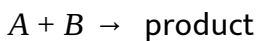
If the concentration of B is increased from 0.1 to 0.3 mole, keeping the value of A at 0.1, mole the rate constant will be :

A. 9k

B. $k/3$

C. k

D. 3k

603. Which of the following is an example of homoleptic complex ?

A. $\left[Co\left(NH_3\right)_6 \right]Cl_3$

B. $\left[Co\left(NH_3\right)_4 Cl_2 \right]$

C. $\left[Pt(NH_3)_2Cl_2\right]$

D. $\left[Co(NH_3)_5Cl\right]Cl_2$
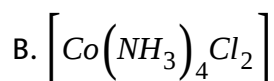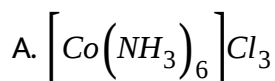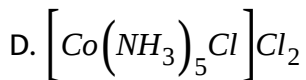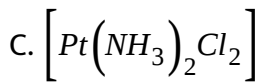
604. Observation of "Rinmann's purple "is confirmatory test for the presence of :

A. Protein

B. Reducing sugar

C. Starch

D. Cupric ion

605. Fluorination of an aromatic ring is easily accompolished by treating a diazonium salt with HBF_4. Which of the following conditions is correct about this reaction ?

    A. NaF/Cu

    B. $NaNO_2/Cu$

    C. $Cu_2O; H_2O$

    D. Only heat

606. Which of the following polymers is synthesized using a free radical polymerization technique?

    A. Terylene

    B. Nylon 6,6

C. Melamine polymer

D. Teflon

607. An aqueous solution of a salt MX_2 at certain temperature has a van'f Hoff factor of 2. The degree of dissociation for this solution of the salt is:

A. 0.80

B. 0.50

C. 0.67

D. 0.33

608. The commerical name for calcium oxide is :

A. Limestone

B. Milk of lime

C. Slacked lime

D. Quick lime

609. If 100 mole of H_2O_2 decompose at 1 bar and 300 K, the work done (kJ) by one mole of $O_2(g)$ as it expands against 1 bar pressure is

$$2H_2O_2(l) \;\overset{\rightarrow}{\leftarrow}\; 2H_2O(l) + O_2(g)$$
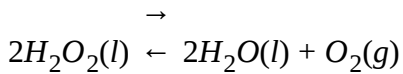
$$\left(R = 8.3 JK^{-1}mol^{-1}\right)$$

A. 498.00

B. 62.25

C. 249.00

D. 124.50

610. The correct statement about the synthesis of erythritol $\left(C\left(CH_2OH\right)_4\right)$ used in the preparation of PETN is :

A. The synthesis requires three aldol condensations and one Cannizzaro reaction.

B. The synthesis requires two aldol condensations and two Cannizzaro reactions.

C. Alpha hydrogens of ethanol and methanol are involved in this reaction.

D. The synthesis requires four aldol condensations between methanol and ethanol.

611. Which one of the following substances used in dry cleaning is a better strategy to control enviroment pollution ?

    A. Tetrachloroethylene

    B. Sulphur dioxide

    C. Carbon dioxide

    D. Nitrogen dioxide

612. The following statements concern elements in the periodic table. Which of the following is true ?

A. (a) For group 15 elements, the stability of +5 oxidation state

increases down the group .

B. (b) All the elements in Group 17 are gases.

C. (c) Elements of Group 16 have lower ionization enthalpy values

compared to those of Group 15 in the corresponding periods.

D. (d) The Group 13 elements are all metals.

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613. Which of the following is a bactericidal antibiotic ?

A. (a) Ofloxacin

B. (b) Tetracycline

C. (c) Chloroamphenicol

D. (d) Erythromycin

614. Identify the reaction which does not liberatre hydrogen :

A. (a) Reaction of zinc with aqueous alkali.

B. (b) Electrolysis of acidified water using Pt electrodoes.

C. (c) Reaction of lithium hydride with B_2H_6.

D. (d) Allowing a solution of sodium in liquid ammonia to stand.

615. The root mean square speed fo molecules of nitrogen gas is v at a certain temperature. When the temperature is doubled, the molecules dissociate into individual atoms. The new rms speed of the atom is:

A. u/2

B. 14 u

C. 4u

D. 2u

616. Bromination of cyclohexene under conditions given below yields :

Br_2/hv

A.

(A)

Br

Br

(B)

B.

(C)

C.

(D)

D.
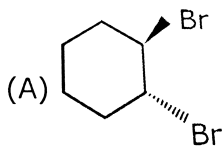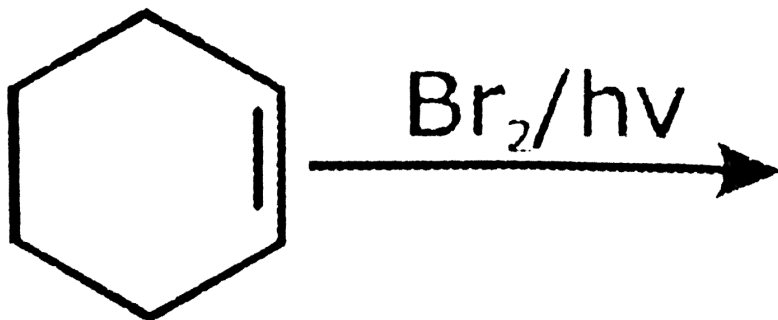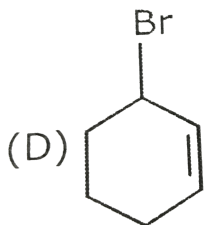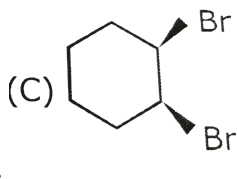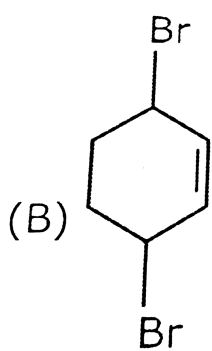
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617. The volume of $0.1N$ dibasic acid sufficient to neutralize 1g of a base that furnishes 0.04 mole of OH^- in aqueous solution is :

A. (a) 200mL

B. (b) 800mL

C. (c) 600mL

D. (d) 400mL

618. Identify the incorrect statement :

A. Rhombic and monoclinic sulphurf have S_8 molecules.

B. S_2 is paramagnetic like oxygen .

C. The S - S - S bond angles in the S_8 and S_6 rings are the same.

D. S_8 ring has a crown shape.

619. If the shortest wavelength in Lyman series of hydrogen atom is A, then the longest wavelength in Paschen series of He^+ is:

A. $\dfrac{5A}{9}$

B. $\dfrac{36A}{7}$

C. $\dfrac{36A}{5}$

D. $\dfrac{9A}{5}$

Answer: B

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620. Among the following, the essential amino acid is :

A. Valine

B. Alanine

C. Serine

D. Aspartic acid

Answer: A

621. Identify the pollutant gases largely responsible for the discoloured

and lustreless nature of marble of the Taj Mahal.

A. $SO_2 and O_3$

B. $O_3 and CO_2$

C. $SO_2 and NO_2$

D. $CO_2 and NO_2$

Answer: C

622. Which of the following compounds will not undergo Friedel Craft's

reaction with benzene ?

A. (1) Cl

B. (2) Cl

C. (3) Cl

D. (4)
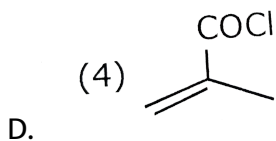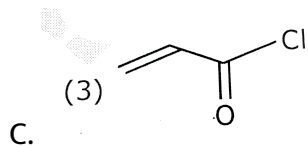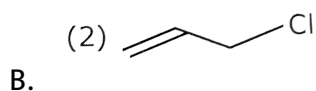
Answer: A

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623. Which of the following is paramagnetic ?

A. CO

B. NO^+

C. O_2^{2-}

D. B_2

Answer: D

624. The rate of a reaction A doubles on increasing the temperature from 300 to 310 K. By how much, the temperature of reaction B should be increased from 300 K so that rate doubles if activation energy of the reaction B is twice to that of reaction A

A. (a) 4.92K

B. (b) 9.84K

C. (c) 19.67K

D. (d) 2.45K

Answer: A

625. A solution containing a group-IV cation gives a precipitate on passing, H_2S. A solution of this precipitate in dil. HCl produces a white precipitate with NaOH solution and bluish-white precipitate with basic potassium ferrocyanide. The cation is :

A. Mn^{2+}

B. Zn^{2+}

C. Ni^{2+}

D. Co^{2+}
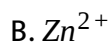
Answer: B

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626. Which of the following statements is not true about partition chromatography ?

A. Stationary phase is a finely divided solid adsorbent

B.)Separation depends upon equilibration of solute between a mobile

and a stationary phase

C. Paper chromatography is an example of partition chromatography

D. Mobile phase can be a gas

Answer: D

627. Excess of NaOH (aq) was added to 100 mL of $FeCl_3$ (aq) resulting into

2.14 g of $Fe(OH)_3$. The molarity of $FeCl_3$ (aq) is:

(Given molar mass of Fe = 56g mol^{-1} and molar mass of Cl = 35.5g mol^{-1})

A. 0.3M

B. 0.2M

C. 0.6M

D. 1.8M

Answer: B

628. 5 g of Na_2SO_4 was dissolved in x g of H_2O . The change in freezing point was found to be $3.82\,°C$. If Na_2SO_4 is 81.5 % ionised , the value of x

(k_f for water =1.86 $°C$ kg mol^{-1}) is apporximately :

(molar mass of S=32 g mol^{-1} and that of Na=23 g mol^{-1})

A. 25 g

B. 65 g

C. 15 g

D. 45 g

Answer: C

629. Consider the following standard electrode potentials ($E°$ in volts) in aqueous solution:

Element	M^{3+}/M	M^+/M
Al	-1.66	+0.55
Tl	+1.26	-0.34

Based on these data, which of the following statements is correct ?

A. Tl^{3+} is more stable than Al^{3+}

B. Al^+ is more stable than Al^{3+}

C. Tl^{3+} is more stable than Al^{3+}

D. Tl^+ is more stable than Al^+

Answer: D

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630. The major product expected from the following reaction is :

A. CO

B. O_2

C. B_2

D. NO
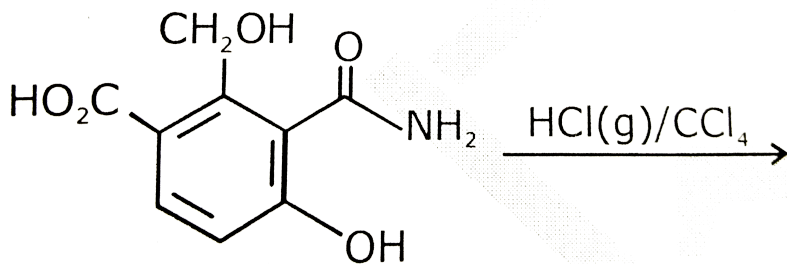
Answer: A

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631. Among the following, the incorrect statement is :

A. At low pressure, real gases show ideal behaviour.

B. At very low temperature, real gases show ideal behaviour

C. At Boyle's temperature, real gases show idela behaviour

D. At very large volume, real gases show ideal behaviour.

Answer: B

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632. The pair of compounds having metals in their highest oxidation state is

A. MnO_2 and CrO_2Cl_2

B. $\left[Fe(CN)_6\right]^{3-}$ and $\left[Cu(CN)_4\right]^{-2}$

C. $\left[NiCl_4\right]^{2-}$ and $\left[CoCl_4\right]^{2-}$

D. $\left[FeCl_4\right]^{-}$ and Co_2O_3

Answer: A

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633. The IUPAC name of the following compound is
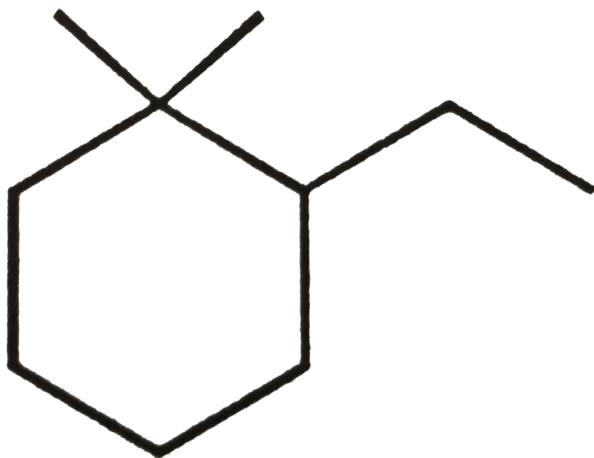
A. IIItIItIII

B. IItIIIItII

C. IIItIIIItI

D. IIIItIIItI

Answer: A

634. A mixture containing the following four compounds is extracted with 1 M HCl. The compound that goes to aqueous layer is :
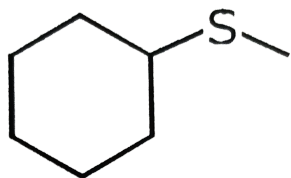
(I)
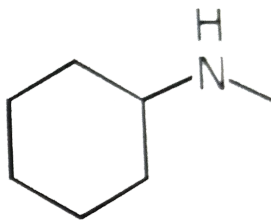
(II)
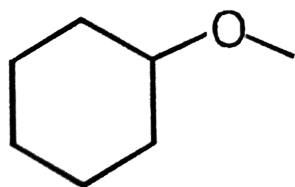
(III)
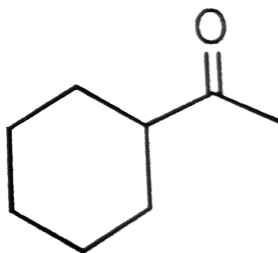
(IV)

A. Both form soluble bicarbonates

B. both from nitrides

C. nitrates of both Li and Mg yield NO_2 and O_2 on heating

D. both form basic carbonates

Answer: A

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635. Consider the following ionization enthalpies of two elements 'A' and 'B'.

Element	Ionization enthalpy (kJ/mol)		
	1st	2nd	3rd
A	899	1757	14847
B	737	1450	7731

Which of the following statements is correct?

A. Both 'A' and 'B' belong to group-1 where 'A' comes below 'B'.

B. Both 'A' and 'B' belong to group-2 where 'A' comes below 'B'.

C. Both 'A' and 'B' belong to group-1 where 'B' comes below 'A'.

D. Both 'A' and 'B' belong to group-2 where 'B' comes below 'A'.

Answer: D

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636. sp^3d^2 hybridization is not displayed by :

A. SF_6

B. BrF_5

C. PF_5

D. $\left[CrF_6\right]^{3-}$
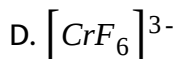
Answer: C

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637. The number of S = O and S–OH bonds present in peroxodisulphuric acid and pyrosulphuric acid respectively are :

A. (2 and 4) and (2 and 4)

B. (4 and 2) and (4 and 2)

C. (4 and 2) and (2 and 4)

D. (2 and 2) and (2 and 2)

Answer: B

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638. Among the following, correct statement is :

A. Sols of metal sulphides are lyophilic

B. Brownian movement is more pronounced for smaller particles than

for bigger-particles

C. One would expect charcoal to adsorb chlorine more than hydrogen

sulphide

D. Hardy Schulze law states that bigger the size of the ion is, the

greater is its coagulating power.

Answer: C

639. The major product of the following reaction is :

$$C_6H_5CH_2 - \underset{\underset{Br}{|}}{\overset{\overset{CH_3}{|}}{C}} - CH_2 - CH_3 \quad \xrightarrow[C_2H_5OH]{C_2H_5ONa}$$

A. $C_6H_5CH = \underset{\underset{CH_3}{|}}{C} - CH_2 - CH_3$

B. $C_6H_5CH_2 - \underset{\underset{CH_3}{|}}{C} = CHCH_3$

C. $C_6H_5CH_2 - \underset{\underset{OC_2H_5}{|}}{\overset{\overset{CH_3|}{|}}{C}} - CH_2CH_3$

D. $C_6H_5CH_2 - \underset{\underset{CH_3}{|}}{C}CH_2CH_3 = CH_2$
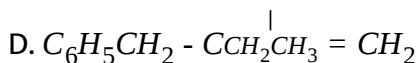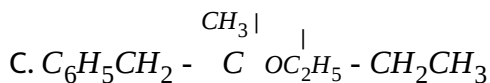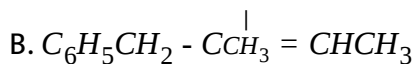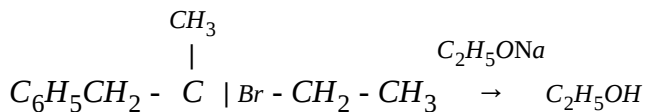
Answer: A

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640. What is the standard reduction potential $\left(E^\circ \right)$ for $Fe^{3+} \rightarrow Fe?$

Given that :

$Fe^{2+} + 2e^- \rightarrow Fe, E^\circ_{Fe^{2+}/Fe} = -0.47V$

$Fe^{3+} + e^- \rightarrow Fe^{2+}, E^\circ_{Fe^{3+}/Fe^{2+}} = +0.77V$
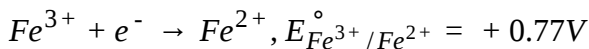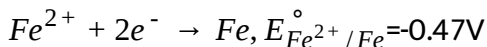
A. –0.057 V

B. + 0.30 V

C. – 0.30 V

D. + 0.057 V

Answer: A

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641. The reason for "drug induced poisoning" is :

A. Binding irreversibly to the active site of the enzyme

B. Binding at the allosteric sites of the enzyme

C. Binding reversibly at the active site of the enzyme

D. Bringing conformational change in the binding site of enzyme

Answer: B

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642. The major product of the following reaction is :

$$CH_3 \overset{|}{C}BrHCH_2 \overset{|}{C}BrHCH_2CH_3 \quad \xrightarrow[\text{heat}]{KOH, CH_3OH}$$

A. $CH_3CH = CH \text{ - } CH = CHCH_3$

B. $CH_2 = CHCH = CHCH_2CH_3$

C. $CH_3CH = C = CHCH_2CH_3$

D. $CH_2 = CHCH_2CH = CHCH_3$
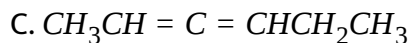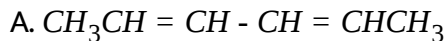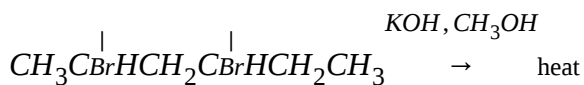
Answer: A

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643. In which of the following reactions, hydrogen peroxide acts as an oxidizing agent ?

A. $HOCI + H_2O_2 \rightarrow H_3O^+ + CI^- + O_2$

B. $I_2 + H_2O_2 + 2OH^- \rightarrow 2I^- + 2H_2O + O_2$

C. $PbS + 4H_2O_2 \rightarrow PbSO_4 + 4H_2O$

D. $2MnO_4^- + 3H_2O_2 \rightarrow 2MnO_2 + 3O_2 + 2H_2O + 2OH^-$
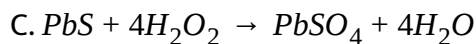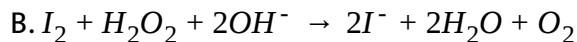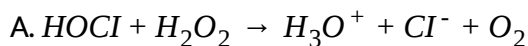
Answer: C

644. For a reaction, $A(g) \rightarrow A(l)$, $\Delta H = -3RT$

The correct statement for the reaction is :

A. $\Delta H = \Delta U = 0$

B. $|\Delta H| < |\Delta U|$

C. $|\Delta H| > |\Delta U|$

D. $\Delta H = \Delta U \neq 0$

Answer: C

645. Calcualte the enthalpy change on freezing of 1.0 mole of water at $10.0°C$ to ice at $-10°C$. $\Delta_{fs}H = 6.03kJmol^{-1}$ at $0°C$.

$C_p\left[H_2O(l)\right] = 75.3Jmol^{-1}K^{-1}$, $C_P\left[H_2O(s)\right] = 36.8Jmol^{-1}K^{-1}$

A. $6.00kJmol^{-1}$

B. $-5.81kJmol^{-1}$

C. $-7.151kJmol^{-1}$

D. $6.56kJmol^{-1}$

Answer: D

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646. Addition of sodium hydroxide solution to a weak acid (HA) results in a buffer of pH 6. If ionisation constant of HA is 10^{-5}, the ratio of salt to acid concentration in the buffer solution will be :

A. $10:1$

B. $4:5$

C. $5:4$

D. $1:10$

Answer: A

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647. A metal 'M' reacts with nitrogen gas to afford $'M_3N'$. $'M_3N'$ on heating at high temperature gives back 'M' and on reaction with water produces a gas 'B'. Gas 'B' reacts with aqueous solution of $CuSO_4$ to form a deep blue compound. 'M' and 'B' respectively are :

    A. Li and NH_3

    B. Na and NH_3

    C. Ba and N_2

    D. Al and N_2

Answer: A

648. For 1 molal aqueous solution of the following compounds, which one will show the highest freezing point ?

A. $\left[Co\left(H_2O\right)_3 Cl_3 \right].3H_2O$

B. $\left[Co\left(H_2O\right)_6 \right]Cl_3$

C. $\left[Co\left(H_2O\right)_5 Cl \right]Cl_2.H_2O$

D. $\left[Co\left(H_2O\right)_4 Cl_2 \right]Cl.H_2O$
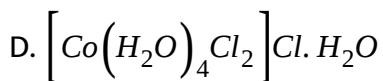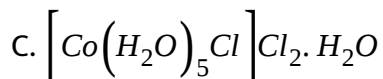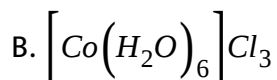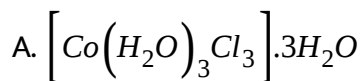
Answer: A

649. Hydrogen peroxide oxidises $\left[Fe(CN)_6\right]^{4-}$ to $\left[Fe(CN)_6\right]^{3-}$ in acidic medium but reduces $\left[Fe(CN)_6\right]^{3-}$ to $\left[Fe(CN)_6\right]^{4-}$ in alkaline medium. The other products formed are, respectively

A. H_2O and $\left(H_2O + OH^-\right)$

B. $\left(H_2O + O_2\right)$ and H_2O

C. $\left(H_2O + O_2\right)$ and $\left(H_2O + OH^-\right)$

D. H_2O and $\left(H_2O + O_2\right)$

Answer: D

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650. Which of the following compounds will be suitable for Kjeldahl's method for nitrogen estimation?

(a)

(b)

NH$_2$

(c)

NO$_2$

(d)

N$_2^+$Cl$^-$

(1)

A.

N$_2^+$Cl$^-$

B.

(3)

C.

NH$_2$

D.
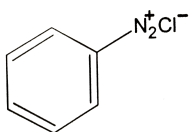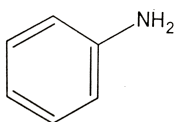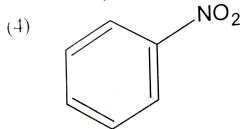
Answer: C

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651. Glucose on prolonged heating with HI gives

A. 6-iodohexanal

B. n-Hexane

C. 1-Hexene

D. Hexanoic acid

Answer: B

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652. Three reactions involving $H_2PO_4^-$ are given below

I. $H_3PO_4 + H_2O \rightarrow H_3O^+ + H_2PO_4^-$

II. $H_2PO_4^- + H_2O \rightarrow HPO_4^{2-} + H_3O^+$

III. $H_2PO_4^- + OH^- \rightarrow H_3PO_4 + O^{2-}$
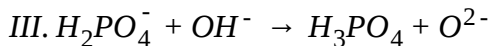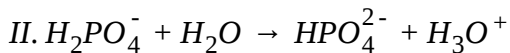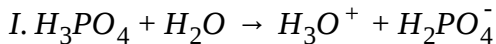
In which of the above does $H_2PO_4^-$ act as an acid?

A. (ii) only

B. (i) and (ii)

C. (iii) only

D. (i) only

Answer: A

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653. In aqueous solution the ionization constants for carbonic acid are:

$K_1 = 4.2 \times 10^{-7}$ and $K_2 = 4.8 \times 10^{-11}$

Select the correct statement for a saturated $0.034M$ solution of the carbonic acid.

A. The concentration of CO_3^{2-} is 0.034 M.

B. The cocentration of CO_3^- is greater than that of HCO_3^-.

C. The concentration of H^+ and HCO_3^- are approximately equal.

D. The concentration of H^+ is double that of CO_3^{2-}.

Answer: C

654. The edge length of a face-centred cubic unit cell is 508 pm. If the radius of the cation is 110 pm the radius of the anion is

A. 288 pm

B. 398 pm

C. 618 pm

D. 144 pm

Answer: D

---

655. The correct order of increasing basicity of the given conjugate bases $\left(R = CH_3 \right)$ is

A. $RCO\bar{O} < HC = \bar{C} < \bar{R} < \bar{N}H_2$

B. $\bar{R} < HC \equiv \bar{C} < RCO\bar{O} < \bar{N}H_2$

C. $RCO\bar{O} < \bar{N}H_2 < HC \equiv \bar{C} < \bar{R}$

D. $RCO\bar{O} < HC \equiv \bar{C} < \bar{N}H_2 < \bar{R}$
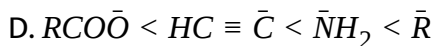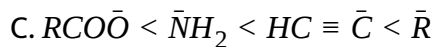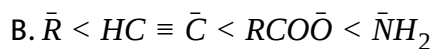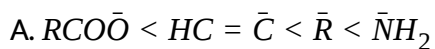
Answer: B

656. The correct sequence which shows decreasing order of the ionic radii of the elements is

A. $Al^{3+} > Mg^{2+} > Na^{+} > F^{-} > O^{2-}$

B. $Na^{+} > Mg^{2+} > Al^{3+} > O^{2-} > F^{-}$

C. $Na^{+} > F^{-} > Mg^{2+} > O^{2-} > Al^{3+}$

D. $O^{2-} > F^{-} > Na^{+} > Mg^{2+} > Al^{3+}$
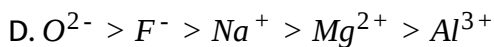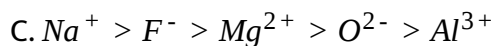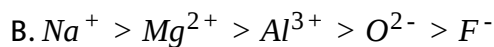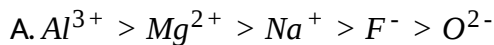
Answer: D

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657. Solubility product of silver bromide is 5.0×10^{-13}. The quantity of potassium bromide (molar mass taken as $120 gmol^{-1}$) to be added to $1L$ of $0.05M$ solution of silver nitrate to start the precipitation of $AgBr$ is

A. $1.2 \times 10^{-1} g$

B. $1.2 \times 10^{-9} g$
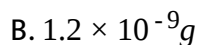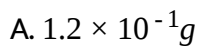
C. $6.2 \times 10^{-5}g$

D. $5.0 \times 10^{-8}g$

Answer: B

658. The Gibbs energy for the decomposition of Al_2O_3 at $500\,^\circ C$ is as follows:

$$\frac{2}{3}Al_2O_3 \rightarrow \frac{4}{3}Al + O_2, \Delta_r G = +966kJmol^{-1}$$
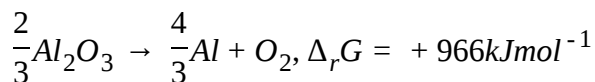
The potential difference needed for electrolytic reduction of Al_2O_3 at $500\,^\circ C$ is at least:

A. 4.5 V

B. 3.0 V

C. 2.5 V

D. 5.0 V

Answer: C

659. At $25 \,^\circ C$, the solubility product of $Mg(OH)_2$ is 1.0×10^{-11}. At which pH, will Mg^{2+} ions start precipitating in the form of $Mg(OH)_2$ from a solution of $0.001 M Mg^{2+}$ ions ?

A. 9

B. 10

C. 11

D. 8

Answer: B

660. Percentage of free space in cubic close packed struchure and in body centred structure are respectively.

    A. 30 % and 26 %

    B. 26 % and 32 %

    C. 32 % and 48 %

    D. 48 % and 26 %

Answer: B

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661. Out of the following the alkene that exhibits optical isomerism is

    A. 3-methyl-2-pentene

    B. 4-methyl-1-pentene

    C. 3-methyl-1-pentene

    D. 2-methyl-2-pentene

Answer: C

---

662. Biuret test is not given by:

A. carbohydrates

B. polypeptides

C. urea

D. proteins

Answer: A

---

663. The correct order of $E^{\circ}_{M^{2+}/M}$ Values with negative sign for the four successive elements Cr, Mn, Fe and Co is:

A. Mn > Cr > Fe > Co

B. Cr > Fe > Mn > Co

C. Fe > Mn > Cr > Co

D. Cr > Mn > Fe > Co

Answer: A

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664. The polymer containing strong intermolecular forces, e.g., hydrogen bonding is:

A. teflon

B. nylon 6,6

C. polystyrene

D. natural rubber

Answer: B

665. For a particular reversible reaction at temperature T, ΔH and ΔS were found to be both $+ve$. If T_e is the temperature at equilibrium, the reaction would be spontaneous when :

A. $T_e > T$

B. $T > T_e$

C. T_e is 5 times T

D. $T = T_e$

Answer: B

666. Which of the following is the energy of a possible excited state of hydrogen?

A. $-6.8eV$

B. $-3.4eV$

C. $+6.8eV$

D. $+13.6eV$

Answer: B

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667. In the following squence of reactions

$$\text{Toluene} \xrightarrow{KMnO_4} A \xrightarrow{SOCl_2} B \xrightarrow{H_2/Pd} BaSO_4, \text{C the product C is}$$

A. $C_6H_5CH_3$

B. $C_6H_5CH_2OH$

C. C_6H_5CHO

D. C_6H_5COOH

Answer: C

668. Which compound will yield 5-keto -2 methyl hexanal upon treatment with O_3?

(1)

CH₃ ... CH₃

A.

(2)

CH₃ ... CH₃

B.

(3)

H₃C ... CH₃

C.

(4)

CH₃ ... CH₃

D.

Answer: A

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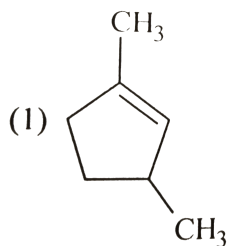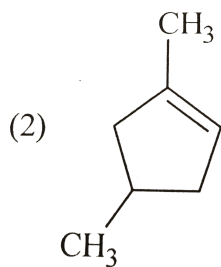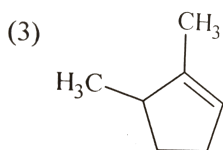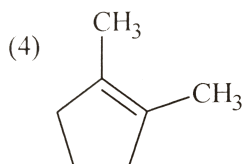
669. The ionic radii of N^{3-}, O^{2-} and F^- are respectively given by:

A. 1.36, 1.71 and 1.40

B. 1.71, 1.40 and 1.36

C. 1.71, 1.36 and 1.40

D. 1.36, 1.40 and 1.71

Answer: B

---

670. The color of $KMnO_4$ is due to

A. d - d transition

B. $L \rightarrow M$ charge transfer transition

C. σ - $\sigma *$ transition

D. $M \rightarrow L$ charge transfer transition

Answer: B

671. Statement I- Nitrogen and oxygen are the main components in the atmosphere but these do not react to form oxides of nitrogen.

Statement II -the reaction between nitrogen and oxygen requires high temperature.

A. Both assertion and reason are correct, but the reason is not the correct explanation for the assertion

B. The assertion is incorrect, but the reason is correct

C. Both the assertion and reason are incorrect

D. Both assertion and reason are correct, and the reason is the correct

explanation for the assertion

Answer: D

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672. Which of the following compounds is not an antacid?

A. Cimetidine

B. Phenelzine

C. Ranitidine

D. Aluminium hydroxide

Answer: B

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673. In the context of the Hall-Heroult process for the extraction of Al, which of the following statements is false ?

A. Al_2O_3 is mixed with CaF_2 which lowers the melting point of the mixture and brings conductivity

B. Al^{3+} is reduced at the cathode to form Al

C. Na_3AlF_6 serves as the electrolyte

D. CO and CO_2 are produced in this process

Answer: C

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674. Match the catalysts to the correct processes :

Catalyst	Process
(A) $TiCl_3$	(i) Wacker process
(B) $PdCl_2$	(ii) Ziegler - Natta polymerization
(C) $CuCl_2$	(iii) Contact process
(D) V_2O_5	(iv) Deacon's process

A. $(A) - (ii), (B) - (i), (C) - (iv), (D) - (iii)$

B. $(A) - (ii), (B) - (iii), (C) - (iv), (D) - (i)$

C. $(A) - (iii), (B) - (i), (C) - (ii), (D) - (iv)$

D. $(A) - (iii), (B) - (ii), (C) - (iv), (D) - (i)$

Answer: A

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675. In the reaction :
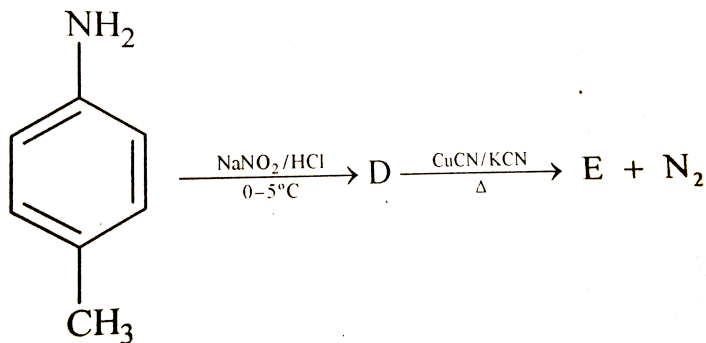
the product E is

the product E is

A.

(2)

CN

CH₃

B.

(3)

CH₃

C.

(4)

COOH

CH₃

D.
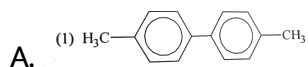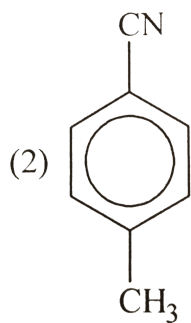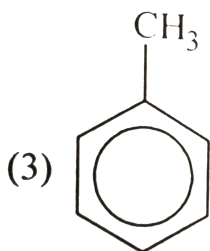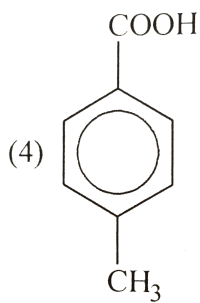
Answer: B

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676. Which polymer is used in the manufacture of paints and lacquers?

A. Glyptal

B. Polypropene

C. Poly vinyl chloride

D. Bakelite

Answer: A

677. The number of geometric isomers that can exist for square planar

$\left[Pt(C1)(py)\left(NH_3\right)\left(NH_2OH\right)\right]^+$ is (py = pyridine).
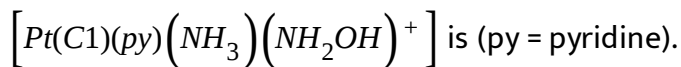
A. 3

B. 4

C. 6

D. 2

Answer: A

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678. Higher order (> 3) reaction are rare due to :

A. increase in entropy and activation energy as more molecules are
   involved

B. shifting of equilibrium towards reactants due to elastic collisions

C. loss of active species on collision

D. low probability of simultaneous collision of all the reacting species

Answer: D

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679. Which among the following is the most reactive?

A. Br_2

B. I_2

C. Icl

D. Cl_2

Answer: C

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680. Two faraday of electricity is passed through a solution of $CuSO_4$. The mass of copper deposited at the cathode is: (at mass of Cu = 63.5 amu)

A. 63.5 g

B. 2 g

C. 127 g

D. 0 g

Answer: A

681. $3g$ of activated charcoal was added to 50mL of acetic acid solution $(0.06N)$ in a flask. After an hour it was filtered and the strength of the filtrate was found to be $0.042N$. The amount of acetic adsorbed (per gram of charcoal) is:

A. 36 mg

B. 42 mg

C. 54 mg

D. 18 mg

Answer: D

682. The synthesis of alkyl fluoride is best accomplished by:

A. Sandmeyer's reaction

B. Finkelstein reaction

C. swarts reaction

D. Free radical fluorination

Answer: C

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683. The molecular formula of a commercial resin used for exchanging ions in water softening is $C_8H_7SO_3Na(mol. wt. 206)$. What would be the maximum uptake of Ca^{2+} ions by the resin when expressed in mole per gram resin?

A. $\dfrac{1}{206}$

B. $\dfrac{2}{309}$

C. $\dfrac{1}{412}$

D. $\dfrac{1}{103}$

Answer: C

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684. Which of the vitamins given below is water soluble ?

A. Vitamin D

B. Vitamin E

C. Vitamin K

D. Vitamin C

Answer: D

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685. The intermolecular interaction that is dependent on the inverse cube of distance between the molecules is

    A. ion - dipole interaction

    B. London force

    C. hydrogen bond

    D. ion - ion interaction

Answer: A

686. The standard free energy of formation of NO(g) is 86.6 kJ/ mol at 298 K what is the standard free energy of formation of NO_2g at 298 k? $K_p = 1.6 \times 10^{12}$

    A. $86600 + R(298) \ln \left(1.6 \times 10^{12}\right)$

B. $86600 - \dfrac{\ln\left(1.6 \times 10^{12}\right)}{R(298)}$

C. $0.5\left[2 \times 86,600 - R(298) \ln\left(1.6 \times 10^{12}\right)\right]$

D. $R(298) \ln\left(1.6 \times 10^{12}\right) - 86600$

Answer: C

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687. Which of the following compounds is not yellow coloured ?

A. $K_3\left[Co\left(NO_2\right)_6\right]$

B. $\left(NH_4\right)_3\left[As\left(Mo_3O_{10}\right)_4\right]$

C. $BaCrO_4$

D. $Zn_2\left[Fe(CN)_6\right]$
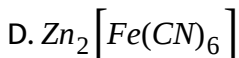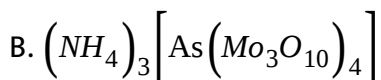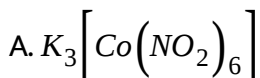
Answer: D

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688. In Carius method of estimation of halogens $250mg$ of an organic compound gave $141mg$ of $AgBr$. The percentage of bromine in the compound is (atomic mass $Ag = 108, Br = 80$)

A. 36

B. 48

C. 60

D. 24

Answer: D

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689. Sodium metal crystallizes in a body centred cubic lattice with a unit cell edge of 4.29 Å. The radius of sodium atom is approximately :

A. 3.22 Å

B. 5.72 Å

C. 0.93 Å

D. 1.86 Å

Answer: D

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690. Which of the following compounds will exhibit geometrical isomerism?

A. 3 - Phenyl - 1 - butene

B. 2 - Phenyl - 1 - butene

C. 1, 1 - Diphenyl - 1- propane

D. 1 - Phenyl - 2 - butene

Answer: D

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691. The vapour pressure of acetone at $20\,^\circ C$ is 185 torr. When $1.2g$ of non-volatile substance was dissolved in $100g$ of acetone at $20\,^\circ C$ its vapour pressure was 183 torr. The molar mass $\left(gmol^{-1}\right)$ of the substance is:

A. 64

B. 128

C. 488

D. 32

Answer: A

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692. From the following statements regarding H_2O_2, choose the incorrect statements:

A. It decomposes on exposure to light

B. It has to be stored in plastic or wax lined glass bottles in dark

C. It has to be kept away from dust

D. It can act only as an oxidizing agent

Answer: D

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693. Which one of the following alkaline earth metal sulphates has its hydration enthalpy greater than its lattice enthalpy?

A. $BeSO_4$

B. $BaSO_4$

C. $SrSO_4$

D. $CaSO_4$

Answer: A

694. The standard Gibbs energy change at $300K$ for the reaction $2A \Leftrightarrow B + C$ is 2494. $2J$. At a given time, the composition of the reaction mixture is $[A] = \dfrac{1}{2}$, $[B] = 2$ and $[C] = \dfrac{1}{2}$. The reaction proceeds in the $(R = 8.314JK/mole = 2.718)$

    A. reverse direction because $Q > K_c$

    B. forward direction because $Q < K_c$

    C. reverse direction because $Q < K_c$

    D. forward direction because $Q > K_c$

Answer: A

695. Which one has the highest boiling point?

A. Ne

B. Kr

C. Xe

D. He

Answer: C

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696. The shortest wavelength of H-atom in Lyman series is x, then longest wavelength in Balmer series of He^+ is

A. $\dfrac{5A}{9}$

B. $\dfrac{36A}{7}$

C. $\dfrac{36A}{5}$

D. $\dfrac{9A}{5}$

Answer: B

697. The non-essential amino acid among the following is

A. Valine

B. Alanine

C. Serine

D. Aspartic acid

Answer: A

698. Identify the pollutant gases largely responsible for the discoloured and lustreless nature of marble of the Taj Mahal.

A. SO_2 and O_3

B. O_3 and CO_2

C. SO_2 and NO_2

D. CO_2 and NO_2

Answer: C

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699. Which of the following compounds will not undergo Friedel - Crafts reaction easily ?

A.
(1) Cl

B.
(2) —Cl

C.
(3) —Cl, O

D.
(4) COCl

Answer: A

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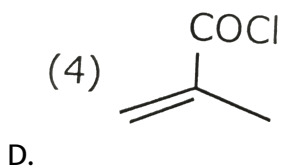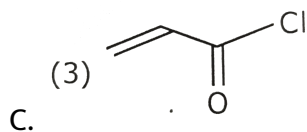
700. Which of the following is paramagnetic ?

A. CO

B. NO^+

C. O_2^{2-}

D. B_2

Answer: D

---

701. The rate of a reaction doubles when its temperature changes from

$300K$ to $310K$. Activation energy of such a reaction will be:

$\left(R = 8.314 JK^{-1}mol^{-1} \text{ and } \log 2 = 0.301\right)$

A. 4.92 K

B. 9.84 K

C. 19.67 K

D. 2.45 K

Answer: A

702. A solution containing a group-IV cation gives a precipitate on passing, H_2S. A solution of this precipitate in dil. HCl produces a white precipitate with NaOH solution and bluish-white precipitate with basic potassium ferrocyanide. The cation is :

A. Mn^{2+}

B. Zn^{2+}

C. Ni^{2+}

D. Co^{2+}

Answer: B

703. Which of the following statements is not true about partition chromatography?

  A. Stationary phase is a finely divided solid adsorbent

  B. Separation depends upon equilibration of solute between a mobile

     and a stationary phase

  C. Paper chromatography is an example of partition chromatography

  D. Mobile phase can be a gas

Answer: D

704. An excess of $NaOH$ was added to $100mL$ of a $FeCl_3$ solution which gives $2.14g$ of $Fe(OH)_3$. Calculate the molarity of $FeCl_3$ solution.

A. 0.3 M

B. 0.2 M

C. 0.6 M

D. 1.8 M

Answer: B

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705. 5 g of Na_2SO_4 was dissolved in x g of H_2O . The change in freezing point was found to be $3.82\,°C$. If Na_2SO_4 is 81.5 % ionised , the value of x

(k_f for water =1.86 $°C$ kg mol^{-1}) is apporximately :

(molar mass of S=32 g mol^{-1} and that of Na=23 g mol^{-1})

A. 25 g

B. 65 g

C. 15 g

D. 45 g

Answer: D

706. Consider the following standard electrode potentials ($E°$ in volts) in aqueous solution:

Element M^{3+}/M M^{+}/M
Al   -1.66   +0.55
Tl   +1.26   -0.34

Based on these data, which of the following statements is correct ?

A. Tl^{3+} is more stable than Al^{3+}
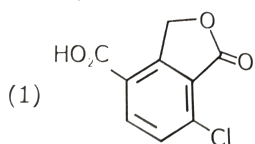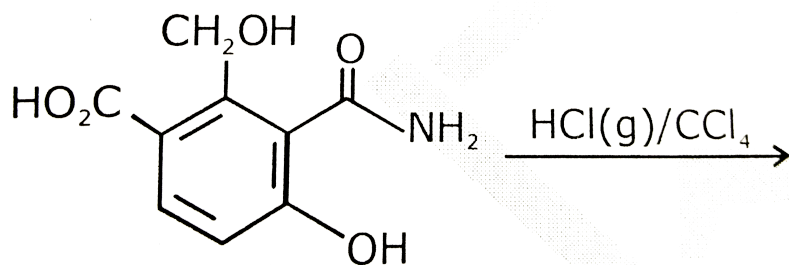
B. Al^{+} is more stable then Al^{3+}

C. Tl^{3+} is more stable than Al^{3+}

D. Tl^+ is more stable than Al^+

Answer: D

707. The major product expected from the following reaction is :

$$\text{HO}_2\text{C} \overset{\text{CH}_2\text{OH}}{\diagdown}\text{---}\overset{O}{\overset{\|}{C}}\text{---NH}_2 \xrightarrow{\ \text{HCl(g)/CCl}_4\ }$$

(with OH substituent on ring)

A. (1) HO$_2$C ... Cl

B. (2) HO$_2$C ... OH

C. (3) ... NH$_2$ ... OH

(4)

D.

Answer: C
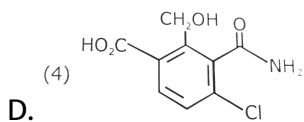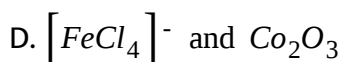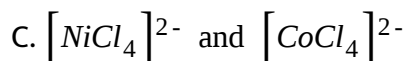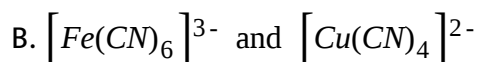
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708. xiii. Among the following the INCORRECT statement is :

A. At low pressure, real gases show ideal behaviour.

B. At very low temperature, real gases show ideal behaviour.

C. At Boyle's temperature, real gases show idela behaviour.

D. At very large volume, real gases show ideal behaviour.

Answer: B

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709. The pair of compounds having metals in their highest oxidation state is .

A. MnO_2 and CrO_2Cl_2

B. $\left[Fe(CN)_6\right]^{3-}$ and $\left[Cu(CN)_4\right]^{2-}$

C. $\left[NiCl_4\right]^{2-}$ and $\left[CoCl_4\right]^{2-}$

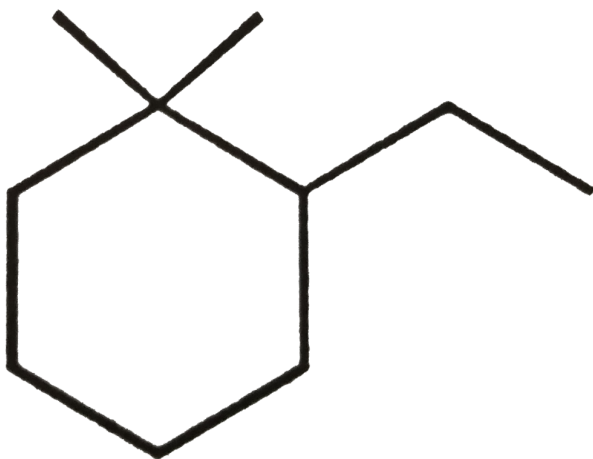D. $\left[FeCl_4\right]^{-}$ and Co_2O_3

Answer: A

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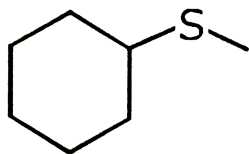
710. The IUPAC name of the following compound is

A. 2-Ethyl-1, 1-dimethylcyclohexane

B. 1, 1-Dimethyl -2-ethylcyclohexane

C. 2, 2-Dimethyl-1-ethylcyclohexane
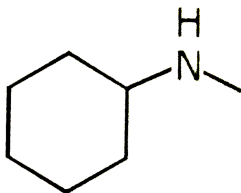
D. 1-Ethyl-2,2-dimethylcyclohexane

Answer: A

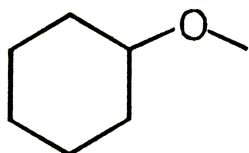▶ Watch Video Solution

711. A mixture containing the following four compounds is extracted with 1 M HCl. The compound that goes to aqueous layer is :
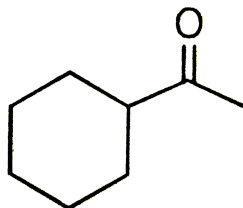

(I)

(II)

(III)

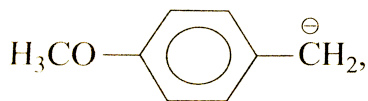

(IV)

(1) IV   (2) II

A. IV

B. II

C. I

D. III

Answer: B

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712. Consider the following carbanions:

$$H_3CO-\overset{\ominus}{\underset{(I)}{C_6H_4}}-\overset{\ominus}{CH_2},\qquad O_2N-\overset{\ominus}{\underset{(II)}{C_6H_4}}-\overset{\ominus}{CH_2},$$

$$\overset{\ominus}{\underset{(III)}{C_6H_5}}-\overset{\ominus}{CH_2},\qquad H_3C-\overset{\ominus}{\underset{(IV)}{C_6H_4}}-\overset{\ominus}{CH_2}$$

H₃CO— ⊖CH₂, (I)   O₂N— ⊖CH₂, (II)
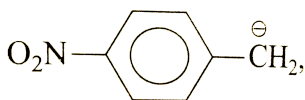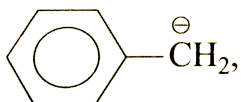
⊖CH₂, (III)   H₃C— ⊖CH₂ (IV)

Correct decreasing order of stability is :

A. Both 'A' and 'B' belong to group-1 where 'A' comes below 'B'.

B. Both 'A' and 'B' belong to group-2 where 'A' comes below 'B'.

C. Both 'A' and 'B' belong to group-1 where 'B' comes below 'A'.

D. Both 'A' and 'B' belong to group-2 where 'B' comes below 'A'.

Answer: D

713. Which complex compound possesses sp^3d^2 hybridization
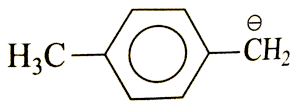
A. SF_6

B. BrF_5

C. PF_5

D. $\left[CrF_6 \right]^{3-}$
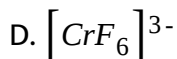
Answer: C

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714. The number of P - O - P and P - OH bonds present respectively in pyrophosphoric acid molecule are

A. (2 and 4) and (2 and 4)

B. (4 and 2) and (4 and 2)

C. (4 and 2) and (2 and 4)

D. (2 and 2) and (2 and 2)

Answer: B

715. Among the following, the correct statement (s) is (are)
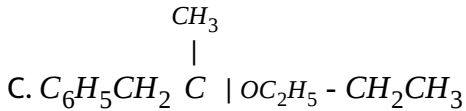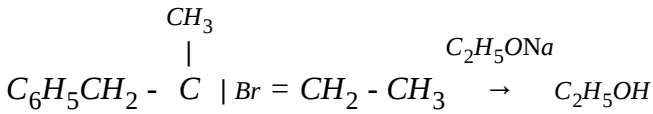
A. Sols of metal sulphides are lyophilic

B. Brownian movement is more pronounced for smaller particles than

for bigger-particles

C. One would expect charcoal to adsorb chlorine more than hydrogen

sulphide.

D. Hardy Schulze law states that bigger the size of the ion is, the

greater is its coagulating power.

Answer: C

716. The major product of the following reaction is :

$$C_6H_5CH_2 - \overset{\overset{\displaystyle CH_3}{|}}{C} | Br = CH_2 - CH_3 \quad \overset{C_2H_5ONa}{\underset{C_2H_5OH}{\longrightarrow}}$$

A. $C_6H_5CH = C | CH_3 - CH_2CH_3$

B. $C_6H_5CH_2 - C | Ch_3 = CHCH_3$

C. $C_6H_5CH_2 \ \overset{\overset{\displaystyle CH_3}{|}}{C} | OC_2H_5 - CH_2CH_3$

D. $C_6H_5CH_2 - C | CH_2CH_3 = CH_2$

Answer: A

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717. If $E^\circ_{Fe^{3+}/Fe}$ and $E^\circ_{Fe^{2+}/Fe}$ are -0.36V and 0.439V respectively, then value of $E^\circ_{Fe^{3+}/Fe^{2+}}$ is

A. -0.057 V

B. +0.30V

C. -0.30V

D. +0.057 V

Answer: A

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718. The reason for "drug induced poisoning" is :

A. Binding irreversibly to the active site of the enzyme

B. Binding at the allosteric sites of the enzyme

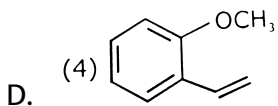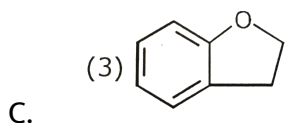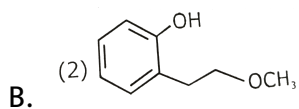C. Binding reversibly at the active site of the enzyme

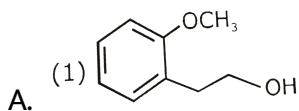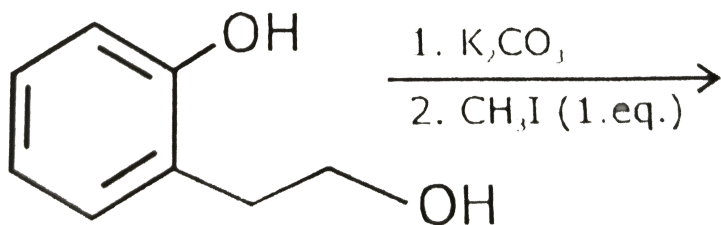D. Bringing conformational change in the binding site of enzyme

Answer: B

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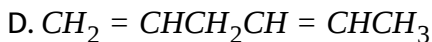
719. The major product of the following reaction is :

$$\xrightarrow[\text{2. CH}_3\text{I (1.eq.)}]{\text{1. K}_2\text{CO}_3}$$

A. (1)

B. (2)

C. (3)

D. (4)

Answer: A

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720. The major product formed in the following reation is

$$CH_3 - \overset{\overset{\displaystyle CH_3}{|}}{C} | H - CH_2 - Br \quad \overset{CH_3ONa}{\longrightarrow} \quad CH_3OH \,.$$

A. $CH_3CH = CH - CH = CHCH_3$

B. $CH_2 = CHCH = CHCH_2CH_3$

C. $CH_3CH = C = CHCH_2CH_3$

D. $CH_2 = CHCH_2CH = CHCH_3$
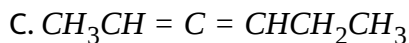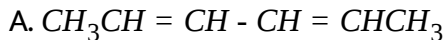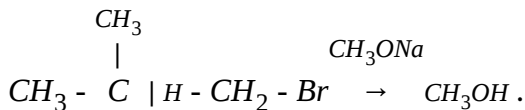
Answer: A

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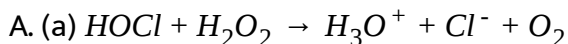
721. In which one of the following reactions, hydrogen peroxide is acts as an oxidising agent ?

A. (a) $HOCl + H_2O_2 \rightarrow H_3O^+ + Cl^- + O_2$

B. (b) $I_2 + H_2O_2 + 2OH^- \rightarrow 2H_2O + O_2$

C. (c) $PbS + 4H_2O_2 \rightarrow PbSO_4 + 4H_2O$

D. (d) $2MnO_4^- + 3H_2O_2 \rightarrow 2MnO_2 + 3O_2 + 2H_2O + 2OH^-$
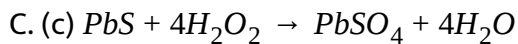
Answer: C

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722. For the reaction : $N_{2(g)} + 3H_{2(g)} \Leftrightarrow 2NH_{3(g)}, \Delta H = $ - ve, the correct statement is :

A. $\Delta H = \Delta U = 0$

B. $|\Delta H| < |\Delta U|$

C. $|\Delta H| > |\Delta U|$

D. $\Delta H = \Delta U \neq 0$

Answer: C

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723. Calculate the enthalpy change of freezing of 1.0 mol of water at $10\,^{\circ}C$ to ice at $-10\,^{\circ}C$, $\Delta_{fus}H = 6.03kJmol^{-1}$ at $0\,^{\circ}C$.

$$C_P\left[H_2O(l)\right] = 75.3Jmol^{-1}K^{-1}$$

$$C_P\left[H_2O(s)\right] = 36.8Jmol^{-1}K^{-1}$$

A. $-7.151KJmol^{-1}$

B. $5.81KJmol^{-1}$

C. $5.44KJmol^{-1}$

D. $-6.56KJmol^{-1}$

Answer: D

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724. Addition of sodium hydroxide solution to a weak acid (HA) results in a buffer of pH 6. If ionisation constant of HA is 10^{-5}, the ratio of salt to acid concentration in the buffer solution will be :

A. (a) $10:1$

B. (b) $4:5$

C. (c) $5:4$

D. (d) $1:4$

Answer: A

725. A metal M reacts with N_2 to give a compound $'A'$ $\left(M_3N\right)$. 'A' on heating at high temperature gives back $'M'$ and $'A'$ on reacting with H_2O gives a gas 'B'.'B' turns $CuSO_4$ solution blue on passing through it A and B can be

A. (a) Li and NH_3

B. (b) Na and NH_3

C. (c) Ba and N_2

D. (d) Al and N_2

Answer: A

726. $1g$ of a carbonate $\left(M_2CO_3\right)$ on treatment with excess HCl produces 0.01186 mole of CO_2. The molar mass of M_2CO_3 in $gmol^{-1}$ is
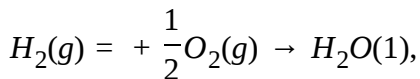
A. (a) 118.6

B. (b) 11.86
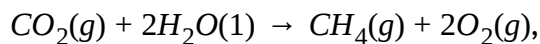
C. (c) 84.3

D. (d) 72.4

Answer: B

727. Given $C_{(graphite)} + O_2(g) \rightarrow CO_2(g)$,

$\Delta_r H^0 = -393.5kJ \quad mol^{-1}$

$$H_2(g) = + \frac{1}{2}O_2(g) \rightarrow H_2O(1),$$

$$\Delta_r H^0 = -285.8 \text{ kJ } mol^{-1}$$

$$CO_2(g) + 2H_2O(1) \rightarrow CH_4(g) + 2O_2(g),$$

$$\Delta_r H^0 = +890.3 kJ \quad mol^{-1}$$

Based on the above thermochemical equations, the value of $\Delta_r H^0$ at at

298 K for the reaction

$C_{(graphite)} + 2H_2(g) \rightarrow CH_4(g)$ will be:
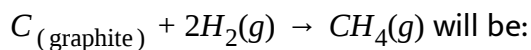
A. +144kj/mol

B. -74.8kj/mol

C. -144kj/mol

D. +74.8kj/mol

Answer: A

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728. The freezing point of benzene decreases by $0.45\,°C$ when $0.2g$ of

acetic acid is added to $20g$ of benzene. IF acetic acid associates to form a

dimer in benzene, percentage association of acetic acid in benzene will be

$\left(K_f \text{for benzene} = 5.12 Kkgmol^{-1}\right)$

A. (a) 64.6 %

B. (b) 74.6 %

C. (c) 80.4 %

D. (d) 94.6 %

Answer: C

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729. The most abundant elements by mass in the body of a healthy human adult are Oxygen (61.4 %), Carbon (22.9 %). Hydrogen (10.0) %), and Nitrogen (2.6 %). The weight which a $75kg$ person would gain if all $.^1H$ atoms are replaced by $.^2H$ atoms is

A. 7.5kg

B. 10kg

C. 15kg

D. 37.5kg

Answer: A

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730. δU is equal to

A. Isochoric work

B. isobaric work

C. adiabatic work

D. isothermal work

Answer: D

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731. The formation of which of the following polymers involves hydrolysis reaction ?

A. Nylon-6

B. Bakelite

C. Nylon-6,6

D. Terylene

Answer: A

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732. Given $E^{\circ}_{Cl_2/Cl^-} = 1.36V$, $E^{\circ}_{Cr^{3+}/Cr} = -0.74V$

$E^{\circ}_{Cr_2O_7^{2-}/Cr^{3+}} = 1.33V$, $E^{\circ}_{MnO_4^-/Mn^{2+}} = 1.51V$

Among the following, the strongest reducing agent is

A. Cl^{1-}

B. Cr

C. Cr^{3+}

D. Mn^{2+}

Answer: B

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733. The Tyndall effect is observed only when following conditions are satisfied:

(A) the diameter of the dispersed particles is much smaller than the wavelength of the light used.

(B) the diameter of the dispersed particle is not much smaller than the wavelength of the light use

(C) the refreactive indices of the dispersed phase and dispersion medium are almost similar in magnitude

(D) the refractive indices of the dispersed phase and dispersion medium differ greatly in magnitude.

A. (A) and (D)

B. (B) and (D)

C. (A) and (C)

D. (B) and (C)

Answer: D

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734. In the following reaction, ZnO is respectively acting as a/an

(i) $ZnO + Na_2O \rightarrow Na_2ZnO_2$

(ii) $ZnO + CO_2 \rightarrow ZnCO_3$
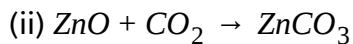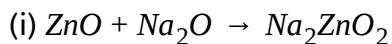
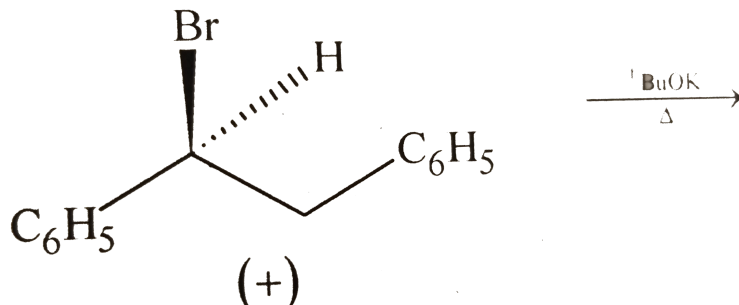A. (a) acid and acid

B. (b) base and acid

C. (c) base and base

D. (d) acid and base

Answer: B

735. The major product obtained in the following reaction is:

A. Tl^{3+} is more stable than Al^{3+}

B. Al^+ is more stable than Al^{3+}

C. Tl^{3+} is more stable than Al^{3+}

D. Tl^+ is more stable than Al^+

Answer: D

736. Which of the following species is not paramagnetic?

A. CO

B. O_2

C. B_2

D. NO

Answer: A

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737. On treatment of 100 mL of 0.1 M solution of $COCl_3.6H_2O$ with excess

of $AgNO_3$, 1.2×10^{22} ions are precipitated. The complex is

A. (a) [Co(H2O)4Cl2]Cl.2H2O

B. (b) [Co(H2O)3Cl3] .3H2O

C. (c) [Co(H2O)6]Cl3

D. (d) [Co(H2O)5Cl] Cl2 .H2O

Answer: B

738. pK_a of a weak acid (HA) and pB_b of a weak base (BOH) are 3.2 and 3.4 respectively. The pH of their salt (AB) solution is

A. (a) 7.1

B. (b) 6.9

C. (c) 3.4

D. (d) 6.5

Answer: A

739. The increasing order of reactivity of the following halides for the S_N1 reaction is

I.$CH_3CH(CI)CH_2CH_3$

II. $CH_3CH_2CH_2Cl$

III. $p. \ - H_3CO - C_6H_4 - CH_2Cl$
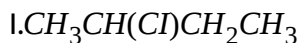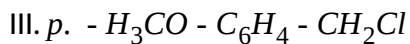
A. (a) II < I < III

B. (b) I < III < II

C. (c) II < III < I

D. (d) III < II < I

Answer: A

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740. Both lithium and magnesium display several similar properties due to the diagonal relationship , however, the one which is incorrect is

A. Both form soluble bicarbonates

B. both form nitrides

C. nitrates of both Li and Mg yield NO_2 and O_2 on heating

D. both form basic carbonates

Answer: A

741. Consider the following ionisation enthalpies of elements A and B:

Element	Ionization enthalpy (kJ/mol)		
	1st	2nd	3rd
A	899	1757	14847
B	737	1450	7731

Which of the following statements is correct

A. Both 'A' and 'B' belong to group-1 where 'A' comes below 'B'.

B. Both 'A' and 'B' belong to group-2 where 'A' comes below 'B'.

C. Both 'A' and 'B' belong to group-1 where 'B' comes below 'A'.

D. Both 'A' and 'B' belong to group-2 where 'B' comes below 'A'.

Answer: D

742. When chlorine reacts with cold and dilute solution of sodium hydroxide, the products obtained are

A. Cl− + ClO−

B. BrF_5

C. PF_5

D. $\left[CrF_6\right]^{3-}$
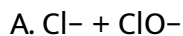
Answer: C

743. Two reactions R_2 and R_2 have identical pre - exponential factors. Activations enery of R_1 exceeds that of R_2 by 10 kJ mol_{-1} . If k_1 and k_2 are

rate constants for rate constants for reactions R_1 and R_2

respectively at 300k , then In $\left(\dfrac{k_2}{k_1}\right)$ is equal to $\left(R = 8.314 Jmol^{-1}K^{-1}\right)$

A. $C_6H_5CH = C\overset{|}{C}H_3 - CH_2 - CH_3$

B. $C_6H_5CH_2 - C\overset{|}{C}H_3 = CHCH_3$

C. $C_6H_5CH_2 - \overset{CH_3|}{C} \ OC_2H_5 \overset{|}{} - CH_2CH_3$

D. $C_6H_5CH_2 - CC\overset{|}{H_2}CH_3 = CH_2$
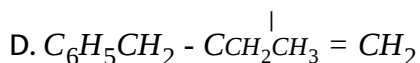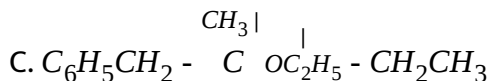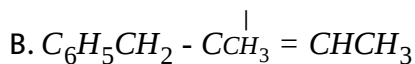
Answer: A

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744. The radius of the second Bohr orbit for hydrogen atom is [Planck's constant $(h) = 6.6262 \times 10^{-34} \cdot Js$, mass of electron=9.1091 $\times 10^{-31} kg$, charge of electron $= 1.60210 \times 10^{-19}C$, permittivity of vacuum $\left(\in_0\right) = 8.854185 \times 10^{-12} kg^{-1} \cdot m^{-3} \cdot A^2]$-

A. 4.76Å

B. 0.529Å

C. 2.12Å

D. 1.65Å

Answer: C

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745. The major product obtained in the following reaction is

$$\xrightarrow{\text{DIBAL} - \text{H}}$$

A. $CH_3CH = CH - CH = CHCH_3$

B. $CH_2 = CHCH = CHCH_2CH_3$

C. $CH_3CH = C = CHCH_2CH_3$

D. $CH_2 = CHCH_2CH = CHCH_3$
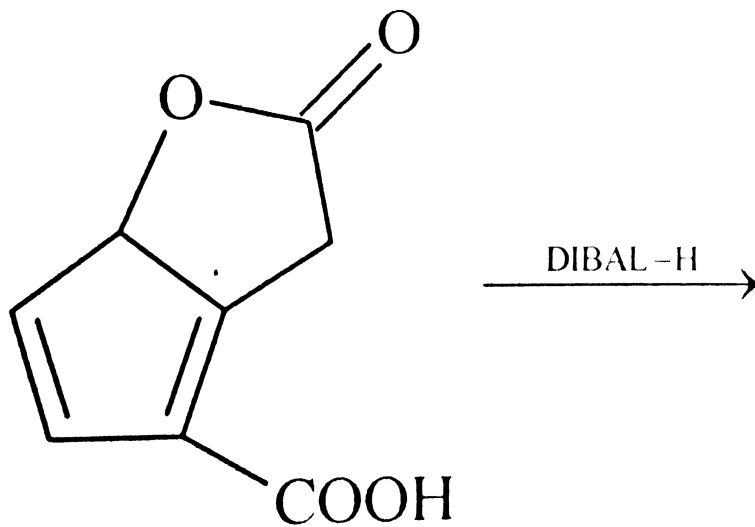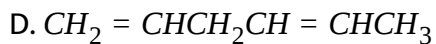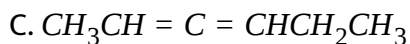
Answer: A

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746. A metal crystallises in a face centred cubic structure. If the edge length of its unit cell is 'a' the closest approach between two atoms in metallic crystal will be

    A. $\Delta H = \Delta U = 0$

    B. $|\Delta H| < |\Delta U|$

    C. $|\Delta H| > |\Delta U|$

    D. $\Delta H = \Delta U \neq 0$

Answer: C

747. Sodium salt of an organic acid 'X' produces effervescence with conc. H_2SO_4. 'X' reacts with the acidified aqueous $CaCl_2$ solution to give a white precipitate which decolourises acidic solution of $KMnO_4$' X' is

A. $6.00 kJmol^{-1}$

B. $5.81 kJmol^{-1}$

C. $5.44 kJmol^{-1}$

D. $6.56 kJmol^{-1}$

Answer: D

748. A water sample has ppm level concentration of following anions

$F^- = 10, SO_4^{2-} = 100, NO_3^- = 50$

the anion/anions that make/makes the water sample unsuitable for drinking is/are

A. $10:1$

B. $4:5$

C. $5:4$

D. $1:10$

Answer: A

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749. The major product in the following reaction is

A.

B.

C.

D.
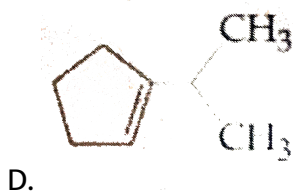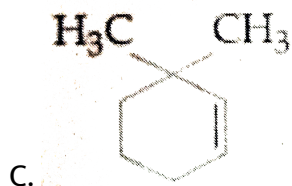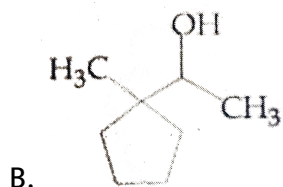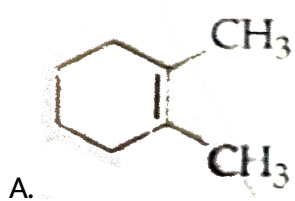
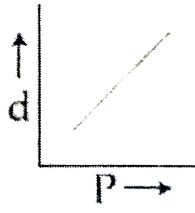**750.** which one of the following graph is not correct for ideal gas ?
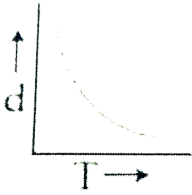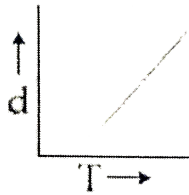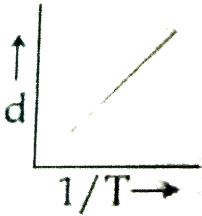
d=density ,P=pressure,T=Temperature

A. IV

B. III

C. I

D. II

751. Which metal is used in devising Photo-chemical cell?

A. Li

B. Na

C. Cs

D. Rb

752. While titrating dilute HCl solution with aqueous NaOH,which of the following will not be required

A. Burette and porcelain stand

B. pipette and distilled water

C. Bunsen burner and measuring cylinder

D. Clamp and phenolthalein

753. For octahedral Mn(II) and tetrahedral Ni(II) complexes,consider the following statements:

(I) Both the complexes can be high spin

(ii) Ni(II)complex can be ery rarely be low spin

(iii) With strong field ligands ,Mn (II) complexes can be low spin

(iv) aqueous solution of Mn(II) ions is yellow in colour .

A. (I) and (II) only

B. (I),(II) and (III) only

C. (II),(IIIand (IV)only

D. (I),(III)and (IV)only

754. In general ,the property (magnitudes only)that shows an opposite trend In comparision to other properties across a period is :

A. Ionization enthalpy

B. Electrongativity

C. electron gain enthalpy

D. Atomic radius

755. On heating compound (A) gives a gas (B) which is a constituent of air . This gas when treated H_2 in the presence of a catalyst gives another gas (C) which is basic in nature. (A) should not be :

A. $Pb(NO_3)_2$

B. NH_4NO_2

C. NaN_3

D. $\left(NH_4\right)_2Cr_2O_7$
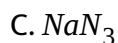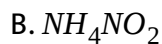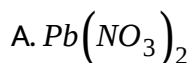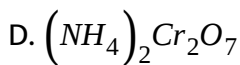
756. For the following Assertion and Reason , the correct option is

Assertion (A) : When Cu (II) and sulphide ions are mixed , they react together extremely quickly to give a solid .

Reason (R) : The equilibrium constant of $Cu^{2+}(aq) + S^{2-}(aq) \leftrightarrow CuS(s)$ is high because the solubility product is low .

A. Both (A) and (R) are false

B. (A) is false and (R) is true

C. Both (A) and (R) are true and (R) is the explanation for (A).

D. Both (A) and (R) are true and (R) is not the explanation for (A).

757. The spin only magnetic moment value of $Cr(CO)_6$ is

A. octahedral and $-2.4\Delta_0 + 2P$

B. tetrahedral and $-0.6\Delta_t$

C. octahedral and $-1.6\Delta_0$

D. tetrahedral and $-1.6\Delta_t + 1P$

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758. The statement that is not true about ozone is :

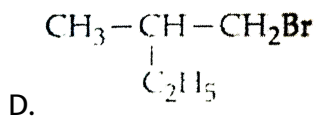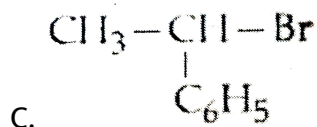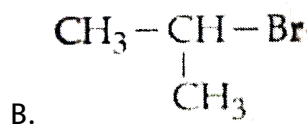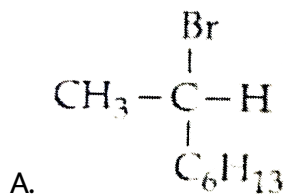A. it is a toxic gas and its reaction with NO gives NO_2.

B. chlorine free radicals (Cl) which reacts with O_3 to give chlorine

dioxide radicals .

C. in the stratosphere , it forms a protective shield against UV

radiation .

D. in the atmosphere , it is depleted by CFCs.

759. Which of the following compound will show retention in configuration on nucleophic substitution by OH^- ion ?

A.
$$CH_3-\underset{\underset{C_6H_{13}}{|}}{\overset{\overset{Br}{|}}{C}}-H$$

B.
$$CH_3-\underset{\underset{CH_3}{|}}{CH}-Br$$

C.
$$CH_3-\underset{\underset{C_6H_5}{|}}{CH}-Br$$

D.
$$CH_3-\underset{\underset{C_2H_5}{|}}{CH}-CH_2Br$$

760. If AB_4 molecule is a polar molecule , a possible geometry of AB_4 is :

A. Rectangular planar

B. Tetrahedral

C. Square pyramidal

D. Square planar

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761. Which of the following is used for the preparation of colloids ?

A. Ostwald Process

B. Van Arkel Method

C. Bredig's Arc Method

D. Mond Process

762. An open beaker to water in equilibrium with water vapour is in a sealed container . When a few grams of glucose are added to the beaker of water , the rate at which water molecules :

   A. leaves the solution decreases

   B. leaves the vapour increases

   C. leaves the vapour decreases

   D. leaves the solution increases

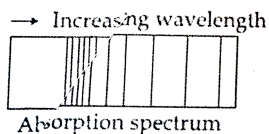763. The figure that is not a direct manifestation of the quantum nature of atom is :

A.

B.

C.

D.
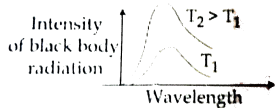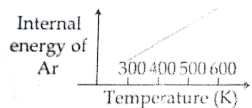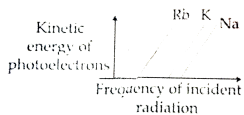
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764. The number of chiral carbons present in he molecule given below is
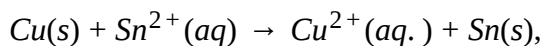
_____ .
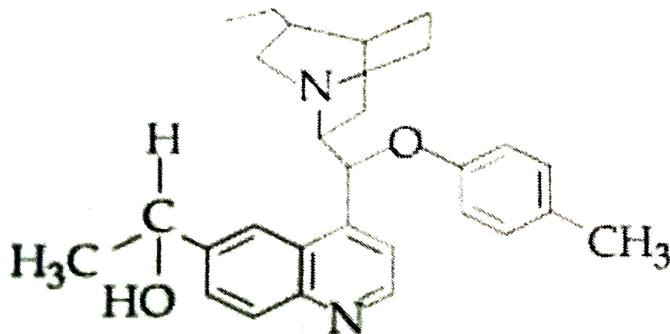
765. The mass of gas adsorbed , x , per unit mass of adsorbate , m , was measured at various pressures , p . A graph between log $\frac{x}{m}$ and log p gives a straight line with slope equal to 2 and the intercept equal to 0.4771 .The value of $\frac{x}{m}$ at a pressure of 4 atm is : (Given log 3 = 0.4771)

766. The Gibbs energy change (in J) for the given reaction at $\left[Cu^{2+} \right] = \left[Sn^{2+} \right] = 1$ M and 298 K is :

$Cu(s) + Sn^{2+}(aq) \rightarrow Cu^{2+}(aq.) + Sn(s)$,

$\left(E^0_{Sn^{2+}/Sn} = -0.16V E^0_{Cu^{2+}|Cu} = 0.34V, \text{ Take F = 96500 C } mol^{-1} \right)$

767. The internal energy change (in J) when 90 g of water undergoes complete evaporation at $100\,^\circ C$ is _____ .

(Given : ΔH_{vap} for water at 373 K = 41 kJ/ mol , $R = 8.314JK^{-1}mol^{-1}$)

768. The oxidation states of iron atoms in compounds (A) ,(B) and (C) , respectively , are x , y and z . The sum of x , y and z is _____

$$Na_4\Big[Fe(CN)_5(A)(NOS)\Big] \quad Na_4\Big[FeO_4\Big](B) \quad \Big[Fe_2(CO)_9(C)\Big]$$
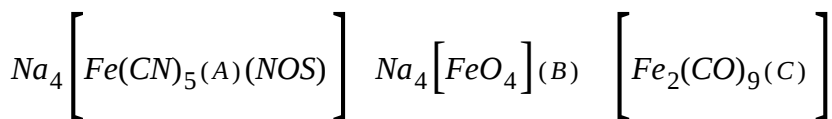
769. The strengths of 5.6 volume hydrogen peroxide (of density 1g/ mL) in terms of mass percentage and molarity (M) , respectively are :

(Take molar mass of hydrogen peroxide as 34g / mol)

A. 1.7 and 0.5

B. 0.85 and 0.5

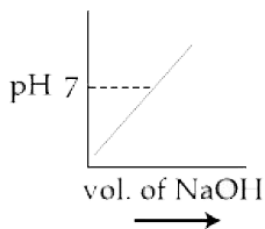C. 0.85 and 0.25

D. 1.7 and 0.25

770. 100 mL of 0.1 HCl is taken in a beaker and to it 100 mL of 0.1 M NaOH is added in steps of 2ml and the pH is continuously measured . Which of the following graphs correctly depicts the change in pH
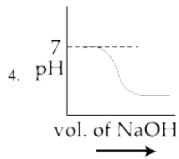
A.

B.

C.

D.
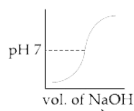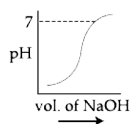
771. Write down decreasing order of nucleophilic addition reaction of following

Propanal, Butanone, Propanone, Benzaldehyde

    A. benzaldehyde < butanone < propane < propanal

    B. propanal < propanal < butanone < benzaldehyde

    C. butanone < propanone < benzaldehyde < propanal

    D. benzaldehyde < propanal < propanone < butanone

772. Which of the following statements are incorrect statements for acid rain (A) it corrodes water pipes (B) it is not harmful for trees and plants (C) it does not cause breathing problem in human being and animals (D) it damages building and other structures made of stone or metal

A. c only

B. c and d

C. a,c and d

D. a, b and d

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773. Consider the hypothetical situation where the azimuthal quantum number , l,takes values 0, 1, 2, ...n+1 , where n is the principal quantum number . Then the element with atomic number :
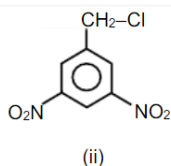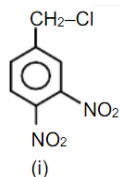
A. 9 is the first alkali metal

B. 8 is the first noble gas

C. 13 has a half - filled valence subshell

D. 6 has a 2p valence subshell

774. Write down nucleophilic substitution $\left(S_N 2\right)$ order for following.
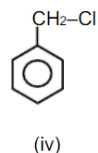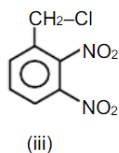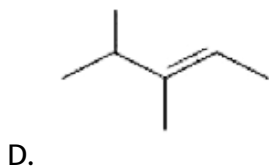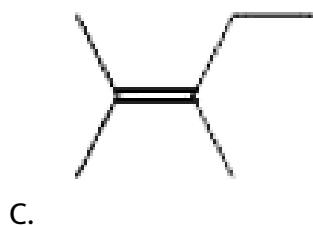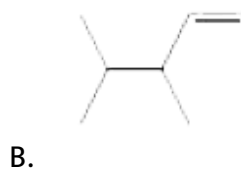

A. $(IV) > (II) > (III) > (I)$
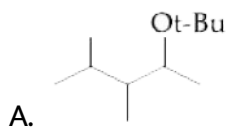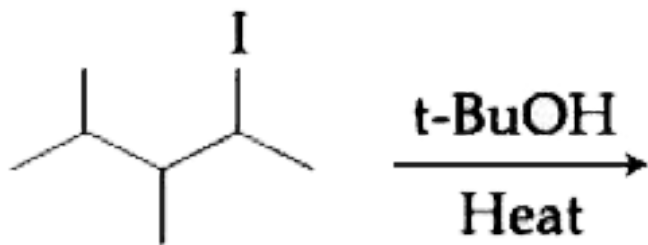
B. $(II) > (III) > (I) > (IV)$

C. $(II) > (III) > (IV) > (I)$

D. $(III) > (II) > (IV) > (I)$

775. The major product in the following reaction is

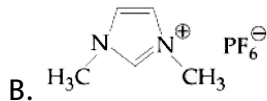t-BuOH / Heat
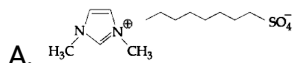
A.

Ot-Bu

B.

C.

D.

776. Consider the following reaction :
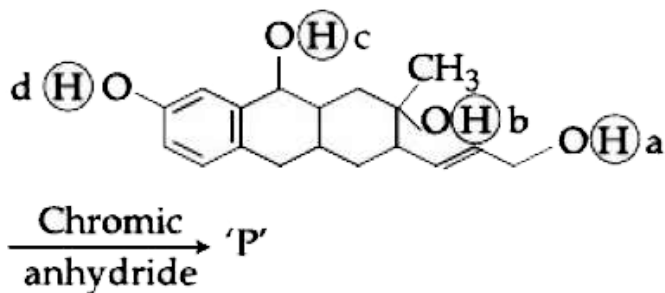
The product 'P' gives positive caric ammonium nitrate test. This is because of the presence of the which of these -OH group ?

A. b and d

B. b only

C. d only

D. c and d
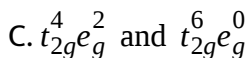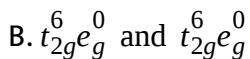
777. An ionic micelle is formed on the addition of :
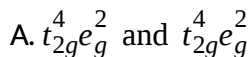
A.

B.

C. sodium stearate to pure toluene

D. liquid diethyl ether to aqueous NaCl solution

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778. The d electron configuration of $\left[Ru(en)_3\right]Cl_2$ and $\left[Fe(H_2O)_6\right]Cl_2$, respectively are :

A. $t_{2g}^4 e_g^2$ and $t_{2g}^4 e_g^2$

B. $t_{2g}^6 e_g^0$ and $t_{2g}^6 e_g^0$

C. $t_{2g}^4 e_g^2$ and $t_{2g}^6 e_g^0$

D. $t_{2g}^6 e_g^0$ and $t_{2g}^4 e_g^2$

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779. Among the statements (I -IV) , the correct ones are :

(I) Be has smaller atomic radius compared to Mg.

(II) Be has higher ionization enthalpy than Al.

(III) Charge/ radius ratio of Be is greater than that of Al.

(IV) Both Be and Al form mainly covalent compounds.

A. (I) , (III) and (IV)

B. (I), (II) and (IV)

C. (I) ,(II) and (III)

D. (II), (III) and (IV)

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780. The five successive energies of an element are 800, 2427, 3658, 25024

and $32824 kJmol^{-1}$ respectively. The number of valence electron is

A. 4

B. 3

C. 2
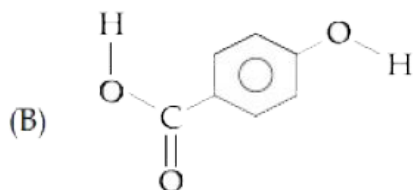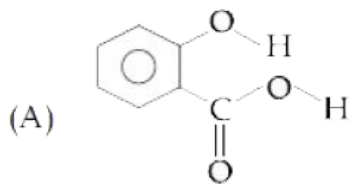
D. 5

781. Consider the following molecules and statements related to them :

(A)

(B)

(B) is move likely to be crystalline than (A)

(B) has higher boiling point than (A)

(B) dissolves more readily than (A) in water

Identify the correct option from below :

A. (a) and (c) are true

B. (b) and (c) are true

C. only (a) is true

D. (a) and (b) are true

782. Match the following drugs with their therpeutic actions :

(i)	Ranitidine	(a)	Antidepressant
(ii)	Nardil (Phenelzine)	(b)	Antibiotic
(iii)	Chloramphenicol	(c)	Antihistamine
(iv)	Dimetane (Brompheniramine)	(d)	Antacid
		(e)	Analgesic

A. (i)-(d) , (ii)-(c) , (iii)-(a) , (iv)-(e)

B. (i)-(a) , (ii)-(c) , (iii)-(b) , (iv)-(e)

C. (i)-(d) , (ii)-(a) , (iii)-(b) , (iv)-(c)

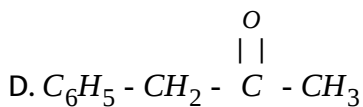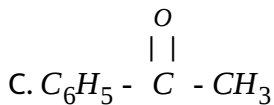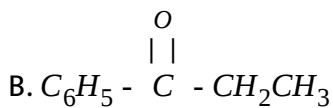D. (i)-(e) , (ii)-(a) , (iii)-(c) , (iv)-(d)

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783. The incorrect statement is :

A. Manganate and permanganate ions are paramagnetic

B. In manganate and permanganate ions , the π-bonding kes place by overlap of p-orbitals of oxygen and d-orbitals of manganese.

C. Manganate and permanganate ions are tetrahedral

D. Manganate ion is green in colour and permanganate ion is purple in colour

784. The compound A in the following reactions is :

$$A \xrightarrow[\text{(ii) Conc. } H_2SO_4/\Delta]{\text{(i) } CH_3MgBr/H_2O}$$
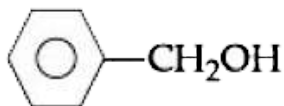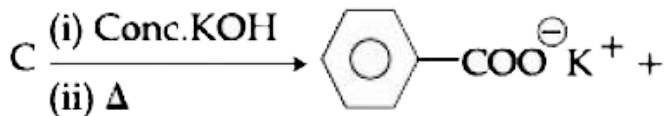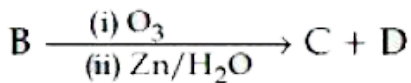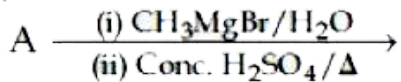
$$B \xrightarrow[\text{(ii) } Zn/H_2O]{\text{(i) } O_3} C + D$$

$$C \xrightarrow[\text{(ii) } \Delta]{\text{(i) Conc.KOH}} \bigcirc\!\!-COO^{\ominus}K^+ \; +$$

$$\bigcirc\!\!-CH_2OH$$

$$D \xrightarrow[\Delta]{Ba(OH)_2} H_3C-\overset{\overset{\displaystyle CH_3}{|}}{C}=CH-\overset{\overset{\displaystyle O}{||}}{C}-CH_3$$

A. $C_6H_5-\overset{\overset{\displaystyle O}{||}}{C}-CH\overset{CH_3}{\underset{CH_3}{<}}$

B. $C_6H_5 - \overset{\overset{\displaystyle O}{||}}{C} - CH_2CH_3$

C. $C_6H_5 - \overset{\overset{\displaystyle O}{||}}{C} - CH_3$

D. $C_6H_5 - CH_2 - \overset{\overset{\displaystyle O}{||}}{C} - CH_3$
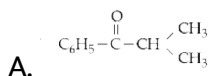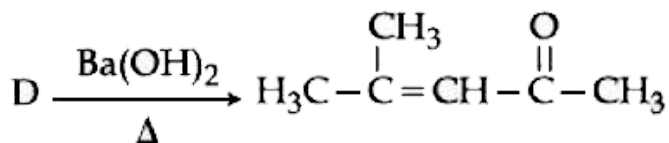
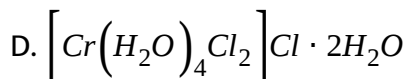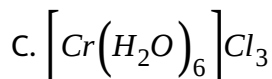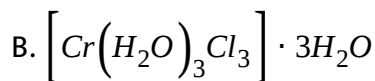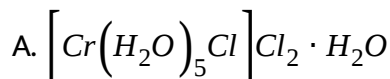**785.** Complex A has a composition of $H_{12}O_6Cl_3Cr$. If the complex on treatment with conc. H_2SO_4 loses 13.5 % of its original mass, the correct molecular formula of A is :

[Given : atomic mass of Cr=52 amu and Cl= 35 amu]

A. $\left[Cr\left(H_2O\right)_5 Cl\right]Cl_2 \cdot H_2O$

B. $\left[Cr\left(H_2O\right)_3 Cl_3\right] \cdot 3H_2O$

C. $\left[Cr\left(H_2O\right)_6\right]Cl_3$

D. $\left[Cr\left(H_2O\right)_4 Cl_2\right]Cl \cdot 2H_2O$

786. A mixture of one mole of each of $O_2(g), H_2(g)$, He(g) exists in a container of volume V at temperatureT in which partial pressure of H_2 (g)

is 2atm. the total pressure in the container is:

A. 6 atm

B. 38 atm

C. 22 atm

D. 14 atm

787. For the reaction $2A + 3B + \dfrac{3}{2}C \rightarrow 3P$ the correct relation between rate of reaction of species A,B,C is

A. $\dfrac{dn_A}{dt} = \dfrac{2}{3}\dfrac{dn_B}{dt} = \dfrac{3}{4}\dfrac{dn_C}{dt}$

B. $\dfrac{dn_A}{dt} = \dfrac{3}{2}\dfrac{dn_B}{dt} = \dfrac{3}{4}\dfrac{dn_C}{dt}$

C. $\dfrac{dn_A}{dt} = \dfrac{2}{3}\dfrac{dn_B}{dt} = \dfrac{4}{3}\dfrac{dn_C}{dt}$

D. $\dfrac{dn_A}{dt} = \dfrac{dn_B}{dt} = \dfrac{dn_C}{dt}$

788. 6.022×10^{22} molecules of compound X has mass 10g.What is molarity of solution containing 5g of 'X' in 2 Lit. solution answer as P(where $M = P \times 10^{-3} mo \frac{l}{l} it$)

789. If $250 cm^3$ of an aqueous solution containing 0.73 g of a protein A of isotonic with one litre of another aqueous solution containing 1.65 g of a protein B, at 298 K, the ratio of the molecular masses of A and B is _____ $\times 10^{-2}$ (to the nearest integer).
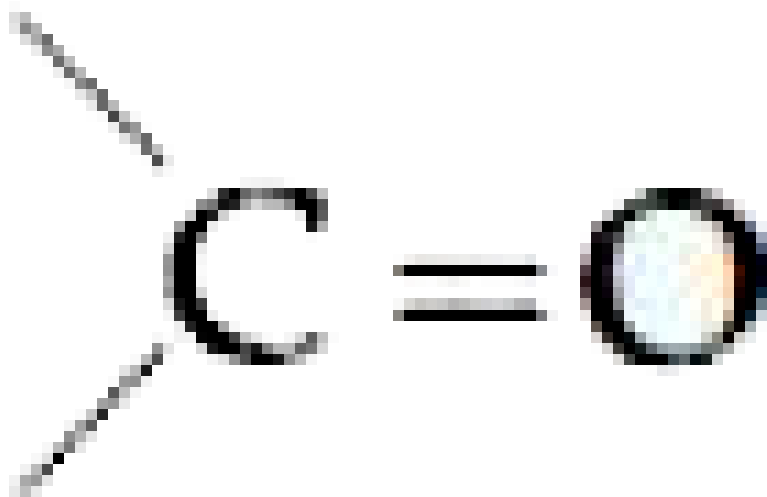
790. The volume (in mL) of 0.1 N NaOH required to neutralise 10 mL of 0.1 N phosphinic acid is _____

791. The number of


groups present in a tripeptide Asp-Gly- Lys is _____.

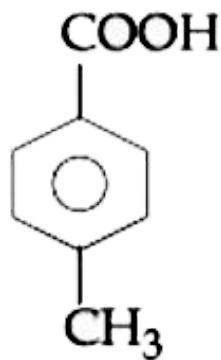**792.** Elements with atomic no. 101,104 belongs to group respectively?

A. Actinoids and Group 4

B. Actinoids and Group 6

C. Group 6 and Actinoids

D. Group 11 and Group 4

Answer: C

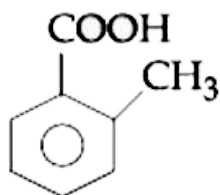▶ Watch Video Solution

793. A compound A $\left(C_8H_8O_2\right)$ react with $Br_2/FeBr_3$ and gives only one kind of product when A react with sodalime gives toulene find A?

COOH

A.

COOH

CH₃

B.

COOH

CH₃

C.

CH₂COOH

D.
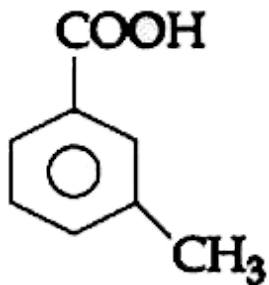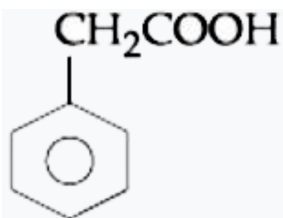
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794. Balmer series lies in which region of electromagnetic spectrum

A. Infared

B. Ultraviolet

C. Microwave

D. Visible

Answer: B

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795. The number of possible isomers $\left[Pt(en)\left(NO_2\right)_2\right]$

A. 3

B. 2

C. 4

D. 1

Answer: B

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796. Lead nitrate on heating gives A, A on cooling give B, NO with B give C(blue solid). Find oxidation no of N in compound C

A. $+5$

B. $+4$

C. $+2$

D. $+3$

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797. The combustion of Li, Na, K in excess of air gives major oxides
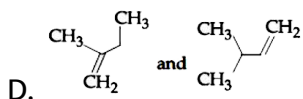
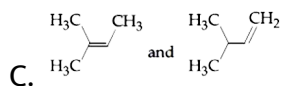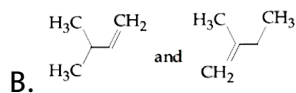A. Li_2O, Na_2O and K_2O_2

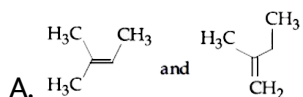B. Li_2O, Na_2O_2 and K_2O

C. Li_2O, Na_2O_2 and KO_2

D. Li_2O_2, Na_2O_2 and K_2O_2

Answer: D

798. When neopentyl alcohol is heated with an acid , it slowly converted into an 85 : 15 mixture of alkenes A and B , respectively. What are these alkenes ?
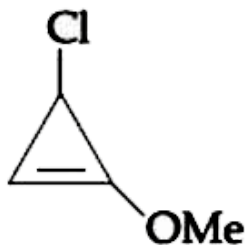
A.

B.

C.

D.

Answer: A

799. The decreasing order of reactivity of the following organic molecules towards $AgNO_3$ solution is

(A)

OMe

(B)

$CH_3CHCH_3 | Cl(C)$ $CH_3CHCH_2NO_2 | Cl(D)$
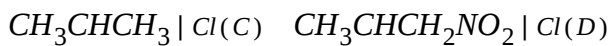
A. $(A) > (B) > (C) > (D)$

B. $(C) > (D) > (A) > (B)$

C. $(B) > (A) > (C) > (D)$

D. $(A) > (B) > (D) > (C)$

Answer: B

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800. Among statements (a) - (d) , the correct ones are

(a) Lime stone is decomposed to CaO during the extraction of iron from its oxides

(b) In the extraction of silver , silver is extracted as an anionic complex.

(c) Nickel is purified by Mond's process .

(d) Zr and Ti are purified by Van Arkel method .

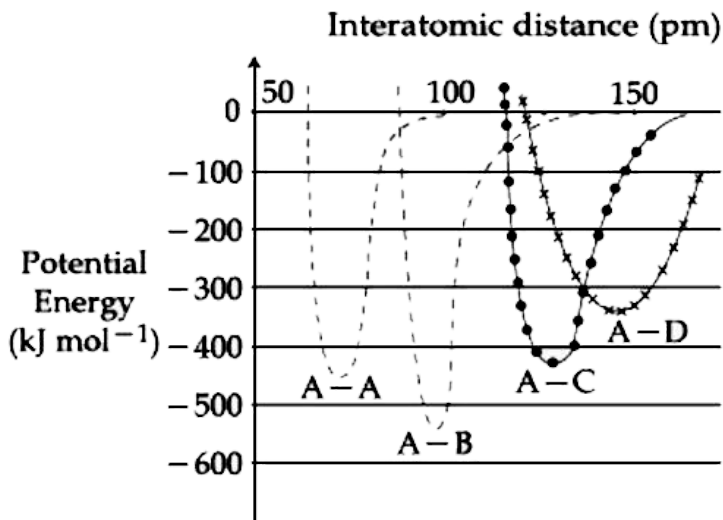   A. (a), (b), (c) and (d)

    B. (a), (c) and (d) only

    C. (c) and (d) only

    D. (b), (c) and (d) only

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801. The intermolecular potential energy for the molecules A, B, C and D given below suggests that :

Interatomic distance (pm)

A. A - B has the stiffest bond.

B. D is more electronegative than other atoms

C. A - A has the largest bond enthalpy.

D. A - D has the shortest bond length.

Answer: B

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802. What are the functional groups present in the structure of maltose ?
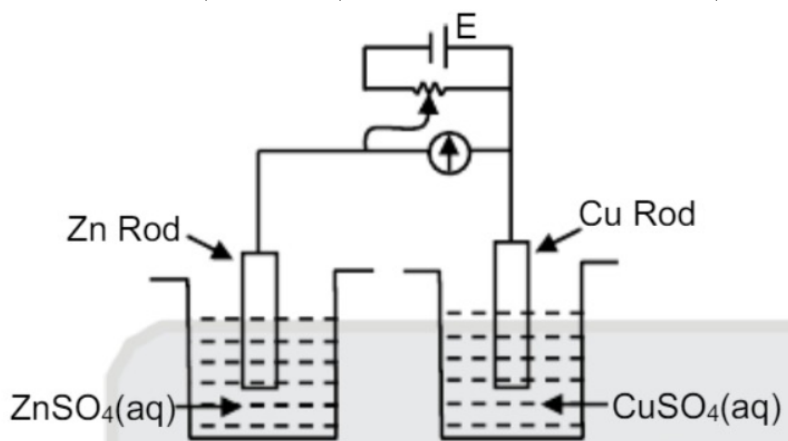
A. One ketal and one hemiketal

B. One acetal and one ketal

C. One acetal and one hemiacetal

D. Two acetals

Answer: C

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803. For the given cell arrangement identify incorrect statement

given $E° - \left(Cu^{2+}/Cu\right)$ = 0.34V &$E° - \left(Zn^{2+}/Zn\right)$ = - 0.76V

A. If $E_{ext} > 1.1$ V , Zn dissolves at Zn

electrode and Cu deposits at Cu electrode

B. If $E_{ext} = 1.1V$, no flow of e^0 or current occurs
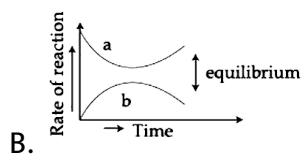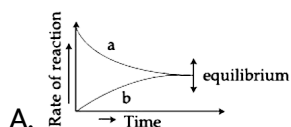
C. If $E_{ext} > 1.1V$, e^- flows from Cu to Zn

D. If $E_{ext} < 1.1$ V , Zn dissolves at anode and Cu deposits at cathode

Answer: A
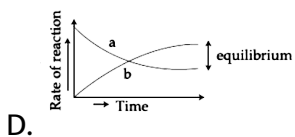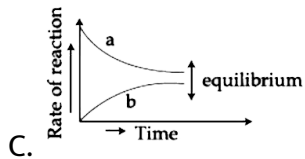
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804. For the equilibrium $A \Leftrightarrow B$, the variation of the rate of the forward

(a) and reverse (b) reaction with time is given by :

A.

B.

C.

D.

Answer: A

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805. The ionic radii of O^{2-}, F^-, Na^+ and Mg^{2+} are in the order :

A. $O^{2-} > F^- > Mg^{2+} > Na^+$

B. $Mg^{2+} > Na^+ > F^- > O^{2-}$

C. $O^{2-} > F^- > Na^+ > Mg^{2+}$

D. $F^- > O^{2-} > Na^+ > Mg^{2+}$
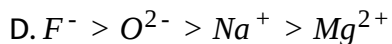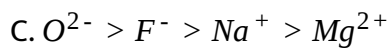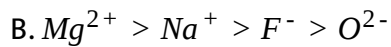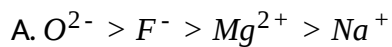
Answer: C

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806. IUPAC name of given compound
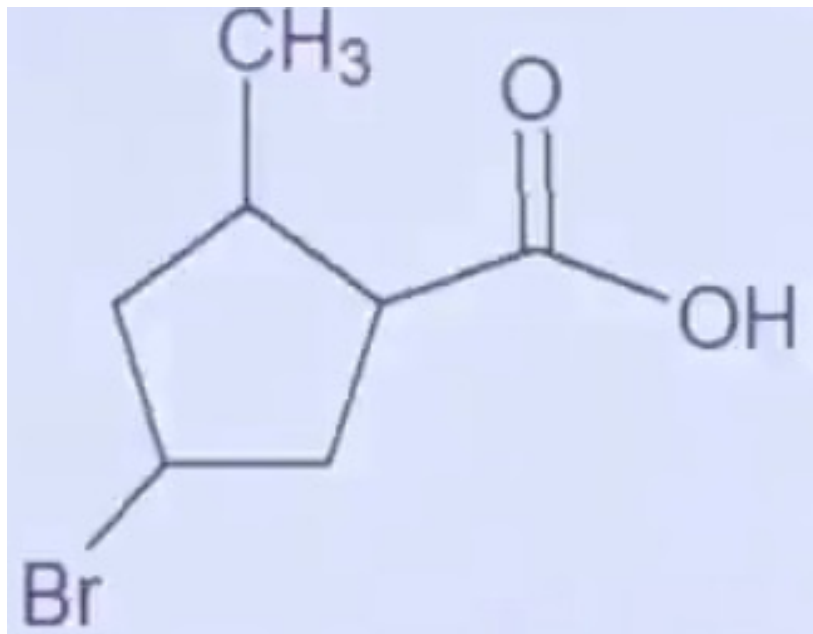
A. 3 - Bromo - 5- methylcyclopentane carboxylic acid

B. 3 - Bromo - 5- methylcyclopentanoic acid

C. 5 - Bromo - 3- methylcyclopentanoic acid

D. 4 - Bromo - 2- methylcyclopentane carboxylic acid

Answer: B

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807. For 1 mole of ideal gas which of the following statements must be true

a) U & H depend only on temperature

b) Compressibility factor (Z) can not be 1.

c) $C_p - C_v$ =R

d) $\triangle U = C_v dT$ for all processes
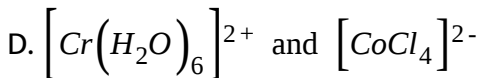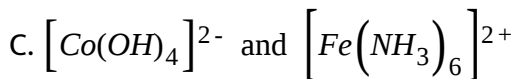
    A. (b), (c) and (d)

    B. (a) and (c)

    C. (a),(c) and (d)

    D. (c) and (d)

808. The pair in which both species have same magnetic moment (spin only value) is .

A. $\left[Mn\left(H_2O_6\right)\right]^{2+}$ and $\left[Cr\left(H_2O\right)\right]^{2+}$

B. $\left[Cr\left(H_2O_6\right)\right]^{2+}$ and $\left[Fe\left(H_2O\right)_6\right]^{2+}$

C. $\left[Co(OH)_4\right]^{2-}$ and $\left[Fe\left(NH_3\right)_6\right]^{2+}$

D. $\left[Cr\left(H_2O\right)_6\right]^{2+}$ and $\left[CoCl_4\right]^{2-}$
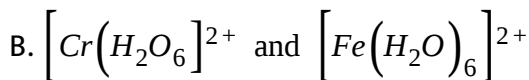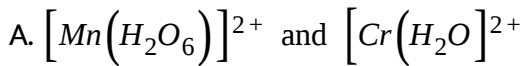
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809. Which of the following will react with $CHCl_3$ + alc. KOH ?

A. Adenine and lysine

B. Thymine and proline

C. Adenine and thymine

D. Adenine and proline

Answer: C

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810. An organic compound (A) (molecular formula $C_6H_{12}O_2$) was hydrolysed with dil . H_2SO_4 to give carboxylic acid (B) 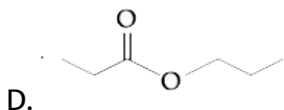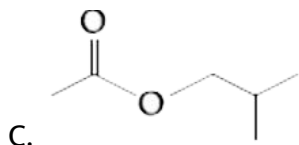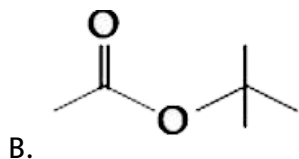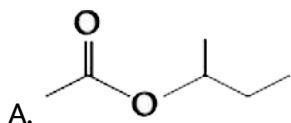and an alcohol (C). 'C' gives white turbidity immediately when treated with anhydrous $ZnCl_2$ and conc. HCl . The organic compound (A) is

A.

B.

C.

D.

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811. Match the following :

(*i*)	Foam	(*a*)	smoke
(*ii*)	Gel	(*b*)	cell fluid
(*iii*)	Aerosol	(*c*)	jellies
(*iv*)	Emulsion	(*d*)	rubber
		(*e*)	froth
		(*f*)	milk

A. (i) - (d) , (ii) - (b) , (iii) - (a) , (iv) - (e)

B. (i) - (b) , (ii) - (c) , (iii) - (e) , (iv) - (d)

C. (i) - (e) , (ii) - (c) , (iii) - (a) , (iv) - (f)

D. (i) - (d) , (ii) - (b) , (iii) - (e) , (iv) - (f)

Answer: D

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812. A 20.0 mL solution containing 0.2 impure H_2O_2 reacts completely with 0.316 g of $KMnO_4$ in acid solution . The purity of H_2O_2 (in%) is ....

(mol .wt.of H_2O_2 = 34 , mol . Wt . Of $KMnO_4$ = 158)

813. Vapour pressure of solution obtained by mixing 1 mole of n hexane and 3 mole of n-heptane is 550 mm Hg . On mixing 1 mole n-heptane, vapour pressure of solution increases by 10mm Hg. Find the vapour pressure of pure n-heptane

814. If 75% of a first order reaction was completed in 90 minutes, 60% of the same reaction would be completed in approximately (in minutes)
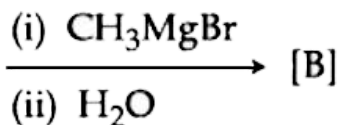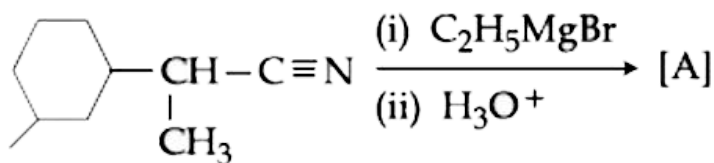
....

(Take : log 2 = 0.30 , log 2.5 = 0.40)

815. Find the weight of NH_3 in grams when 2.8 kg N_2 reacts with 1Kg H_2 ?

816. The number of chiral centres present in [B] is ....

$$\text{(cyclohexyl)} - \overset{|}{\underset{CH_3}{CH}} - C \equiv N \xrightarrow[\text{(ii) } H_3O^+]{\text{(i) } C_2H_5MgBr} [A]$$

$$\xrightarrow[\text{(ii) } H_2O]{\text{(i) } CH_3MgBr} [B]$$

817. For a reaction $4M(s) + nO_2(g) \rightarrow 2M_2O_n(s)$,

the free energy change is plotted as a function of temperature. The temperature below which the oxide is stable could be inferred from the plot as the point at which :

A. the siope changes from negative to positive

B. the free energy change shows a changge from negative to positive

C. the slopw changes from positive to negative

D. the slope changes from positive to zeros

818. Average atomic mass of chlorine is 35.5 then the correct naturally occuring molar ratio of ^{35}Cl & ^{37}Cl is

A. $4:1$

B. $3:1$

C. $2:1$

D. $1:1$

819. For an equlibrium reaction $N_2(g) + 3H_2(g) \leftrightarrow 2NH_3(g)$, $K_c = 64$. what is the equilibriu constant for the reaction $NH_3(g) \leftrightarrow \frac{1}{2}N_2(g) + \frac{3}{2}H_2(g)$

A. 1/64

B. 8

C. 1/4

D. 1/8

820. Dihydrogen of high purity (> 99.95%) is obtained through :
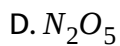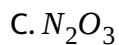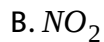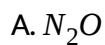
A. the reaction of Zn with dilute HCl.

B. the electrolysis of acidified water using Pt electrodes.

C. the electrolysis fo brine solution

D. the electrolysis of warm $Ba(OH)_2$ solution using Ni electrodes.

821. The reaction of NO with N_2O_4 at 250 K gives :

A. N_2O

B. NO_2

C. N_2O_3

D. N_2O_5

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822. The correct match between Item- I (starting meterial) and Item - II (reagent) for the preparation of benzaldehyde is :

	Item - I		Item - II
(I)	Benzene	(P)	HCl and $SnCl_2$, H_3O^+
(II)	Benzonitrile	(Q)	H_2, Pd-$BaSO_4$, S and quinoline
(III)	Benzoyl Chloride	(R)	CO, HCl and $AlCl_3$

A. (I) - (Q), (II) - (R) and (III) - (P)

B. (I) - (P), (II) - (Q) and (III) - (R)

C. (I) - (R) , (II) - (P) and (III) - (Q)

D. (I) - (R) , (II) - (Q) and (III) - (P)

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823. In a metal oxide, oxide ions crystallises in CCP lattice in which metal M occupies 50% of octahedral voids and metal M_2 occupies 12.5% of

tetrahedral voids. then the oxidation state of metal M_1 and M_2 respectively are:

A. $+2, \ +4$

B. $+1, \ +3$

C. $+3, \ +1$

D. $+4, \ +2$

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824. The element that can be refined by distillation is :

A. nickel

B. zinc

C. tin

D. gallium

825. For a d^4 metal ion in an octahedral field, the correct electronic configuration is :

A. $t_{2g}^3 e_g^1$ when $\Delta_0 < P$

B. $t_{2g}^3 e_g^1$ when $\Delta_0 > P$

C. $t_{2g}^4 e_g^0$ when $\Delta_0 < P$

D. $e_g^2 t_{2g}^2$ when $\Delta_0 < P$

826. Match the following

	Test / Method		Reagent
(i)	Lucas Test	(a)	$C_6H_5SO_2Cl$ / aq. KOH
(ii)	Dumas method	(b)	HNO_3/ $AgNO_3$
(iii)	Kjeldahl's method	(c)	CuO/CO_2
(iv)	Hinsberg Test	(d)	Conc. HCl and $ZnCl_2$
		(e)	H_2SO_4

A. (i) - (d), (ii) - (c), (iii) - (b), (iv) - (e)

B. (i) - (b), (ii) - (d), (iii) - (e), (iv) - (a)

C. (i) - (d), (ii) - (c), (iii) - (e), (iv) - (a)

D. (i) - (b), (ii) - (a), (iii) - (c), (iv) - (d)

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827. Match the following compounds (Column -I) with their uses (Column - II) :

S. No.	Column - I	S. No.	Column - II
(I)	$Ca(OH)_2$	(A)	casts of statues
(II)	NaCl	(B)	white wash
(III)	$CaSO_4 \cdot \frac{1}{2}H_2O$	(C)	antacid
(IV)	$CaCO_3$	(D)	washing soda preparation

A. (I) - (D), (II) - (A), (III) - (C), (IV) - (B)

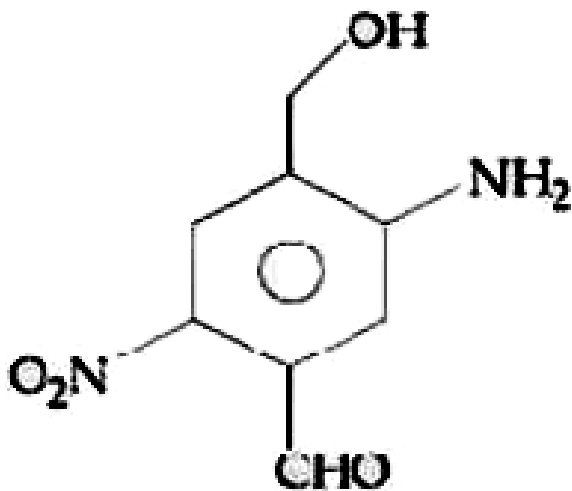B. (I) - (B), (II) - (D), (III) - (A), (IV) - (C)

C. (I) - (B), (II) - (C), (III) - (D), (IV) - (A)

D. (I) - (C), (II) - (D), (III) - (B), (IV) - (A)

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828. The IUPAC name of the following compound is
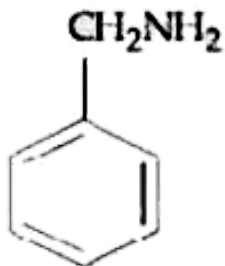

A. 2 -nitro - 4 - hydroxymethyl 1-5 - amino benzaledehyde

B. 3-amino - 4 hydroxymethy 1-5- nitrobenzaldehyde

C. 5 - amino -4 hydroxymethy 1-2-nitrobenzaldehyde
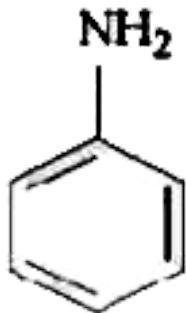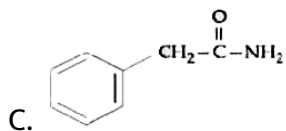
D. 4 - amino - 2 - formy 1-5- hydroxymethyl nitrobenzene

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829. Which of the following compounds can be prepared in good yield by Gabriel phthalimide synthesis ?

A.

B. $CH_3 - CH_2 - NHCH_3$

C.

D.

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830. A set of solution is prepared using 180 g of water as a solvent and 10 g of different non - volatile solutes A, B and C . The relative lonwering of vapour pressure in the presence of these solutes are in the order . [Given , molar mass of $A = 100 gmol^{-1}$ $B = 200 gmol^{-1}$, $C = 10,000 gmol^{-1}$]
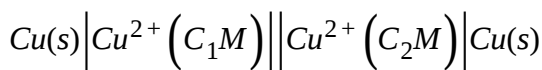
A. $B > C > A$

B. $C > B > A$

C. $A > B > C$

D. $A > C > B$

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831. For the given concentration cell

$$Cu(s)\left|Cu^{2+}\left(C_1M\right)\right|\left|Cu^{2+}\left(C_2M\right)\right|Cu(s)$$
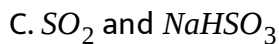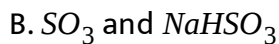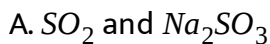
Gibbs energy $\triangle$ G is negative if:

A. $C_1 = C_2$

B. $C_2 = C_1/\sqrt{2}$

C. $C_1 = 2C_2$

D. $C_2 = \sqrt{2}C_1$

832. Reaction of an inorganic sulphite X with dilute H_2SO_4) generates compound Y . Reaction of Y with NaOH gives X . Further , the reaction of X and Y and water affords compound Z . Y and Z respectively are :

A. SO_2 and Na_2SO_3

B. SO_3 and $NaHSO_3$

C. SO_2 and $NaHSO_3$

D. S and Na_2SO_3

833. Misch metal is an alloy consisting mainly of :

A. lanthanoid metals

B. actinoid and transition metal

C. lanthanoid and actinoid metals

D. actinoid metals

834. The correct match between Item - I and Item - II is :

	Item - I		Item - II
(a)	Natural rubber	(I)	1, 3-butadiene + styrene
(b)	Neoprene	(II)	1, 3-butadiene + acrylonitrile
(c)	Buna-N	(III)	Chloroprene
(d)	Buna-S	(IV)	Isoprene

A. (a) -(III) , (b) - (IV) , (c) - (I) , (d) - (II)

B. (a) - (III) , (b) - (IV), (c) - (II) ,(d)- (I)

C. (a) - (IV) , (b) - (III) , (c) - (II) , (d) - (I)

D. (a) - (IV), (b) - (III), (c) - (I), (d) - (II)

835. If the solubility product of AB_2 is $3.2x10^{-11}M^{-1}$, then the solubilty of AB_2 in pure water is _____ $\times 10^{-4}molL^{-1}$. [Assuming that neither kind of ion reacts with water].

836. For freundlich adsorption isotherm, a plot of log (x/m) (y - axis) and log p (x-axis) gives a straight line . The intercept and slope for the line is 0.4771 and 2, respectively . The mass of gas , adsorbed per gram of

adsorbent if the intital pressure is 0.04 atm , is _____ $\times 10^{-4}$ g.

(log 3=0.4771).

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837. A solution of phenol in chlorofom when treated with aqueous NaOH

gives compound Pasa major product . The mass percentage of carbon in P

is _____ (to the nearest integer).

(Atomic mass : $C = 12, H = 1, O = 16$)

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838. The atomic number of Unnilunium is _____ .

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839. The rate of a reaction decreased by 3.555 times when the

temperature was changed from $40\,^\circ C$ to $30\,^\circ C$. The activation energy (in

kj mol^{-1}) of the reaction is _____.

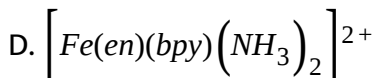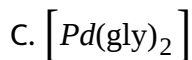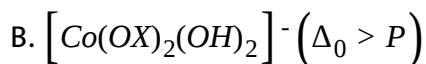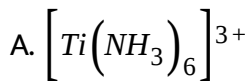Take : R = 8314 J $mol^{-k} K^{-1}$ In 3.555 = 1268

840. The mechanism of action of "Terfenadine" (Seldane) is :

A. Activates the histamine receptor

B. Inhibits the action of histamine receptor

C. Inhibits the secretion of histamine

D. Helps in the secretion of histamine

841. The one that can exhibit highest paramagnetic behaviour among the

following is :

gly = glycinato , byy = 2, 2'-bipyridine

A. $\left[Ti\left(NH_3\right)_6\right]^{3+}$

B. $\left[Co(OX)_2(OH)_2\right]^-\left(\Delta_0 > P\right)$

C. $\left[Pd(\text{gly})_2\right]$

D. $\left[Fe(en)(bpy)\left(NH_3\right)_2\right]^{2+}$

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842. The process of calcination and roasting in metallurgical industries, respectively, can lead to :

A. Global warming and acid rain

B. Photochemical smog and global warming

C. Global warming and photochemical smog

D. Photochemical smog and ozone layer depletion

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843. In colloidal solution of blue ink following reagent are mixed

H_2O, Egg, CH_3COOH & HCl

then which of the obove reagent ensure the stability of blue ink
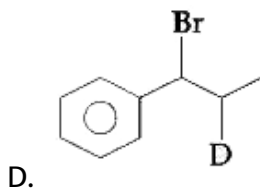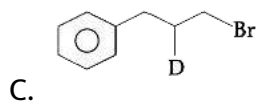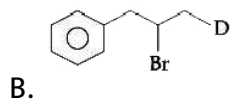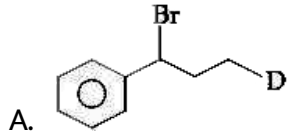
A. HCHO

B. Egg white

C. Water

D. Eosin dye

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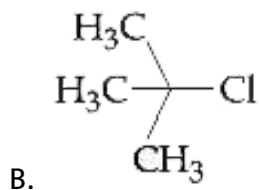**844.** The major product [C] of the following reaction sequence will be :

$$CH_2=CH-CHO \xrightarrow[\text{(ii) } SOCl_2]{\text{(i) } NaBH_4} [A] \xrightarrow[\substack{\text{Anhy.} \\ AlCl_3}]{\bigcirc} [B]$$
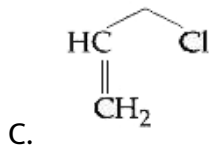
$$\xrightarrow{DBr} [C]$$

A.

B.

C.

D.
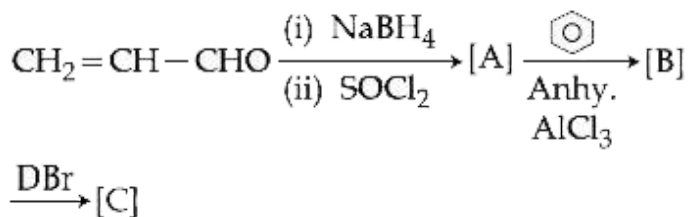
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845. Among the following compounds, which one has the shortest C - Cl

bond?

A. H_3C - Cl

B.

C.

HC   Cl

$\|$

CH$_2$

Cl

CH

$\|$

CH$_2$

D.
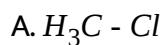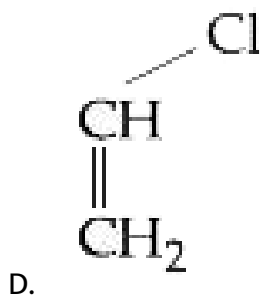
846. In the equilibrium constant for $A \Leftrightarrow B + C$ is $K_{eq}^{(1)}$ and that of

$B + C = P$ is $K_{eq}^{(2)}$, the equilibrium constant for $A \Leftrightarrow P$ is :

A. $K_{eq}^{(1)} / K_{eq}^{(2)}$

B. $K_{eq}^{(2)} - K_{eq}^{(1)}$

C. $K_{eq}^{(1)} K_{eq}^{(2)}$

D. $K_{eq}^{(1)} + K_{eq}^2$

847. The Crystal Field Stabilization Energy (CFSE) of

$$\left[CoF_3(H_2O)_3\right]\left(\Delta_0 < P\right) \text{ is :}$$
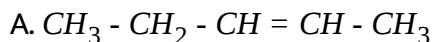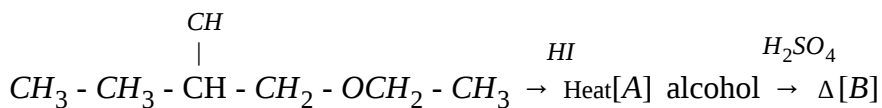
A. $-0.8\Delta_0 + 2P$

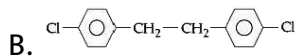B. $-0.8\Delta_0$

C. $-0.4\Delta_0$

D. $-0.4\Delta_0 + P$

848. The major product [B] in the following reaction is :

$$CH_3 - CH_3 - \overset{\overset{\displaystyle CH}{\displaystyle |}}{CH} - CH_2 - OCH_2 - CH_3 \xrightarrow[\text{Heat}]{HI} [A] \text{ alcohol} \xrightarrow{H_2SO_4} \Delta [B]$$

A. $CH_3 - CH_2 - CH = CH - CH_3$

B. $CH_2 = CH_2$

C. $CH_3 - CH = \overset{\overset{\displaystyle CH_3}{|}}{C} - CH_3$

D. $CH_3 - CH_2 - \overset{\overset{\displaystyle CH_3}{|}}{C} = CH_2$
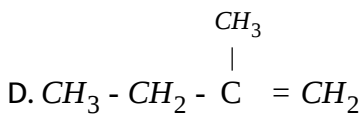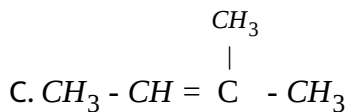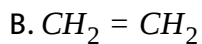
849. In the following reaction sequence, [C] is :

$$\xrightarrow[\text{(ii) } Cu_2Cl_2 + HCl]{\text{(i) } NaNO_2 + HCl,\ 0\text{-}5\ °C} [A]$$

$$\xrightarrow[hv]{Cl_2} [B] \xrightarrow{Na+dry\ ether} \underset{\text{(Major Product)}}{[C]}$$

A.

B.

C.

D. CH₃—⬡—⬡—CH₃
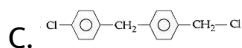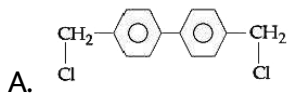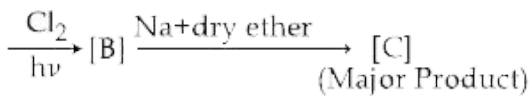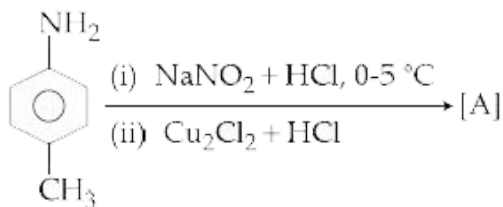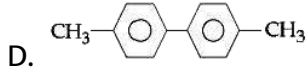
850. In which of the following reaction, Hybridisation of underline atom gets changed

A. $H_2\underline{S}O_4 + NaCl \xrightarrow{420K}$

B. $\underline{N}H_3 \xrightarrow{H^+}$

C. $H_3\underline{P}O_2 \xrightarrow{\text{Disproportionation}}$

D. $\underline{X}eF_4 + SbF_5 \rightarrow$
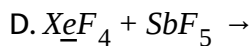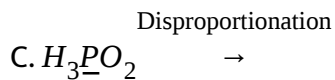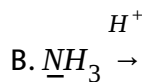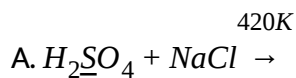
851. 250 mL of a waste solution obtained from the workshop of a goldsmith contains $0.1 M AgNO_3$ and $0.1 M AuCl$. The solution was electrolyzed at 2 V by passing a current of 1 A for 15 minutes. The metal/metals electrodeposited will be :

$$\left(E^{\circ}_{Ag^{+}/Ag} = 0.80V, E^{\circ}_{Au^{+}/Au} = 1.69V \right)$$

A. silver and gold in equal mass proportion

B. only gold

C. only silver

D. silver and gold in proportion to their atomic weights

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852. The incorrect statement(s) among (a) - (c) is (are):

(a) W(VI) is more stable than Cr(IV).

(b) in the presence of HCl, permanganate titrations provide satisfactory

results.

(c)some lanthanoid oxides can be used as phosphors.
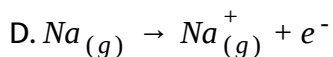
A. (a) only

B. (b) and (c) only

C. (b) only

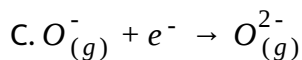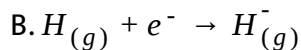D. (a) and (b) only

853. The process that is NOT endothermic in nature is :

A. $Ar_{(g)} + e^- \rightarrow Ar^-_{(g)}$

B. $H_{(g)} + e^- \rightarrow H^-_{(g)}$

C. $O^-_{(g)} + e^- \rightarrow O^{2-}_{(g)}$

D. $Na_{(g)} \rightarrow Na^+_{(g)} + e^-$
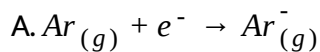
854. An alkaline earth metal 'M' readily forms water soluble sulphate and water insoluble hydroxide. Its oxide MO is very stable to heat and does not have rock - salt structure. M is

A. Be

B. Ca

C. Sr

D. Mg

855. The major product [R] in the following sequence of reactions is :

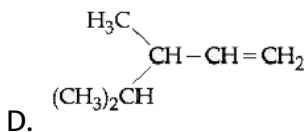$$HC \equiv CH \xrightarrow[\text{(ii) } H_3C]{\text{(i) } LiNH_2/\text{ether}} [P]$$

(ii) H_3C
$CH-Br$
$(CH_3)_2CH$

$$\xrightarrow[\rightarrow \text{ (ii) } NaBH_4 \ [Q]]{\text{(i) } HgSO_4/H_2SO_4 \quad \text{Conc. } H_2SO_4} \rightarrow \Delta \quad [R]$$

A.

H_3C
$C=CH-CH_3$
$(CH_3)_2CH$

B.

H_3C
$C=C(CH_3)_2$
H_3CCH_2

C.

H_2C
$C-CH_2-CH_3$
$CH(CH_3)_2$

D.

H_3C
$CH-CH=CH_2$
$(CH_3)_2CH$
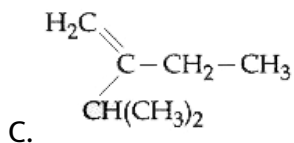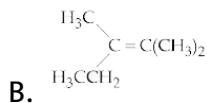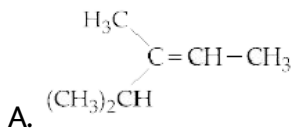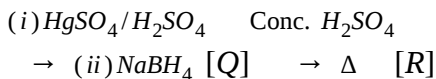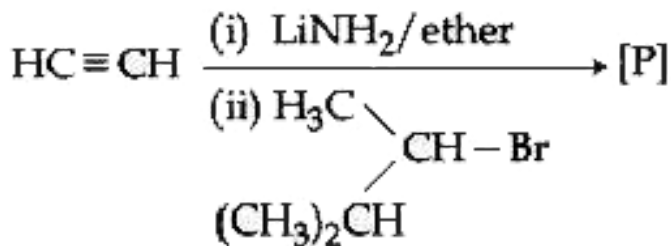
Answer: D

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856. The molecule in which hybrid MO s involve only one d - orbital of the central atom is :

A. XeF_4

B. BrF_5

C. $\left[CrF_6\right]^{3-}$

D. $\left[Ni(CN)_4\right]^{2-}$

857. Which of the following compounds will form the precipitate with $aq.\ AgNO_3$ solution most readily?

A.

B.

C.

D.
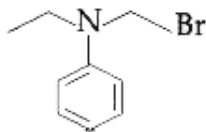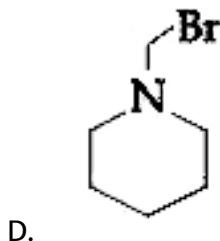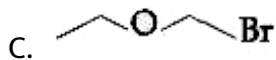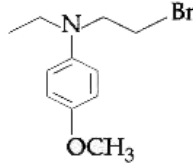
Answer: D

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858. 5 mole of an ideal gas of volume is expanded against vaccum to make its volume 2 times, then work done by the gas is:
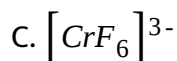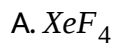
A. $-RT\left(V_2 - V_1\right)$

B. zero

C. $C_V\left(T_2 - T_1\right)$

D. $-RT\ln V_2/V_1$

859. If the shortest wavelength in Lyman series of hydrogen atom is A, then the longest wavelength in Paschen series of He^+ is :

A. $\dfrac{5\lambda_1}{9}$

B. $\dfrac{27\lambda_1}{5}$

C. $\dfrac{36\lambda_1}{5}$

D. $\dfrac{9\lambda_1}{5}$

860. Consider the following equations :

$$2Fe^{2+} + H_2O_2\text{(in basic medium)} \rightarrow xA + yB$$

$$2MnO_4^- + 6H^+ + 5H_2O_2\text{(in acidic medium)} \rightarrow x'\,C + y'\,D + z'\,E$$
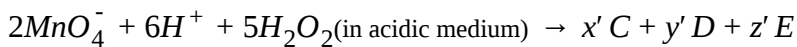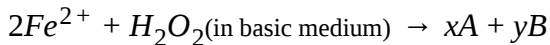
The sum of the stoichiometric coefficients

x, y, $x'\,y'$ and z' for products A, B, C, D and E, respectively, is _____.

861. A 100 mL solution was made by adding 1.43 g of $Na_2CO_3.\,xH_2O$. The normality of the solution is 0.1 N. The value of x is _____.

(The atomic mass of Na is 23 g/mol)

862. The number of molecules with energy greater than tha threshold enegy for a reaction increases five fold by a rise of temperature from $27\,^\circ C$ to $42\,^\circ C$. Its energy of activation in J/mol is _____. (Take $\ln 5 = 1.6094$, $R = 8.314$ J mol^{-1}K^{-1})

863. How many chiral centres are present in Threonine

864. The osmotic pressure of a solution of NaCl is 0.10 atm and that of a glucose solution is 0.20 atm. The osmotic pressure of a solution formed by mixing 1 L of the sodium chloride solution with 2L of the glucose solution is $x \times 10^{-3}$ atm. x is _____.(nearest integer)

865. It is true that :

A. A second order reaction is always a multistep reaction

B. A first order reaction is always a single step reaction

C. A zero order reaction is a multistep reaction

D. A zero order reaction is a single step reaction

Answer: C

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866. An acidic buffer is obtained on mixing :

A. 100 mL of 0.1 M HCl and 200 mL of 0.1 M CH_3COONa

B. 100 mL of 0.1 M HCl and 200 mL of 0.1 M NaCl

C. 100 mL of 0.1 M CH_3COOH and 100 mL of 0.1 M NaOH

D. 100 mL of 0.1 M CH_3COOH and 200 mL of 0.1 M NaOH

Answer: A

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867. The Kjeldahl method of Nitrogen estimation fails for which of the following reaction products?
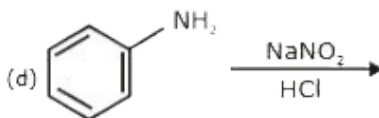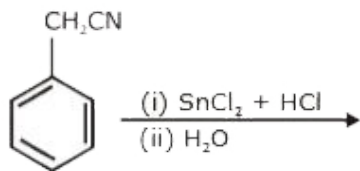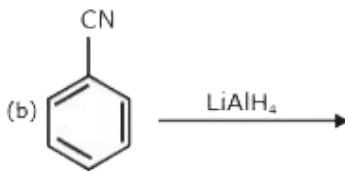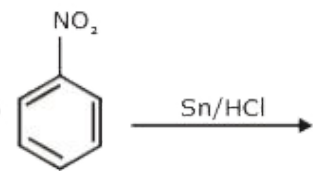
A. (a), (c) and (d)

B. (b) and (c)

C. (c) and (d)

D. (a) and (d)

Answer: C

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868. If the boiling point of H2O is 373 K, the boiling point of H2S will be :

A. greater than 300 K but less than 373 K

B. equal to 373 K

C. more than 373 K

D. less than 300 K

Answer: D

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869. The complex that can show optical activity is :

A. cis - $\left[CrCl_2(ox)_2\right]^{3-}$ (ox = oxalate)

B. $trans$ - $\left[Fe\left(NH_3\right)_2(CN)_4\right]^{-}$

C. $trans$ - $\left[Cr\left(Cl_2\right)(ox)_2\right]^{3-}$

D. cis - $\left[Fe\left(NH_3\right)_2(CN)_4\right]^{-}$

Answer: A

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870. Which one of the following compounds possesses the most acidic hydrogen?

A. $H_3C - C \equiv C - H$

B.

MeO, O, O, OMe, H, O, OHe

C.

$N \equiv C$, $C \equiv N$, H, H

D.

H_3C, O, CH_3
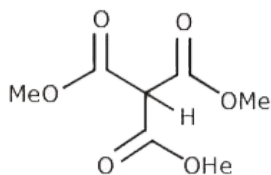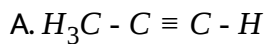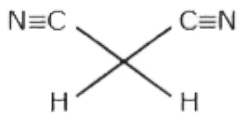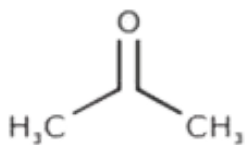
Answer: C

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871. Aqua regia is used for dissolving noble metals (Au, Pt, etc.). The gas evolved in this process is :

A. N_2O_3

B. N_2

C. N_2O_5

D. NO
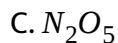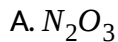
Answer: D

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872. The antifertilituy drug "Novestrol" can react with :

A. Br_2/water, $ZnCl_2$/HCl, $FeCl_3$

B. Br_2/water, $ZnCl_2$/HCl, NaOCl

C. Alcoholic HCN, NaOCl , $ZnCl_2$/HCl

D. $ZnCl_2$/HCl, $FeCl_3$, Alcoholic HCN
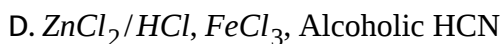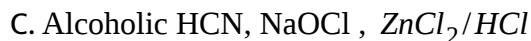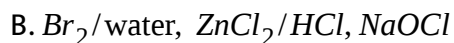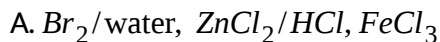
Answer: A

873. Which of the following compounds produces an optically inactive compound on hydrogenation?

A.

B.

C.

D.
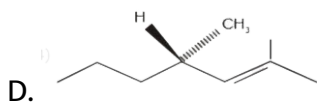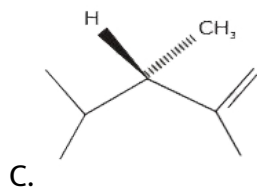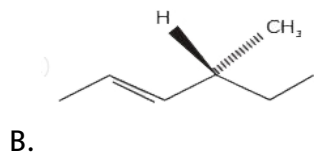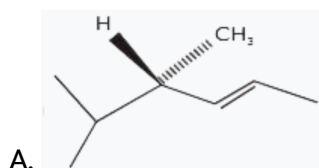
Answer: C

874. Of the species, NO, NO^+, NO^{2+} and NO^-, the one with minimum bond strength is :

A. NO^-

B. NO^+

C. NO^{2+}

D. NO

Answer: A

875. Glycerol is separated in soap industries by :

A. Fractional distillation

B. Distillation under reduced pressure

C. Differential extraction

D. Steam distillation

Answer: B

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876. Effect of thermal power plant is

A. Ozone layer depletion

B. Blue baby syndrome

C. Eutrophication

D. Acid rain

Answer: D

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877. Henry's constant (in kbar) for four gases α, β, γ and δ in water at 298 K is given below :

	α	β	γ	δ
K_H	50	2	2×10^{-5}	0.5

$\left(\text{density of water} = 103 \text{ kg m}^{-3} \text{ at 298 K}\right)$

This table implies that :

A. solubility of γ at 308 K is lower than at 298 K

B. The pressure of a 55.5 molal solution of δ is 250 bar

C. α has the highest solubility in water at a given pressure

D. The pressure of a 55.5 molal solutio of γ is 1 bar

Answer: A

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878. The electronic spectrum of $\left[Ti(H_2O)_6\right]^{3+}$ shows a single broad peak with a maximum at 20,300 cm^{-1}.

The crystal field stabillization energy (CFSE) of the complex ion, in kJ mol^{-1}, is :

$\left(1 \text{ kJ mol}^{-1} = 83.7 \text{ cm}^{-1}\right)$

A. 83.7

B. 242.5

C. 145.5

D. 97

Answer: D

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879. Find atomic number of unnilennium?

A. 109

B. 102

C. 119

D. 108

Answer: A

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880. An organic compound [A], molecular formula $C_{10}H_{20}O_2$ was hydrolyzed with dilute sulphuric acid to

give a carboxylic acid [B] and an alcohol [C]. Oxidation of [C] with

CrO_3 - H_2SO_4 produced [B].

Which of the following strucutres are not possible for [A]?

A. $\left(CH_3\right)_3$ - C - $COOCH_2C\left(CH_3\right)_3$

B. CH_3 - CH_2 - CH| CH_3 - $OCOCH_2\overset{\overset{\displaystyle CH_3}{|}}{CH}$ - CH_2CH_3

C. $CH_3CH_2CH_2COOCH_2CH_2CH_2CH_3$

$$\underset{\text{D. }}{CH_3 - CH_2 - CH|} \overset{CH_3}{|} CH_3 - COOCH_2 - CH - CH_2CH_3$$

D. $CH_3 - CH_2 - CH| \ CH_3 - COOCH_2 - CH - CH_2CH_3$ with CH_3 branch
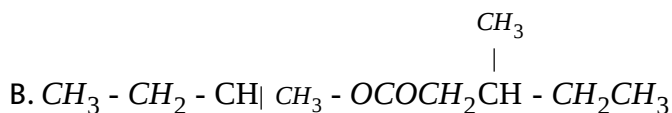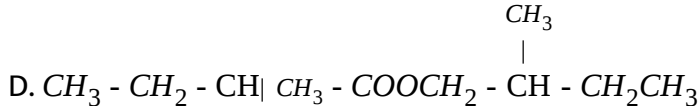
Answer: B

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881. The mechanism of SN1 reaction is given as :

$$R - X - R^{\oplus} X^{\ominus} \ \rightarrow \ R^{\oplus} \text{ lon pair} || X^{\ominus} \ \overset{Y^{\ominus}}{\rightarrow} \ R - Y + X^{\ominus} \text{ Solvent Separated ionpair}$$
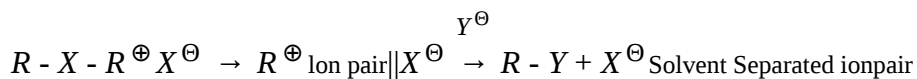
A student writes general characteristics based on the given mechanism as :

(a) The reaction is favoured by weak nucleophiles.

(b) $R^{\oplus}$ would be easily formed if the substituents are bulky.

(c) The reaction is accompanied by racemization.

Which observations are correct?

A. (a) and (b)

B. (a), (b) and (c)

C. (a) and (c)

D. (b) and (d)

Answer: B

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882. Tyndall effect is observed when:

A. The diameter of dispersed particles is much smaller than the wavelength of light used.

B. The diameter of dispersed particles is much larger than the wavelength of light used.

C. The refractive index of dispersed phase is greater than that of the dispersion medium.

D. The diameter of dispersed particles is similar to the wavelenght of light used.

Answer: D

883. Let C_{NaCl} and C_{BaSO_4} be the conductances (in S) measured for saturated aqueous solutions of NaCl and BaSO4, respectively, at a temperature T.

Which of the following is false?

A. $C_{NaCl}(T_2) > C_{NaCl}(T_1)$ for $T_2 > T_1$

B. $C_{BaSO_4}(T_2) > C_{BaSO_4}(T_1)$ for $T_2 > T_1$

C. Ionic mobilities of ions form both salts increase with T.

D. $C_{NaCl} > > C_{BaSO_4}$ at a given T

Answer: D

884. In a molecule of pyrophosphoric acid, the number of P - OH, P = O and P - O - P bonds/moiety(ies) respectively are :

A. 3, 3 and 3

B. 4, 2 and 1

C. 2, 4 and 1

D. 4, 2 and 0

Answer: B

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885. The mole fraction of glucose $\left(C_6H_{12}O_6\right)$ in an aqueous binary solution is 0.1. The mass percentage of water in it, to the nearest integer, is _____.

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886. The volume strength of 8.9 M H_2O_2 solution calculated at 273 K and 1 atm is _____. $\left(R = 0.0821 \text{ L atm K}^{-1} \text{ mol}^{-1}\right)$ (rounded off ot the nearest integer)
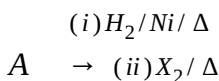
887. An element with molar mas 2.7×10^{-2} kg mol^{-1} forms a cubic unit cell with edge length 405 pm. If its density is $2.7 \times 10^{-3} kgm^{-3}$, the radius of the element is approximately _____ $\times 10^{-12} m$ (to the nearest integer).

888. The total number of monohalogenated organic products in the following (including stereoisomers) reaction is _____.

$A \quad \xrightarrow{\begin{array}{l}(i)H_2/Ni/\Delta \\ (ii)X_2/\Delta\end{array}}$

(Simplect optically active alkene)

889. The photoelectric current from Na (Work function, w0 = 2.3 eV) is stopped   by   the   output   voltage   of   the   cell

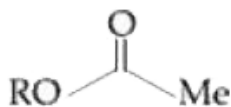$Pt(s)H_2(g, 1 \text{ Bar}) HCl \text{ (aq. pH =1)} |AgCl(s)|Ag(s).$

The pH of aq. HCl required to stop the photoelectric current form

$K\left(w_0 = 2.25eV\right)$, all other conditions remaining the same, is _____
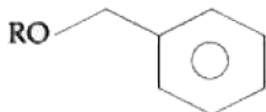
$\times 10(-2)$ (to the nearest integer).

Given,

$2.303\dfrac{RT}{F} = 0.06V, E^{\circ}_{AgCl|Ag|Cl^-} = 0.22V$

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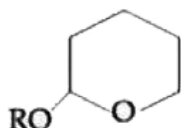
---

890. Which of the following derivatives of alcohols is unstable in an

aqueous base ?

A.

RO ⎯ Me

B.

RO

C.

RO ⎯ O

D. $RO - Cme_3$

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891. The values of the crystal field stabilization energies for a high spin d^6 metal ion in octahedral and tetrahedral fields, respectively, are :

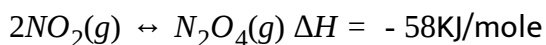A. $-0.4\Delta_\circ$ and $-0.9\Delta_t$

B. $-2.4\Delta_\circ$ and $-0.6\Delta_t$

C. $-1.6\Delta_\circ$ and $-0.4\Delta_t$

D. $-0.4\Delta_\circ$ and $-0.27\Delta_t$

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892. For the following reaction at equilibrium

$2NO_2(g) \leftrightarrow N_2O_4(g)\ \Delta H = -58KJ/mole$

following change are made then identify in which direction reaction shift

|	Increase in temperature	Increase in pressure
(1)	towards product side	towards product side
(2)	towards reactant side	towards product side
(3)	towards reactant side	towards reactant side
(4)	towards product side	towards reactant side

A. (a) towards product, (b) towards rectant

B. (a) towards reactant, (b) towards product

C. (a) towards reactant, (b) no change

D. (a) towards product , (b) no change

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893. The increasing order of the acidity of the α- hydrogen of the following compounds is :

(A)   Ph (B) Ph   (C) OMe   (D) NMe$_2$
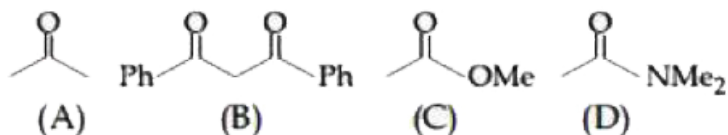
A. $(D) < (C) < (A) < (B)$

B. $(B) < (C) < (A) < (D)$

C. $(A) < (C) < (D) < (B)$

D. $(C) < (A) < (B) < (D)$

894. A diatomic molecule X_2 has a body- centred cubic (bcc) structure with a cell edge of 300pm. The density of the molecuel is $6.17 gcm^{-3}$. The number of molecules present in 200 g of X_2 is :

(Avogadroconstant $\left(N_A\right) = 6 \times 10^{23} mol^{-1}$)
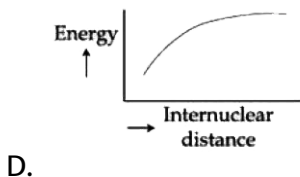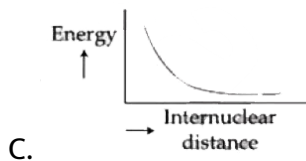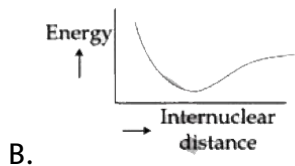
A. $40N_A$

B. $8N_A$

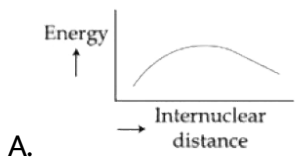C. $4N_A$

D. $2N_A$

895. The potential energy curve for the H_2 molecule as a function of internuclear distance is :

A.

B.

C.

D.

896. Identify the correct molecular picture showing what happens at the

critical micellar concentration (CMC) of an aqueous solution of a

surfactant (polar head , non - polar tail , water) .

A. (D)

B. (B)

C. (A)

D. (C)
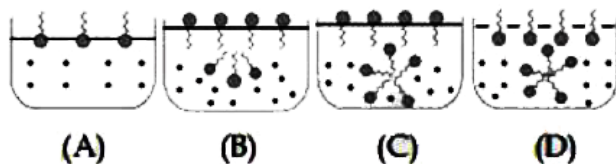
897. The difference between the radii of 3rd and 4th orbits of Li^{2+} is ΔR_1 .

The difference between the radii of $3^{r}d$ and 4th orbits of He^{+} is ΔR_2 .

Ratio $\Delta R_1 : \Delta R_2$ is :

A. $8:3$

B. $3:8$

C. $2:3$

D. $3:2$

898. In the sixth period , the orbitals that are filled are :

A. 6s , 4 f , 5d , 6p

B. 6s , 5 d , 5f , 6p

C. 6s , 5f , 6d , 6p

D. 6s , 5f , 6d , 6f

899. The most appropriate reagent for conversion of C_2H_5CN into $CH_3CH_2CH_2NH_2$ is :

A. $NaBH_4$

B. CaH_2

C. $LiAlH_4$

D. $Na(CN)BH_3$

900. If a person is suffering from the deficiency of nor- adrenaline , what kind of drug can be suggested ?

A. Anti - inflammatory

B. Antidepressant

C. Antihistamine

D. Analgesic

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901. Which of the following is not an essential amino acid ?

A. Tyrosine
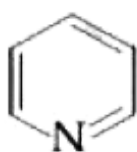
B. Leucine

C. Valine

D. Lysine

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902. The correct electronic configuration and spin -only magnetic moment (BM) of Gd^{3+} (Z = 64) , respectively , are :
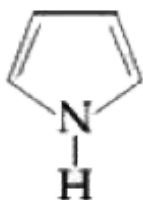
A. [Xe] $4f^7$ and 8.9

B. [Xe] $4f^7$ and 7.9

C. [Xe] $5f^7$ and 8.9

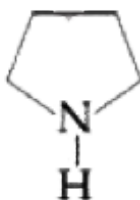D. [Xe] $5f^7$ and 7.9

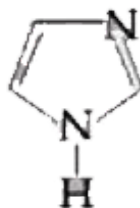**903.** The increasing order of the basicity of the following compounds is :

(A)   (B)   (C)   (D)

A. $(A) < (B) < (C) < (D)$

B. $(B) < (A) < (D) < (C)$

C. $(D) < (A) < (B) < (C)$

D. $(B) < (A) < (C) < (D)$

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904. In flask two components A & B are mixed in which both concentrations are equal . Half life of A is 300s & B is 180s. It is first order kinetics & find at what time concentration A becomes 4 times of concentration of B.

A. 180

B. 900

C. 300

D. 120

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905. The structure of PCl_5 in the solid state is :

A. tetrahedral $\left[PCl_4\right]^+$ and ortahedral $\left[PCl_6\right]^-$

B. square planar $\left[PCl_4\right]^+$ and octahedral $\left[PCl_6\right]^-$

C. square pyramidal

D. trigonal bipyramidal

906. An Ellingham diagram provides information about :
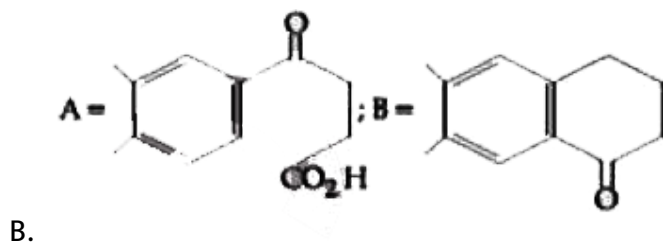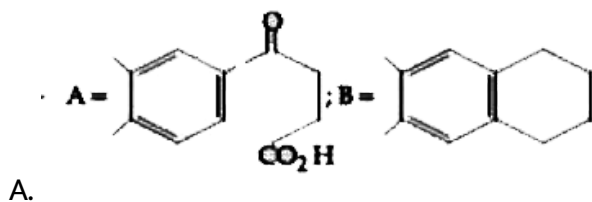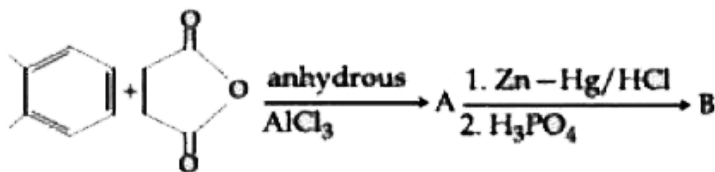
A. the conditions of pH and potential under which a species is thermodynamically stable .

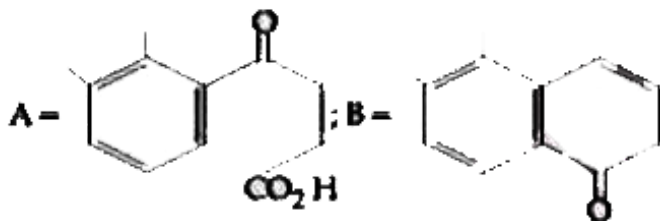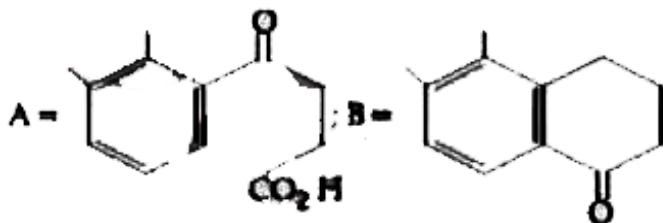B. the temperature dependence of the standard Gibbs energies of formation of some metal oxides .

C. the pressure dependence of the standard electrode potentials of

reduction reactions involved in the extration of metals .

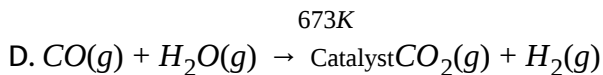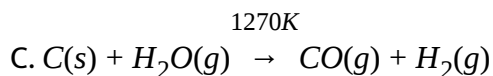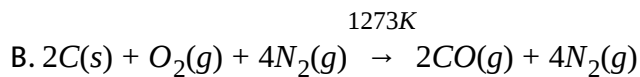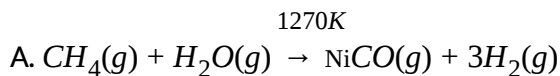D. the kinetics of the reduction process.

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907. In the following reaction sequence the major products A and B are :

A.

B.

A = [benzene ring with branched acyl group and CO_2H]   ; B = [bicyclic ketone structure]

C.

A = [benzene ring with acyl group and CO_2H]   ; B = [bicyclic ketone structure]

D.

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908. The equation that represents the water gas shift reaction is :

$$A.\ CH_4(g) + H_2O(g) \xrightarrow{1270K} NiCO(g) + 3H_2(g)$$

$$B.\ 2C(s) + O_2(g) + 4N_2(g) \xrightarrow{1273K} 2CO(g) + 4N_2(g)$$

$$C.\ C(s) + H_2O(g) \xrightarrow{1270K} CO(g) + H_2(g)$$

$$D.\ CO(g) + H_2O(g) \xrightarrow{673K}_{Catalyst} CO_2(g) + H_2(g)$$

909. Which of the following conditions shows the polluted enviorment ?

A. eutrophication

B. 0.03 % of CO_2 in the atmosphere

C. BOD value of 5 ppm

D. pH of rain water to be 5.6

910. The minimum number of moles of O_2 required for complete combustion of 1 mole of propane and 2 moles of butane is _____.

911. The total number of coordination sites in ethylenediaminetetraacetate $\left(EDTA^{4-} \right)$ is _____.

912. The number of chiral carbon(s) present in peptide , Ile-Arg-Pro is _____.

913. A soft drink was bottled with a partial pressure of CO_2 of 3 bar over the liquid at room temperature . The partial pressure of CO_2 over the solution approaches a value of 30 bar when 44 g of CO_2 is dissolved in 1 kg of water at room temperature . The approximate pH of the soft drink is _____ $\times 10^{-1}$.

(First dissocation constant of $H_2CO_3 = 4.0 \times 10^{-7}$, log 2 = 0.3 , density of the soft drink = 1 gmL^{-1})

914. An oxidation- reduction reaction in which 3 electrons are transferred has a ΔG^0 of $17.37 kJmol^{-1}$ at $25 °C$. The value of E^0_{cell} (in V) is _____ $\times 10^{-2}$

$\left(1F = 96, 500 Cmol^{-1}\right)$

915. Cast iron is used for the production of

A. Wrought iron and steel

B. Wrought iron and pig iron

C. Wrougth iron, pig iron and steel

D. Pig iron, scrap iron and steel

916. The shape/structure of $[XeF_5]^-$ and XeO_3F_2, respectively, are :

A. Pentagonal planar and trigonal bipyramidal

B. Trigonal bipyramidal and trigonal bipyramidal

C. Octahedral and square pyramidal

D. Trigonal bipyramidal and pentagonal planar

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917. Simplified absorption spectra of three complexes ((i), (ii) and (iii)) of Mn+ ion are provided below, their λ_{max} values are marked as A, B and C respectively. The correct match between the complexes and their λ_{max} values is :

(i) $\left[M(NCS)_6\right]^{-6+n}$
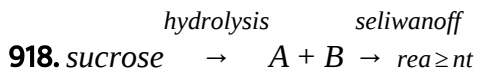
(ii) $\left[MF_6\right]^{-6+n}$

(iii) $\left[M(NH_3)_6\right]^{n+}$
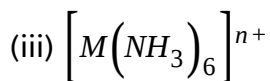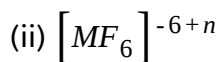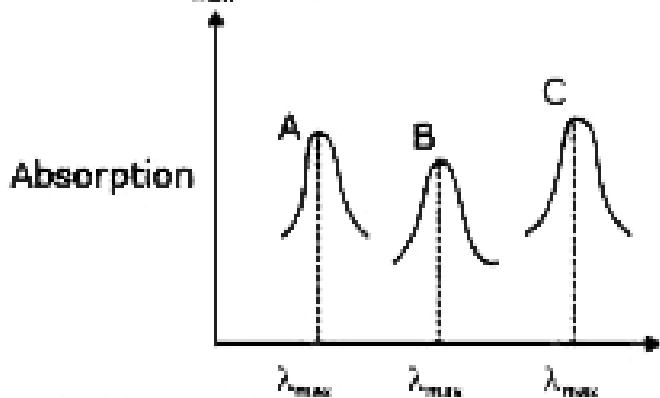
    A. A-(i), B-(ii), C-(iii)

    B. A-(iii), B-(i), C-(ii)

    C. A-(ii), B-(iii), C-(i)

    D. A-(ii), B-(i), C-(iii)

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918. $sucrose \xrightarrow{\text{hydrolysis}} A + B \xrightarrow[rea \geq nt]{\text{seliwanoff}}$

which color is obtained after above reaction?

A. Formation of red colour

B. Formation of blue colour

C. Formation of violet colour

D. Gives no colour

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919. The results given in the below table were obtained during kinetic studies of the following reaction : $2A + B \rightarrow C + D$

Experiment	[A]/ molL^{-1}	[B]/ molL^{-1}	Initial rate/ molL^{-1} min^{-1}
I	0.1	0.1	6.00×10^{-3}
II	0.1	0.2	2.40×10^{-2}
III	0.2	0.1	1.20×10^{-2}
IV	X	0.2	7.20×10^{-2}
V	0.3	Y	2.88×10^{-1}

X and Y in the given table are respectively :

A. 0.4, 0.4

B. 0.3, 0.4

C. 0.4, 0.3

D. 0.3, 0.3

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920. Match the type of interaction in column A with the distance dependence of their interaction energy in column B :

	A		B
(I)	ion-ion	(a)	$\dfrac{1}{r}$
(II)	dipole-dipole	(b)	$\dfrac{1}{r^2}$
(III)	London dispersion	(c)	$\dfrac{1}{r^3}$
		(d)	$\dfrac{1}{r^6}$

A. (I)-(a), (II)-(b), (III)-(d)

B. (I)-(a), (II)-(b), (III)-(c)
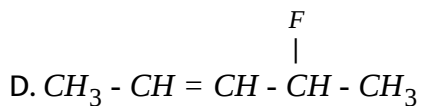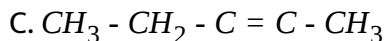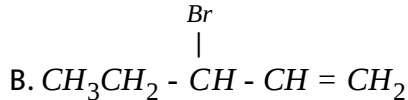
C. (I)-(a), (II)-(c), (III)-(d)

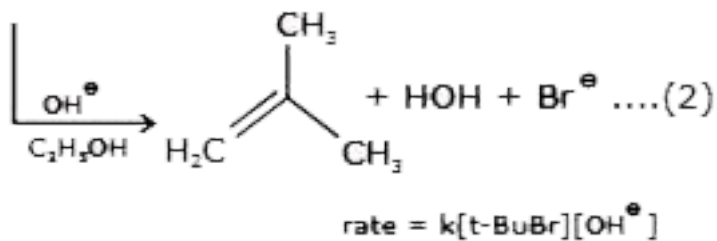D. (I)-(a), (II)-(c), (III)-(b)

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921. The major product obtained from E_2- elimination of 3-bromo-2-fluoropentane is :

A. $CH_3CH_2CH = C - F$

Br
|
B. $CH_3CH_2 - CH - CH = CH_2$

C. $CH_3 - CH_2 - C = C - CH_3$

F
|
D. $CH_3 - CH = CH - CH - CH_3$

922. Consider the reaction sequence given below :

$$\rangle\text{—}Br \xrightarrow[H_2O]{OH^\ominus} \rangle\text{—}OH + Br^\ominus \quad ....(1)$$

$$rate = k[t\text{-}BuBr]$$

$$\xrightarrow[C_2H_5OH]{OH^\ominus} H_2C \diagdown \overset{CH_3}{\diagup}\diagdown CH_3 + HOH + Br^\ominus \quad ....(2)$$

$$rate = k[t\text{-}BuBr][OH^\ominus]$$
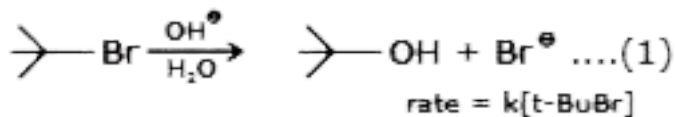
Which of the following statements is true :

A. Changing the concentration of base will have no effect on reaction

(1).

B. Doubling the concentration of base will double the rate of both the reactions.

C. Changing the base from $OH^{\ominus}$ to $^{\ominus}OR$ will have no effect on reaction (2).

D. Changing the concentration of base will have no effect on reaction (2).

923. If a mango shrinks when kept in concrete salt solution, then which of the following process take place?

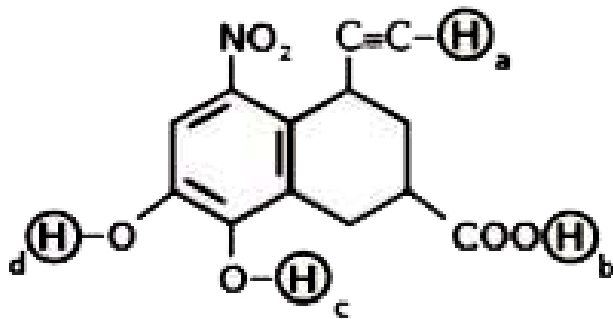A. Diffusion

B. Osmosis

C. Reverse osmosis

D. Dialysis

924. If you spill a chemical toiled cleaning liquid on your hand, your first aid would be :

  A. Aqueous NH_3

  B. Aqueous $NaHCO_3$

  C. Aqueous NaOH

  D. Vinegar

925. Arrange the followig labelled hydrogens in decreasing order of acidity :

A. $b > a > c > d$

B. $b > c > d > a$
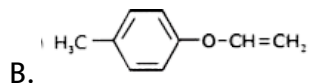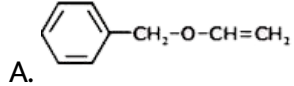
C. $c > b > d > a$

D. $c > b > a > d$

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926. An organic compound 'A' $\left(C_9H_{10}O\right)$ when treated with conc. HI undergoes cleavage to yield compounds 'B' and 'C'. 'B' gives yellow precipitate with $AgNO_3$ where as 'C' tautomerizes to 'D'. 'D' givespositive iodoform test. 'A' could be :

A. $-CH_2-O-CH=CH_2$

B. H_3C- $-O-CH=CH_2$

C. $-O-CH_2-CH=CH_2$

D. $-O-CH=CH=CH_2$
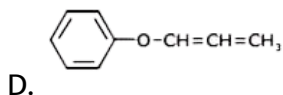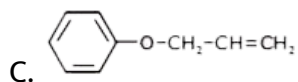
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927. Two elements A and B have similar chemical properties. They don't form solid hydrogencarbonates, but react with nitrogen to form nitrides. A and B, respectively, are :

A. Na and Ca

B. Cs and Ba

C. Na and Rb

D. Li and Mg

928. The number of subshells associated with n = 4 and m = –2 quantum
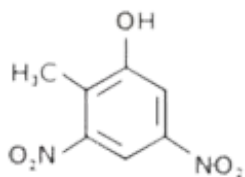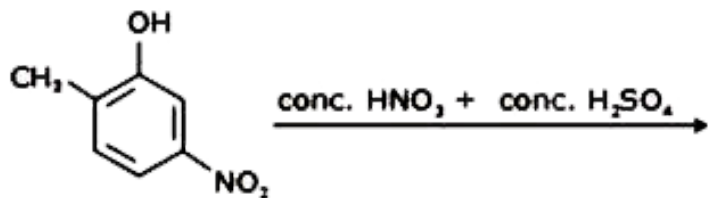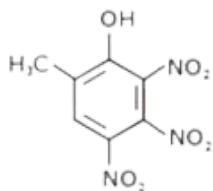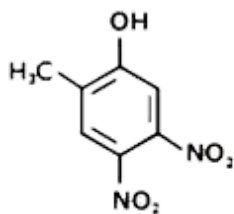
numbers is :

A. 4

B. 8

C. 16

D. 2

Answer: D

929. The major product of the following reaction is :

$$\xrightarrow{\text{conc. HNO}_3 + \text{conc. H}_2\text{SO}_4}$$

A.

B.
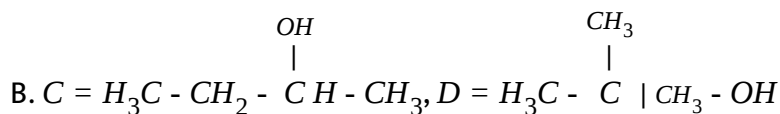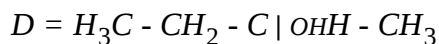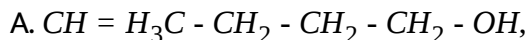

C.

D.
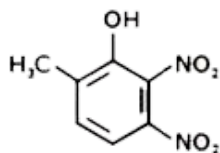
930. Two compounds A and B with same molecular formula $\left(C_3H_6O\right)$ undergo Grignard's reaction with methylmagnesium bromide to give products C and D. Products C and D show following chemical tests.

Test	C	D
Ceric ammonium nitrate Test	Positive	Positive
Lucas Test	Turbidity obtained after five minutes	Turbidity obtained immediately
Iodoform Test	Positive	Negative

A. $CH = H_3C$ - CH_2 - CH_2 - CH_2 - OH,

   $D = H_3C$ - CH_2 - $C \mid OHH$ - CH_3

B. $C = H_3C$ - CH_2 - $\overset{\overset{\displaystyle OH}{\displaystyle |}}{C}H$ - $CH_3, D = H_3C$ - $\overset{\overset{\displaystyle CH_3}{\displaystyle |}}{C} \mid CH_3$ - OH

C. $C = H_3C$ - CH_2 - CH_2 - CH_2 - $OH, D = H_3C$ - $\overset{\overset{\displaystyle CH_3}{\displaystyle |}}{C} \mid CH_3$ - OH

D. $C = H_3C$ - $\overset{\overset{\displaystyle CH_3}{\displaystyle |}}{C} \mid CH_3$ - $OH, D = H_3C$ - CH_2 - $C \mid OHH$ - CH_3
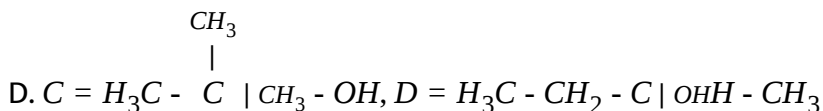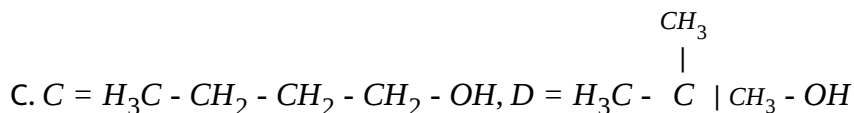
931. Three elements X, Y and Z are in the 3rd periodic table. The oxides of X, Y and Z, respectively, are basic, amphoteric and acidic, The correct order of the atomic numbers of X, Y and Z is :
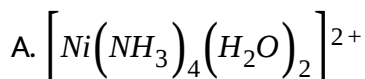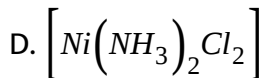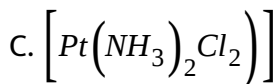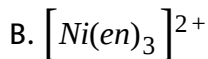
A. $X < Y < Z$

B. $Y < X < Z$

C. $Z < Y < X$

D. $X < Z < Y$

932. Which one of the following complex is not expected to exhibit isomerism

A. $\left[Ni\left(NH_3\right)_4\left(H_2O\right)_2\right]^{2+}$

B. $\left[Ni(en)_3\right]^{2+}$

C. $\left[Pt\left(NH_3\right)_2 Cl_2\right)\right]$

D. $\left[Ni\left(NH_3\right)_2 Cl_2\right]$

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933. Which statement is correct when adsorption of gas take place on metal surface?

(a) δH becomes less negative with pregress of reaction.

(b) with progress of reaction the strength of residual forces increases.

(c) NH_3 is adsorbed more than N_2.

(d) Equilibrium concentration of adsorbate increases with increase in temperature.

    A. (b) and (c)

    B. (c) and (d)

    C. (a) and (b)

D. (d) and (a)

934. The molecular geometry of SF_6 is octahdral. What is the geometry of SF_4 (including lone pair(s) of electrons, if any) ?

A. Pyramidal

B. Trigonal bipyramidal

C. Tetrahedral

D. Square planar

935. In a saturated acyclic compound the mass ration of C:H is 4:1 and C:O is 3:4. find the no. of moles of O_2 required to react with 2 moles

compound to give CO_2 and water.

936. For the disproportionation reaction $2Cu^+(aq) \Leftrightarrow Cu(s) + Cu^{2+}(aq)$ at K, ln K (where K is the equilibrium constant) is _____ $\times 10^{-1}$.

Given : $\left(E^{\circ}_{Cu^{2+}/Cu^+} = 0.16V \text{ and } E^{\circ}_{Cu^+/Cu} = 0.52V\right)$

937. A metal having work function $4.41 \times 10^{-19}J$ is sunjected to a light having wavelength 300nm, then maximum kinetic energy of the emitted photoelectron is .... $\times 10^{-21}J$

938. Let the oxidation state of the transition element of compound $K_2Cr_2O_7, KMnO_4$ and K_2FeO_4 be X,Y, and Z respectively, calculate
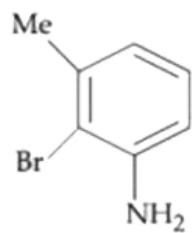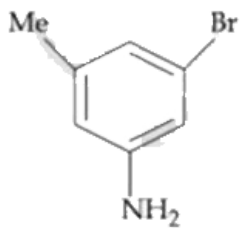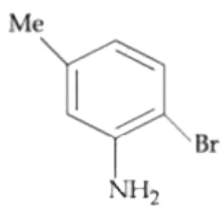
$X + Y + Z.$

939. The heat of combustion of ethanol into carbon dioxide and water is −327 kcal at constant pressure. The heat evolved (in cal) at constant volume and $27 ° C$ (if all gases behave ideally) is (R = 2 cal $mol^{-1}K^{-1}$ _____.

940. The final major product of the following reaction is :

(i) Ac_2O/ Pyridine

(ii) Br_2, $FeCl_3$

(iii) OH^-/Δ

A.

B.

C.

D.
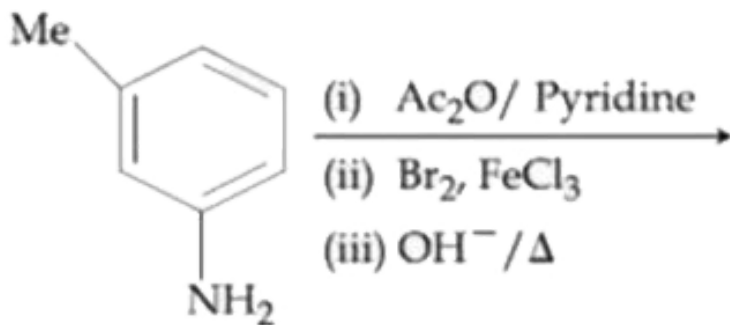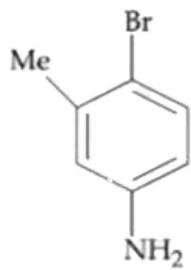
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941. Among the following compounds geometrical isomerism is exhibited by :

A.

B.

C.
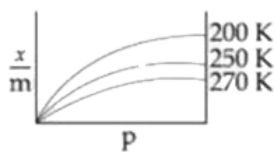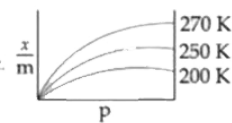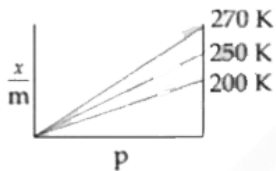
CHCl

D.
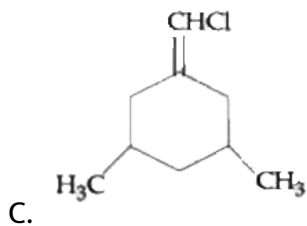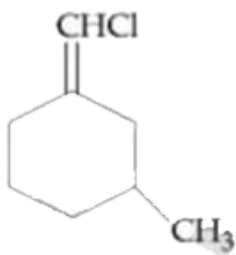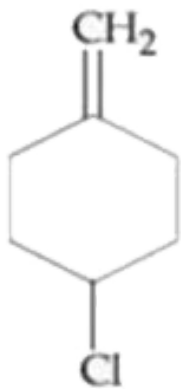
942. Adsorption of gas follows Freundlich adsorption isotherm. If x is the mass of the gas adsorbed on mass m of the adsrobent , the correct plot of $\frac{x}{m}$ versus p is :
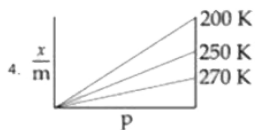
A.

B.

C.

D.

943. An element crystallises in a face -centred cubic (fcc) unit cell with cell edge a. The distance between the centre of two nearest octahedral voids in the crystal lattice is ::

A. $\dfrac{a}{\sqrt{2}}$

B. a

C. $\sqrt{2}a$

D. $\dfrac{a}{2}$

944. Consider the complex ions ,

trans - $\left[Ce(en)_2Cl_2\right]^+(A)$ and

cis - $\left[Co(en)_2Cl_2\right]^+$ (B) . The correct statement regarding them is :
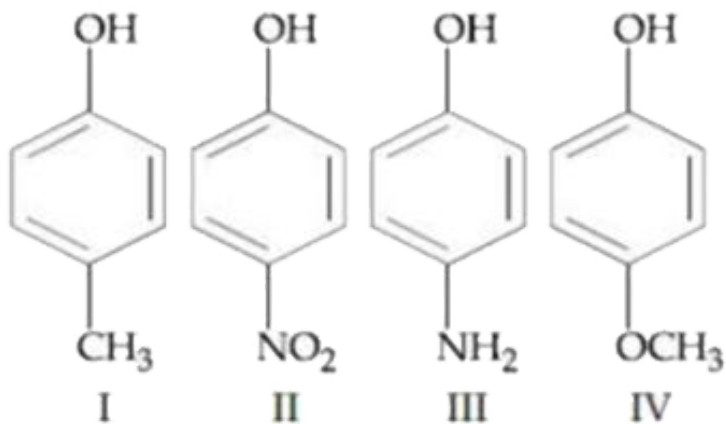
A. both (A) and (B) cannot be optically active

B. (A) canbe optically active , but (B) cannot be optically active

C. both (A) and (B) can be optically active

D. (A) cannot be optically active , but (B) can be optically active.

945. The increasing order of boiling points of the folloiwng compounds is

:

OH   OH   OH   OH

CH$_3$ NO$_2$ NH$_2$ OCH$_3$

I   II   III   IV

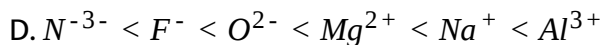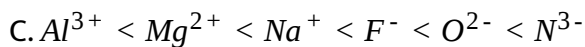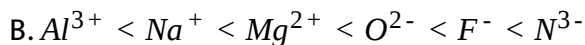A. $I < III < IV < II$

B. $I < IV < III < II$

C. $IV < I < II < III$

D. $III < I < II < IV$

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946. The correct order of the ionic radii of $O^{-2}, N^{3-}, F^-, Mg^{2+}, Na^+$ and Al^{3+} is .

A. $N^{3-} < O^{2-} < F^- < Na^+ < Mg^{2+} < Al^{3+}$

B. $Al^{3+} < Na^+ < Mg^{2+} < O^{2-} < F^- < N^{3-}$

C. $Al^{3+} < Mg^{2+} < Na^+ < F^- < O^{2-} < N^{3-}$

D. $N^{-3-} < F^- < O^{2-} < Mg^{2+} < Na^+ < Al^{3+}$

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947. Which one of the following polymers in not obtained by condensation polymerisation ?
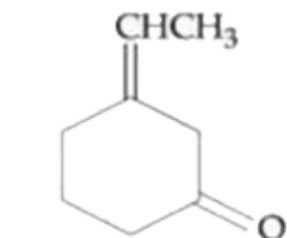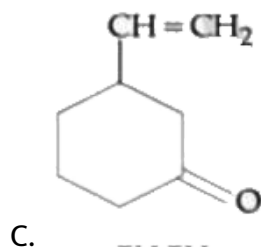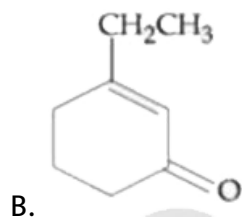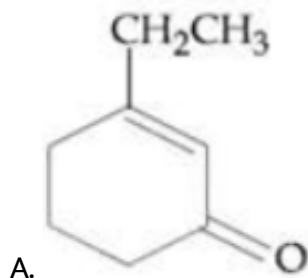
A. nylon 6,6

B. buna - N

C. bakelite

D. nylon 6

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948. The major product of the following reaction is :

HO   CH₂CH₃

$\xrightarrow{H_2SO_4}$

CH₂CH₃

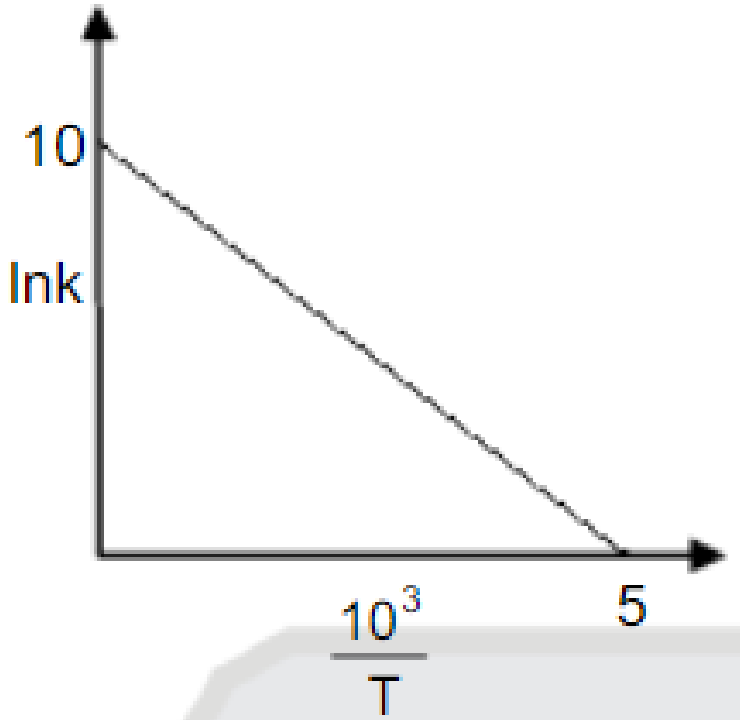A.

CH₂CH₃

B.

CH=CH₂

C.

CHCH₃

D.
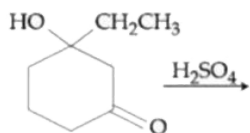
949. Hydrogen peroxide , in the pure state is

    A. non polar and almost colorless

    B. linear and blue in color

    C. linear and almost colorless

    D. planar and blue in color

950. Using following graph find activation energy (in KJ)

A. 2/R

B. 1/R

C. R

D. 2R

951. Lattice enthalpy and enthalpy of solution of NaCl are 788 kJmol^{-1} and

4kJmol^{-1} respectively. The hydration enthalpy of NaCl is

A. -780kJmol^{-1}

B. 780kJmol^{-1}

C. -784kJmol^{-1}

D. 784kJmol^{-1}

952. The one that is NOT suitable for the removal permanent hardness of water is:
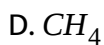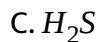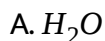
A. Clark's method

B. Ion exchanged method

C. Calgon's method

D. Treatment with sodium carbonate

953. The compound that has the largest H-M-H bond angle (M = N, O, S, C) is :

A. H_2O

B. NH_3

C. H_2S

D. CH_4

954. Boron and silicon of very high purity can be obtained through :

A. liquation

B. zone refining

C. vapour phase refining

D. electrolytic refining

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955. The correct statement about probability density (except at infinite distance from nucleus) is :
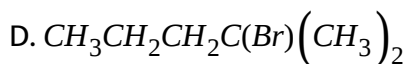
A. it can be zero for 1s orbital

B. it can be negative for 2p orbital

C. it can be zero for 3p orbital

D. it can never be zero for 2s orbital

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956. The major product formed in the following reaction is :

$$CH_3CH = CHCH(CH_3)_2 \xrightarrow{\text{HBr}}$$

A. $CH_3CH(Br)CH_2CH(CH_3)_2$

B. $CH_3CH_2CH(Br)CH(CH_3)_2$

C. $Br(CH_2)_2CH(CH_3)_2$

D. $CH_3CH_2CH_2C(Br)(CH_3)_2$
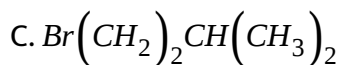
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957. The variation of molar conductivity wih concentration of an electrolyte (X) in aqueous solution is shown in the given figure .
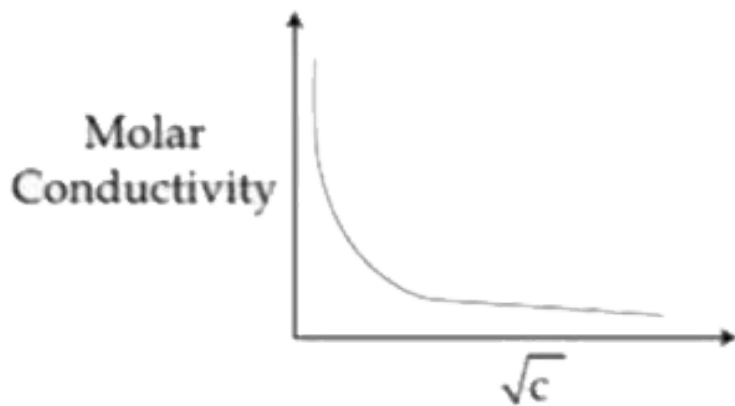
The electrolyte X is :

A. HCl

B. NaCl

C. KNO_3

D. CH_3COOH

958. The following molecule acts as an :

(Brompheniramine)
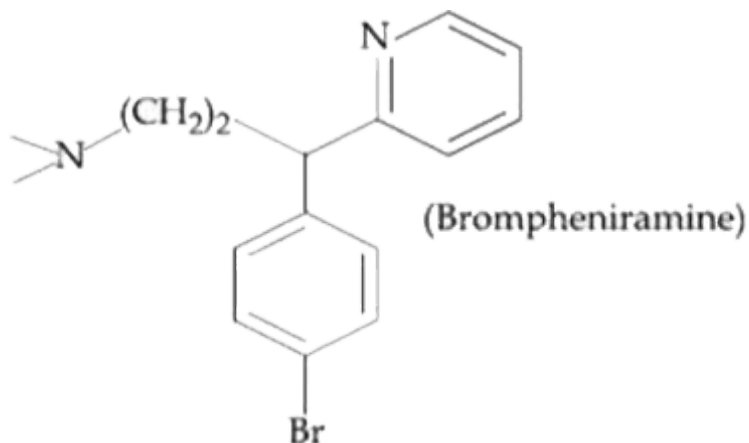
A. Antiseptic

B. Anti-depressant

C. Anti-bacterial

D. Anti-histamine

959. The products formed by reaction of ammonia with excess of chlorine

are:

A. NH_4Cl and N_2

B. NH_4Cl and HCl

C. NCl_3 and NH_4Cl
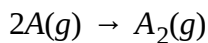
D. NCl_3 and HCl

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960. 0.02M $K_2Cr_2O_7$ is treated with 0.288 g of ferrous oxalate. How much volume of $K_2Cr_2O_7$ is required ?

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961. For a demerization reaction ,

$2A(g) \rightarrow A_2(g)$

at 298 K, $\Delta U(\Theta) = -20kJmol^{-1}$, $\Delta S^{\Theta} = -30JK^{-1}mol^{-1}$, then the ΔG^{Θ}

will be _____J.

962. Considering that $\Delta_0 > P$, the magnetic moment (in BM) of $\left[Ru\left(H_2O\right)_6\right]^{2+}$ would be _____.

963. For a reaction X+Y = 2Z , 1.0 mo of X 1.5 mol of Y and 0.5 mol of Z where taken in a 1L vessel and allowed to react . At equilibrium , the concentration of Z was $1.0 molL^{-1}$. The equilibrium constant of the reaction is ____ $\dfrac{x}{15}$. The value of x is ____.

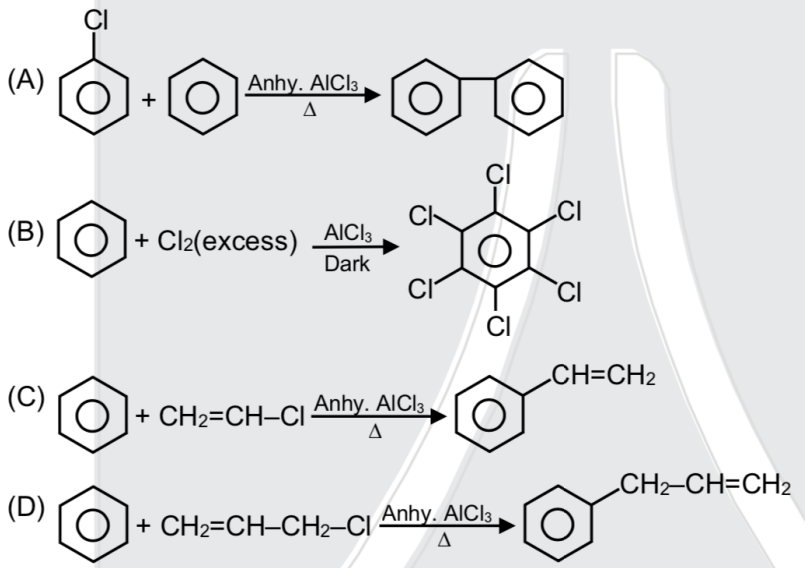**964.** Total no. of chiral carbon atoms present in sucrose is..........

1. Which of the following reactions are possible ?

(A)

(B)

(C)

(D)

A. A, B, C

B. B, D
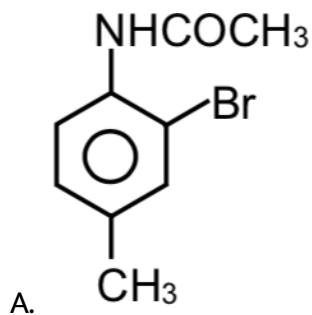
C. A, C, D

D. A, C

Answer: B

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2. A and B are in the given reaction ?

$$\text{(4-methylaniline)} \xrightarrow{Ac_2O} A \xrightarrow[AcOH]{Br_2} B$$

A.

B.

C.

NHCOCH$_3$

Br

CH$_2$Br

D.

NH–COCH$_3$

COCH$_3$

CH$_2$–Br
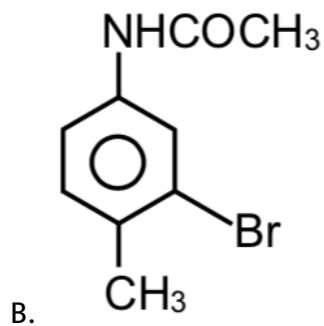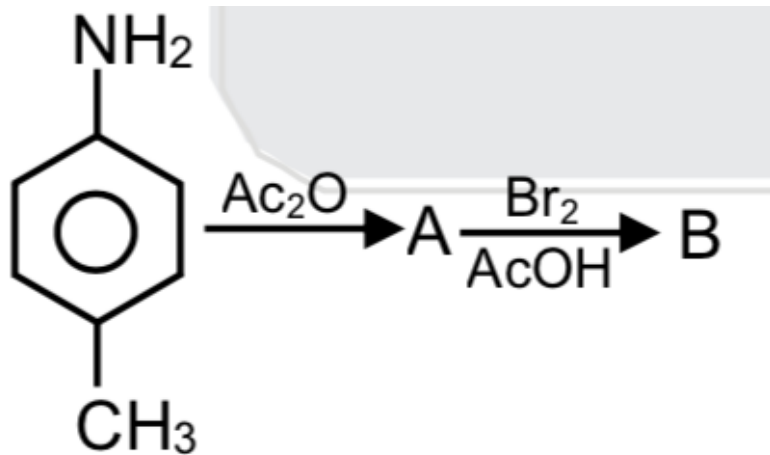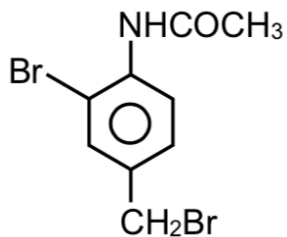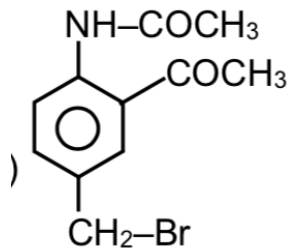
Answer: A

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3. The correct statement about gluconic acid is

A. It is prepared by oxidation of glucose with HNO3

B. It is obtained by partial oxidation of glucose

C. It is a dicarboxylic acid

D. It forms hemiacetals or acetal

Answer: B

4. Stability order of following alkoxide ions is

(A)   (B)   (C)
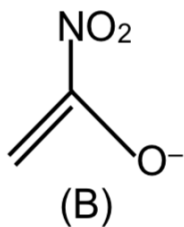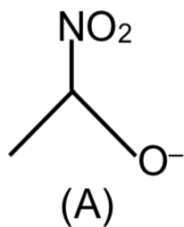
A. $C > B > A$

B. $A > C > B$

C. $B > A > C$

D. $C > A > B$

Answer: A

5. A and B are

A.

B.

C.

D.

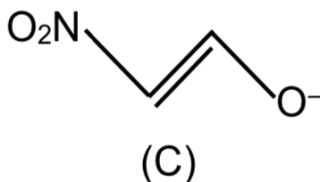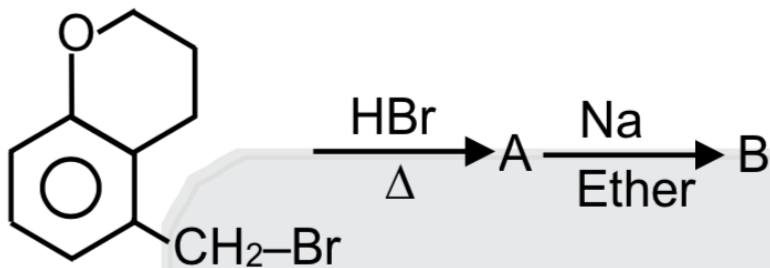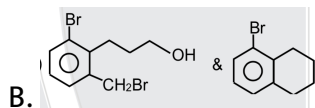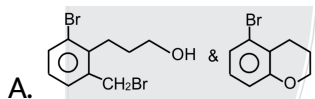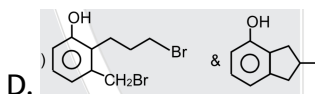**Answer: C**

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6. For the complex $[Ma_2B_2]$ if M is sp^3 or dsp^2 hybridised respectively then total number of optical isomers are respectively:

A. 1,1

B. 2,1

C. 0,0

D. 1,2

Answer: C

7. Bond order and magnetic nature of CN^- are respectively

A. 3, diamagnetic

B. 3, paramagnetic

C. 2.5, paramagnetic

D. 2.5, diamagnetic

Answer: A

8. Which of the following is incorrect?

A. $\Lambda_m^\circ NaCl - \Lambda_m^\circ NaBr = \Lambda_m^\circ KCl - \Lambda_m^\circ KBr$

B. $\Lambda_m^\circ H_2O = \Lambda_m^\circ HCl + \Lambda_m^\circ NaOH - \Lambda_m^\circ NaCl$

C. $\Lambda_m^\circ NaI - \Lambda_m^\circ NaBr = \Lambda_m^\circ NaBr - \Lambda_m^\circ KBr$

D. $\Lambda_m^\circ NaCl - \Lambda_m^\circ KCl = \Lambda_m^\circ NaBr - \Lambda_m^\circ KBr$

Answer: C

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9. NaOH (Hot + Conc.) + Cl_2 rarr A + other products and $Ca(OH)_2$(Cold and dilute) + Cl_2 rarr B + other products . A and B are respectively:

A. $NaClO_3$, $Ca(OCl)_2$

B. $NaClO_3$, $Ca(ClO_3)_2$

C. $NaCl$, $Ca(ClO_3)_2$

D. $NaClO$, $Ca(ClO_3)_2$
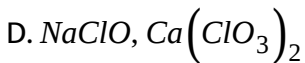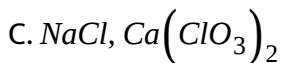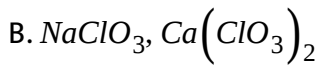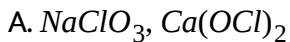
Answer: A

10. There are two beakers (I) having pure volatile solvent and (II) having volatile solvent and non-volatile solute. If both beakers are placed together in a closed container then:

A. Volume of solvent beaker will decrease and solution beaker will increase

B. Volume of solvent beaker will increase and solution beaker will also increase

C. Volume of solvent beaker will decrease and solution beaker will also decrease

D. Volume of solvent beaker will increase and solution beaker will decrease

Answer: A

11. Metal with low melting point containing impurities of high melting point can be purified by

    A. Zone refining

    B. Vapor phase refining

    C. Distillation

    D. Liquation

Answer: D

12. Amongst the following which is a redox reaction ?

A. $N_2 + O_2 \rightarrow$ (at 2000K)

B. Formation of O_3 from O_2

C. Reaction between NaOH and H_2SO_4

D. Reaction between $AgNO_3$ and NaCl
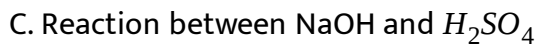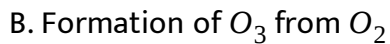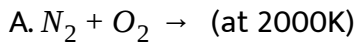
Answer: A

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13.　　　　Select　　　the　　　correct　　　options
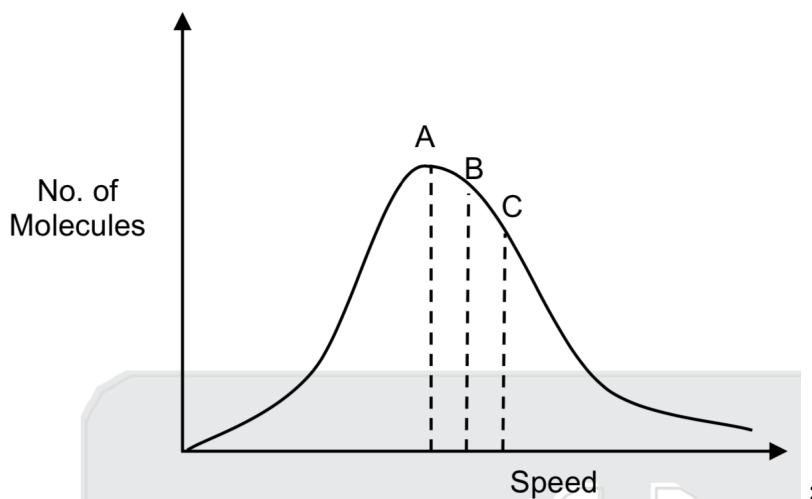
A. $A = C_{MPS}$, $B = C_{Average}$, $C = C_{RMS}$

B. $A = C_{Average}$, $B = C_{MPS}$, $C = C_{RMS}$

C. $A = C_{RMS}$, $B = C_{Average}$, $C = C_{MPS}$

D. $A = C_{MPS}$, $B = C_{RMS}$, $C = C_{Average}$

Answer: A

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14. Which one of the following amongst each pair will release maximum energy on gaining one electron (A = F, Cl), (B = S, Se), (C = Li, Na)

A. (A) = Cl, (B) = S, (C) = Li

B. (A) = S, (B) = Cl, (C) = Li

C. (A) = Li, (B) = Cl, (C) = S

D. (A) = Cl, (B) = Li, (C) = S

Answer: A

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15. Which of the following statements are incorrect ?

(1) Co^{+3} with strong field ligand forms high magnetic moment complex.

(2) For Co^{+3} if pairing energy$(P) > \Delta_o$ then the complex formed will have $\left(t_{2g}^4, \left(e_g \right)^2 \right)$ configuration.

(3) For $\left[Co(en)^3 \right]^{3+}$ $\lambda_{absorbed}$ is less than $\lambda_{absorbed}$ for $\left[CoF_6 \right]^{3-}$

(4) If $\Delta_o = 18000cm^{-1}$ for Co^{+3} then with same ligands for it $\Delta_t = 16000cm^{-1}$

A. 1,4

B. 2,3

C. 1,2

D. 1,2,3,4

Answer: A

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16. 0.6 g of urea on strong heating with NaOH evolves NH3. Liberated NH3 will combine completely with which of the following HCl solution ?

    A. 100ml of 0.2N HCl

    B. 400ml of 0.2N HCl

    C. 100ml of 0.1N HCl

    D. 200ml of 0.2N HCl

Answer: A

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17. Number of sp^2 hybrid carbon atoms in aspartame is

    A. (a) 7

    B. (b) 8

    C. (c) 6

    D. (d) 9

Answer: 9

18. 3 g of acetic acid is added to 250 mL of 0.1 M HCl and the solution made up to 500 mL. To 20 mL of this solution $\frac{1}{2}$ mL of 5 M NaOH is added . The pH of the solution is _____.

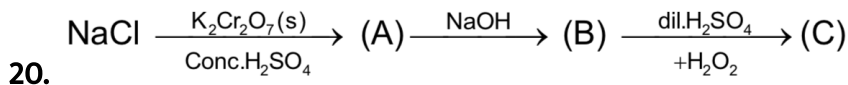[Given : pKa a acetic acid = 4.75, molar mass of acetic acid = 60 g/mol, log 3 = 0.4771]
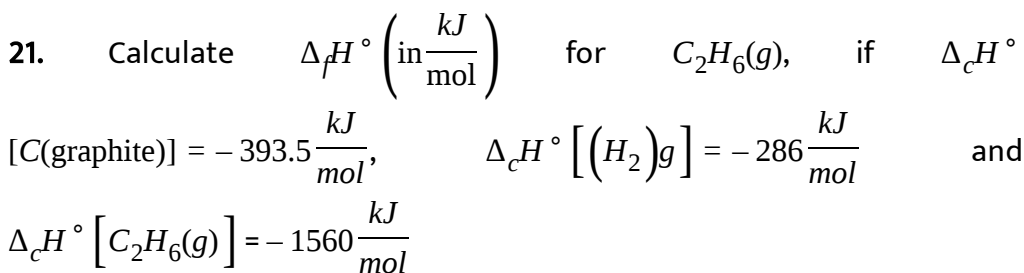
Neglect any changes in volume.

19. Flocculation value for As_2S_3 sol by HCl is 30 mmole L^{-1} . Calculate mass of H_2SO_4 required in gram for 250 mL sol.

20. $NaCl \xrightarrow[\text{Conc.}H_2SO_4]{K_2Cr_2O_7(s)} (A) \xrightarrow{NaOH} (B) \xrightarrow[+H_2O_2]{\text{dil.}H_2SO_4} (C)$

Determine total number of atoms in per unit formula of (A),(B) and (C)

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21. Calculate $\Delta_f H^\circ \left(\text{in} \dfrac{kJ}{\text{mol}} \right)$ for $C_2H_6(g)$, if $\Delta_c H^\circ$

$[C(\text{graphite})] = -393.5 \dfrac{kJ}{\text{mol}}$, $\Delta_c H^\circ \left[\left(H_2 \right) g \right] = -286 \dfrac{kJ}{\text{mol}}$ and

$\Delta_c H^\circ \left[C_2H_6(g) \right] = -1560 \dfrac{kJ}{\text{mol}}$

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CHEMSITRY

1. The correct statement with respect to dinitrogen is :
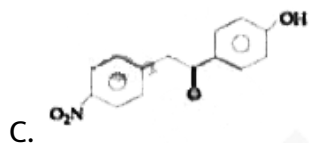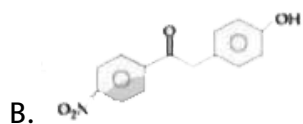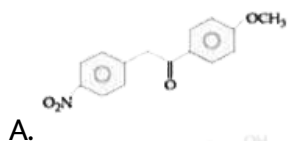
A. N_2 is paramagnetic in nature.

B. It can combine with dioxygen at $25\,^{\circ}C$

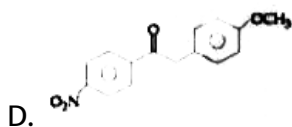C. liquid dinitrogen is not used in cryosurgery.

D. it can be used as an inert diluent for reactive chemicals.

2. The major product obtained from the following reaction is :

$$O_2N-\!\!\!\!\!\bigcirc\!\!\!\!\!-C\equiv C-\!\!\!\!\!\bigcirc\!\!\!\!\!-OCH_3 \xrightarrow[H_2O]{Hg^{2+}/H^+}$$

A.

B.

C.

D.

Answer: D

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3. A solution of two components containing n_1 moles of 1st component and n_2 moles of the 2nd component is prepared . M_1 and M_2 are the molecular weights of component 1 and 2 respectively . If d is the density of the solution in gmL^{-1} , C_2 is the molarity and x_2 is the mole fraction of the 2nd component , then C_2 can be expressed as :

A. $C_2 = \dfrac{1000x_2}{M_1 + x_2(M_2 - M_1)}$

B. $C_2 = \dfrac{dx_2}{M_1 + x_2(M_2 - M_1)}$

C. $C_2 = \dfrac{1000dx_2}{M_1 + x_2(M_2 - M_1)}$

D. $C_2 = \dfrac{dx_1}{M_2 + x_2(M_2 - M_1)}$

4. The INCORRECT statement is :

    A. bronze is an alloy of copper and tin

    B. cast iron is used to manufacture wrought iron.

    C. german silver is an alloy of zinc, copper and nickel

    D. brass is an alloy of copper and nickel

5. Consider the Assertion and Reason given below.

Assertion (A) : Ethene polymerized in the presence of Ziegler Natta Catalyst at high temperature and pressure is used to make buckets and dustbins.

Reason (R) : High density polymers are closely packed and are chemically inert.

Choose the correct answer from the following :

A. (A) is correct but (R) is wrong .

B. Both (A) and (B) are correct but (R) is not the correct explanation of

(A)

C. Both (A) and (B) are correct and (R) is the correct explanation of (A),

D. (A) are (R) both are wrong.

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6. Arrange the following solutions in the decreasing order of pOH :

(A) 0.01 M HCl

(B) 0.01 M NaOH

(C) 0.01 M CH_3COONa

(D) 0.01 M NaCl

A. $(A) > (C) > (D) > (B)$

B. $(A) > (D) > (C) > (B)$

C. $(B) > (C) > (D) > (A)$

D. $(B) > (D) > (C) > (A)$

7. Among the sulphates of alkaline earth metals the solubilities of $BeSO_4$ and $MgSO_4$ in water, respectively , are :

A. poor and poor

B. high and poor
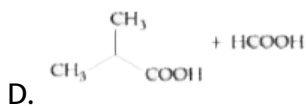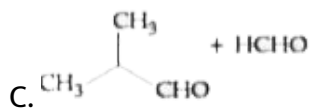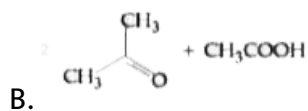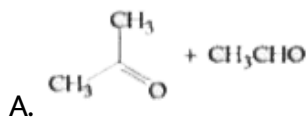
C. high and high

D. poor and high

8. The major products of the following reaction are :
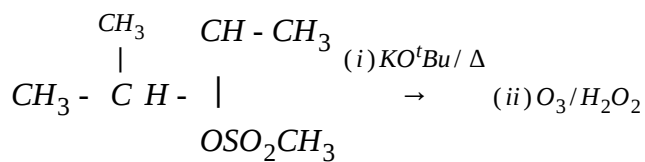
$$CH_3 - \underset{\underset{OSO_2CH_3}{|}}{C}H - \overset{\overset{CH_3}{|}}{C}H\text{-}CH_3 \quad \xrightarrow[\;\;\;\;\;\;\;\;\;\;]{\substack{(i)\,KO^tBu/\,\Delta \\ (ii)\,O_3/H_2O_2}}$$

A.
+ CH_3CHO

B.
+ CH_3COOH

C.
+ $HCHO$

D.
+ $HCOOH$

9. The major product of the following reaction is :

$$\xrightarrow{\ 2HBr\ }$$

A.

B.

C.

D.
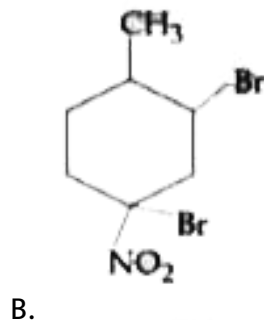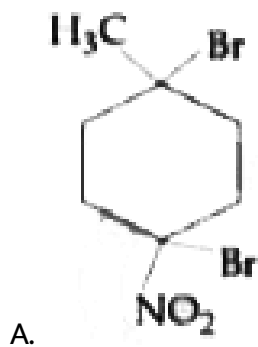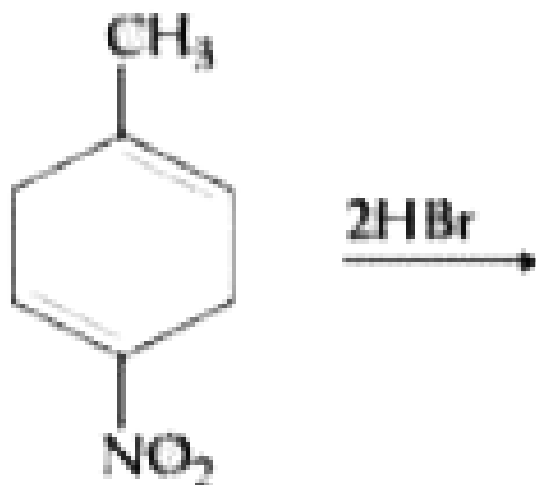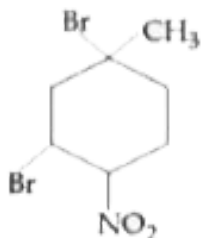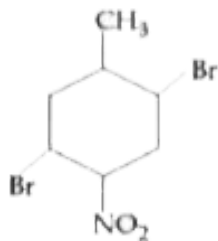
10. A sample of toothpaste weighing 500 g, on analysis was found to contain 0.2 g of flurine .The concentration of flurine in ppm is

A. harmful for teeth

B. harmful to skin

C. harmful to bones

D. safe for teeth

11. Which of the following compounds shows geometrical isomerism ?

A. 2-methylpent-2-ene

B. 4-methylpent-2-ene

C. 4-methylpent-1-ene

D. 2-methylpent-1-ene

12. The set that contains atomic numbers of only transition elements , is :

A. 37,42,50,64

B. 21,25,42,72,

C. 9,17,34,38,

D. 21,32,53,64

13. The variation of equilibrium constant with temperature is given below

:

Temperature   Equilibrium Constant

$T_1 = 25\,°C$ $K_1 = 10$

$T_2 = 100\,°C$ $K_2 = 100$

The values of $\Delta H°$, $\Delta G°$ at T_1 and $\Delta G°$ and T_2 (in KJ mol^{-1}) respectively,

are close to [use R= 8.314 J k^{-1} mol^{-1}]

A. 28.4 , -7.14 and -5.71

B. 0.64 , -7.14 and -5.71

C. 28.4 , -5.71 and -14.29

D. 0.64 , -5.71 and -14.29
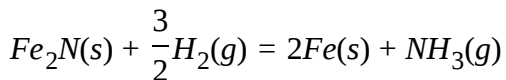
14. Kraft temperature is the temperature :

A. below which the aqueous solution of detergent starts freezing .

B. below which the formation of micelles takes place .

C. above which the aqueous solution of detergents starts boiling .

D. above which the formation of miscelles takes place .

15. For the reaction

$$Fe_2N(s) + \frac{3}{2}H_2(g) = 2Fe(s) + NH_3(g)$$

A. $K_c = K_p(RT)$

B. $K_c = K_p(RT)^{\frac{-1}{2}}$

C. $K_c = K_p(RT)^{\frac{1}{2}}$

D. $K_c = K_p(RT)^{\frac{3}{2}}$

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16. The species that has a spin -only magnetic moment of 5.9 BM , is : (T_d=

tetrahedral)

A. $\left[Ni(CN)_4\right]^{2-}$ (square planar)

B. $\left[NiCl_4\right]^{2-}\left(T_d\right)$

C. $Ni(CO)_4\left(T_d\right)$

D. $\left[MnBr_4\right]^{2-}\left(T_d\right)$
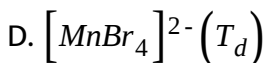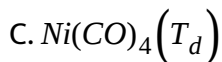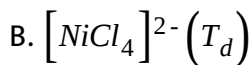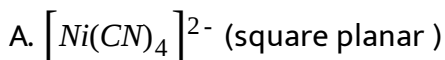
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17. Which of the following Lanthanides element do not show stable +4 oxidation state?

    A. Dy

    B. Ce

    C. Eu

    D. Tb

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18. Consider the following reaction

$A \rightarrow P1, B \rightarrow P2, C \rightarrow P3, D \rightarrow P4,$
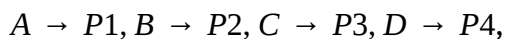
The order of the above reaction are a,b,c and d, respectively . The following graph is obtained when log [rate] vs. log [conc.] are plotted :
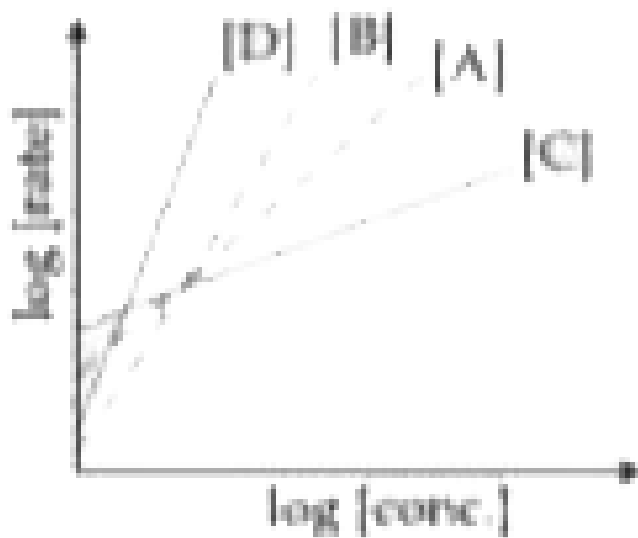
Among the following the correct sequence for the order of the reaction is :

A. $d > a > b > c$

B. $a > b > c > d$

C. $c > a > b > d$

D. $d > b > a > c$

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19. In an estimation of bromine by Carius method , 1.6 g of an organic compound gave 1.88 g of AgBr . The mass percentage of bromine in the compound is _____

(Atomic mass , Ag=108 , Br = 80 g mol^{-1})

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20. Potassium chlorate is prepared by the electrolusis of KCl in basic medium as:

$$Cl^- + 6OH^- \rightarrow ClO_3^- + 3H_2O + 6e$$

If only 60 % of current is utilised in the reaction, the time to produce $10g$ of $KClO_3$ using current of 2 ampere : (*mol. wt.* of $KClO_3$ = 122.5)

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21. The number of Cl=O bonds is perchloric acid is , "_____".

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22. The elevation of boiling point of 0.10 m aqueous $CrCl_3 \cdot xNH_3$ solution is two times that of 0.05 m aqueous $CaCl_2$ solution . The value of x is

_____

[Assume 100% ionisation of the complex and $CaCl_2$, coordination number of Cr as 6 , and that all NH_3 molecules are present inside the coordination sphere]

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23. A spherical balloon of radius 3 cm containing helium gas has a pressure of 48×10^{-3} bar . At the same temperature , the pressure , of a spherical balloon of radius 12 cm containing the same amount of gas will be _____ $\times 10^{-6}$ bar

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