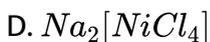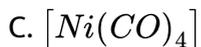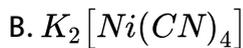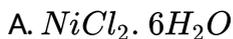# CHEMISTRY

BOOKS - JEE MAINS PREVIOUS YEAR
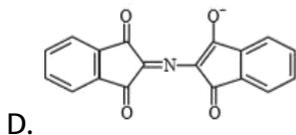
JEE MAINS 2021

Chemistry Section A

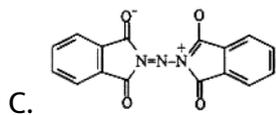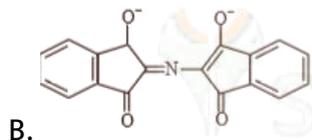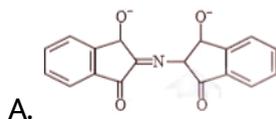**1.** Accding to the valence bond theory the hybridization of central metal atom is dsp^2 for which one of the following compounds?

A. $NiCl_2 . 6H_2O$

B. $K_2\left[Ni(CN)_4\right]$

C. $\left[Ni(CO)_4\right]$

D. $Na_2\left[NiCl_4\right]$

Answer:

2. The correct structure of Rhumann's Purple, the compound formed in the reaction of ninhydrin with proteins is :

A.

B.

C.

D.

Answer:

3. Green chemistry in day–to–day life is in the use of:

A. Chlorine for bleaching of paper

B. Large amount of water alone for washing clothes

C. Tetrachloroethene for laundry

D. Liquified CO_2 for dry cleaning of clothes

Answer:

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4. The correct order of intensity of colors of the compounds is :

A. $[Ni(CN)_4]^{2-} > [NiCl_4]^{2-} > [Ni(H_2O)_6]^{2+}$

B. $[Ni(H_2O)_6]^{2+} > [NiCl_4]^{2-} > [Ni(CN)_4]^{2-}$

C. $[NiCl_4]^{2-} > [Ni(H_2O)_6]^{2+} > [Ni(CN)_6]^{2-}$

D. $[NiCl_4]^{2-} > [Ni(CN)_4]^{2-} > [Ni(H_2O)_6]^{2+}$

Answer:

5. The set in which compounds have different nature is :

A. $B(OH)_3$ and H_3PO_3

B. $B(OH)_3$ and $Al(OH)_3$

C. $NaOH$ and $Ca(OH)_2$

D. $Be(OH)_2$ and $Al(OH)_3$

Answer:

6. The species given below that does NOT show disproportionation reaction is :

A. BrO_4^-

B. BrO^-

C. BrO_2^-

D. BrO_3^-

Answer:

7. Assertion A : Sharp glass edge becomes smooth on heating it upto its melting point.

Reason R : The viscosity of glass decreases on melting.

Choose the most appropriate answer from the options given below.

A. A is true but R is false

B. Both A and R are true but R is NOT the correct explanation of A.

C. A is false but R is true.

D. Both A and R are true and R is the correct explanation of A.

Answer:

8. Orlon fibres are made up of :

A. Polyacrylonitrile

B. Polyesters

C. Polyamide

D. Cellulose

Answer:

9. Given below are two statements : One is labelled as Assertion A and other is labelled as Reason R.

Assertion A : The dihedral angles in H_2O_2 in gaseous phase is $90.2°$ and

in solid phase is $111.5°$.

Reason R : The change in dihedral angle in solid and gaseous phase is due to the difference in the intermolecular forces.

Choose the most appropriate answer from the options given below for A and R.

A. A is correct but R is not correct.

B. Both A and R are correct but R is not the correct explanation of A.

C. Both A and R are correct and R is the correct explanation of A.

D. A is not correct but R is correct

Answer:

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10. Chemical nature of the nitrogen oxide compound obtained from a reaction of concentrated nitric acid and P_4O_{10} (in 4 : 1 ratio) is :

A. acidic

B. basic

C. amphoteric

D. neutral

Answer:

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11. An inorganic Compound 'X' on treatment with concentrated H_2SO_4 produces brown fumes and gives dark brown ring with $FeSO_4$ in presence of concentrated H_2SO_4. Also Compound 'X' gives precipitate 'Y', when its solution in dilute HCl is treated with H_2S gas. The precipitate 'Y' on treatment with concentrated HNO_3 followed by excess of NH_4OH further gives deep blue coloured solution, Compound 'X' is
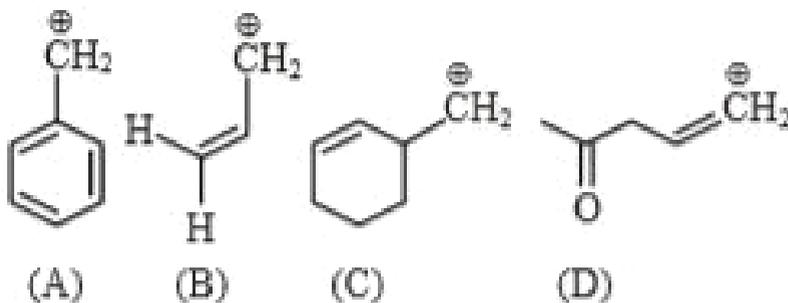
A. $Co(NO_3)_2$

B. $Pb(NO_2)_2$

C. $Cu(NO_3)_2$

D. $Pb(NO_3)_2$

Answer:

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

12.
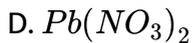
Among the given species the Resonance stabilised carbocations are:

A. (C) and (D) only

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

C. (A) and (B) only

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

Answer:

13. A s-block element (M) reacts with oxygen to form an oxide of the formula MO_2. The oxide is pale yellow in colour and paramagnetic. The element (M) is :

    A. Mg

    B. Na

    C. Ca

    D. K

Answer:

14. In the given reaction 3-Bromo-2, 2-dimethyl butane $\xrightarrow[\text{(Major Product)}]{C_2H_5OH} 'A'$ Product A is :

A. 2-Ethoxy-3, 3-dimethyl butane

B. 1-Ethoxy-3, 3-dimethyl butane

C. 2-Ethoxy-2, 3-dimethyl butane

D. 2-Hydroxy-3, 3-dimethyl butane

Answer:

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15. The metal that can be purified economically by fractional distillation

method is :

A. Fe

B. Zn

C. Cu

D. Ni

Answer:

16. Compound A is converted to B on reaction with $CHCl_3$ and KOH. The compound B is toxic and can be decomposed by C. A, B and C respectively are :

A. primary amine, nitrile compound, conc. HCl

B. secondary amine, isonitrile compound, conc. NaOH

C. primary amine, isonitrile compound, conc. HCl

D. secondary amine, nitrile compound, conc. NaOH

Answer:

17. 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 (E) only

B. (C) and (D) only

C. (A) and (D) only

D. (B) and (E) only

Answer:

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18. Identify the incorrect statement from the following

A. Amylose is a branched chain polymer of glucose

B. Starch is a polymer of α-D glucose

C. β-Glycosidic linkage makes cellulose polymer

D. Glycogen is called as animal starch

Answer:
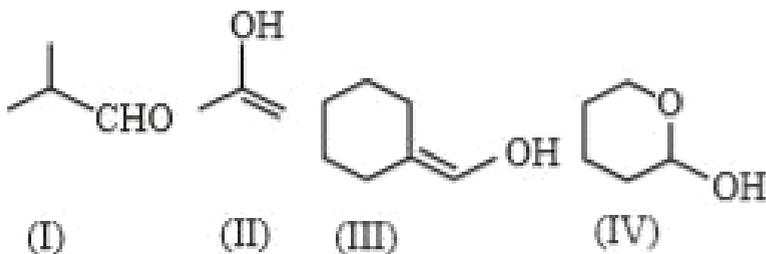
(I)   (II)   (III)   (IV)

19.

Which among the above compound/s does/do not form Silver mirror when treated with Tollen's reagent?

A. (I), (III) and (IV) only

B. Only (IV)
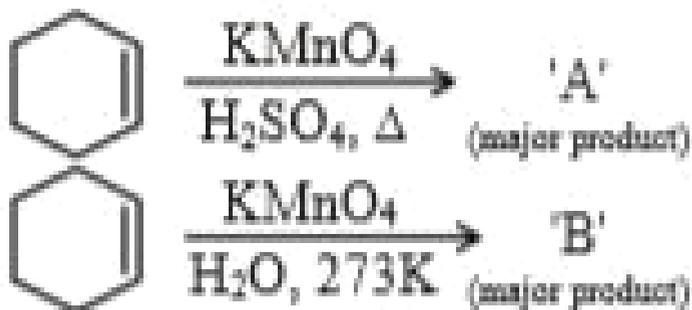
C. Only (II)

D. (III) and (IV) only

Answer:

$$\underset{H_2SO_4, \; \Delta}{\overset{KMnO_4}{\longrightarrow}} \quad \underset{(major\;product)}{'A'}$$

$$\underset{H_2O, \; 273K}{\overset{KMnO_4}{\longrightarrow}} \quad \underset{(major\;product)}{'B'}$$

20.

For above chemical reactions, identify the correct statement from the following:

A. Both compound 'A' and compound 'B' are dicarboxylic acids

B. Both compound 'A' and compound 'B' are diols

C. Compound 'A' is diol and compound 'B' is dicarboxylic acid

D. Compound 'A' is dicarboxylic acid and compound 'B' is diol

Answer:

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1. The number of lone pairs of electrons on the central I atom in I_3^- is

_____ .

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2. 250 mL of 0.5 M NaOH was added to 500 mL of 1 M HCl. The number of unreacted HCl molecules in the solution after complete reaction is _____ $\times 10^{21}$.

(Nearest integer)

$\left(N_A = 6.022 \times 10^{23} \right)$

3. The Azimuthal quantum number for the valence electrons of Ga^+ ion

is _____.

(Atomic number of Ga = 31)

4. The spin-only magnetic moment value for the complex $\left[Co(CN)_6\right]^{4-}$

is _____ BM.

[At. No . Of Co =27]

5. $2SO_3(g) + O_2(g) \Leftrightarrow 2SO_3(g)$
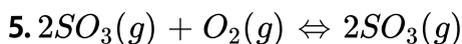
In an equilibrium mixture, the partial pressures are

$P_{SO_3} = 43kPa, P_{O_2} = 530$ Pa and $P_{SO_2} = 45$ kPa. The equilibrium

constant K_p = _____ $\times 10^{-2}$ (nearest integer)

6. The number of nitrogen atoms in a semicarbazone molecule of acetone

is _____.

7. To synthesise 1.0 mole of 2-methylpropan-2-ol from Ethylethanoate

_____ equivalents of CH_3MgBr reagent will be required. (Integer

value)

8. The inactivation rate of a viral preparation is proportional to the

amount of virus. In the first minute after preparation, 10% of the virus is

inactivated. The rate constant for viral inactivation is _____

$\times 10^{-3} min^{-1}$. (Nearest integer)

[Use : ln 10 = 2.303 , $\log_{10} 3 = 0.477$,

Property of logarithm : $\log x^y = y \log x$]

9. An average person needs about 10000 kJ energy per day. The amount of glucose (molar mass = 180.0 g mol^{-1}) needed to meet this energy requirement is _____ g.

(Use : $\Delta_C H$ (glucose) = -2700 KJ mol^{-1})

10. At $20°$ C, the vapour pressure of benzene is 70 torr and that of methyl benzene is 20 torr. The mole fraction of benzene in the vapour phase at $20°$ C above an equimolar mixture of benzene and methyl benzene is _____ $\times 10^{-2}$. (Nearest integer)
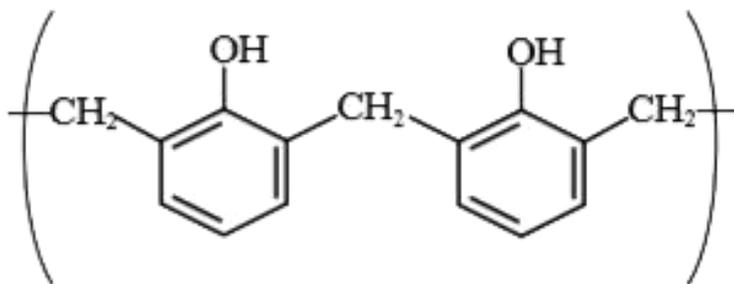
1.

is a repeating unit for :

A. Novolac

B. Buna–N

C. Acrilan

D. Neoprene

Answer:

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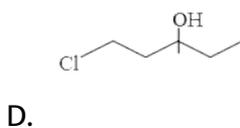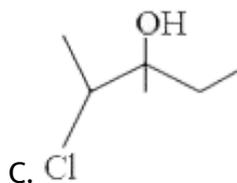**2.** Which one of the following species responds to an external magnetic field?

A. $[Fe(H_2O)_6]^{3+}$

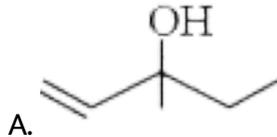B. $[Ni(CN)_4]^{2-}$

C. $[CO(CN)_6]^{3-}$

D. $[Ni(CO)_4]$

Answer:

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$$\xrightarrow[\text{(ii) } H_2O, HCl]{\text{(i) } C_2H_5MgBr, \text{ dry ether}} P$$

(Major product)

3.
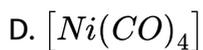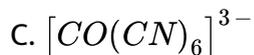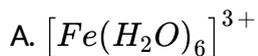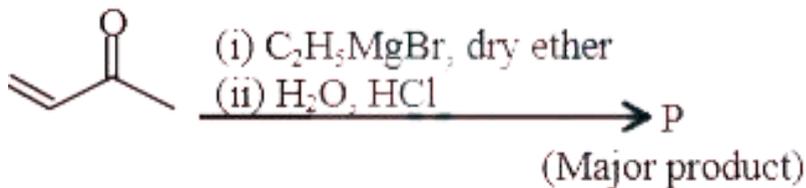
Consider the above reaction, the major product 'P' is:

A.

B.

C.

D.
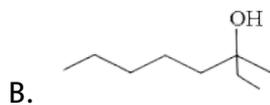
Answer: D

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4. Sodium stearate $CH_3(CH_2)_6COO^- Na^+$ is an anionic surfactant which forms micelles in oil. Choose the correct statement for it from the following :

A. It forms spherical micelles with $CH_3(CH_2)_{16}-$ group pointing towards the centre of sphere.

B. It forms non–spherical micelles with $-COO^-$ group pointing outwards on the surface.

C. It forms spherical micelles with $CH_3(CH_2)_{16}-$ group pointing outwards on the surface of sphere

D. It forms non–spherical micelles with $CH_3(CH_2)_{16}$ - group pointing towards the centre

Answer:

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5. The water soluble protein is :

A. Fibrin

B. Albumin

C. Myosin

D. Collagen

Answer:

6. At 298.2 K the relationship between enthalpy of bond dissociation (in kJ mol^{-1}) for hydrogen $(E_H)$and its isotope, deuterium (ED), is best described by :

A. $E_H = \dfrac{1}{2}E_D$

B. $E_H = E_D$
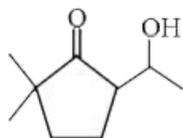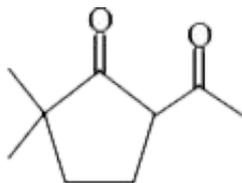
C. $E_H \cong E_D - 7.5$

D. $E_H = 2E_D$

Answer:

$$\xrightarrow[\text{NaOH}]{\text{CH}_3\text{CHO}} \text{'P'} \xrightarrow[\text{(ii) Filtrate} + \text{HCl}]{\text{(i) I}_2/\text{NaOH, Filter}} \text{'X'}$$
(Major product)
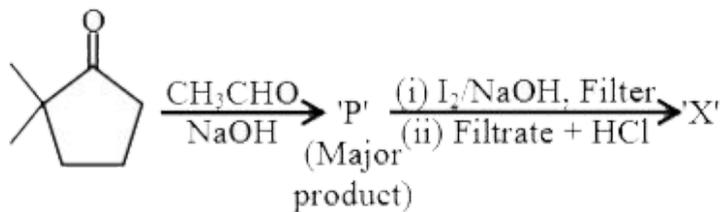
7.

Consider the given reaction, the product 'X' is:

A.

B.

C.

D.

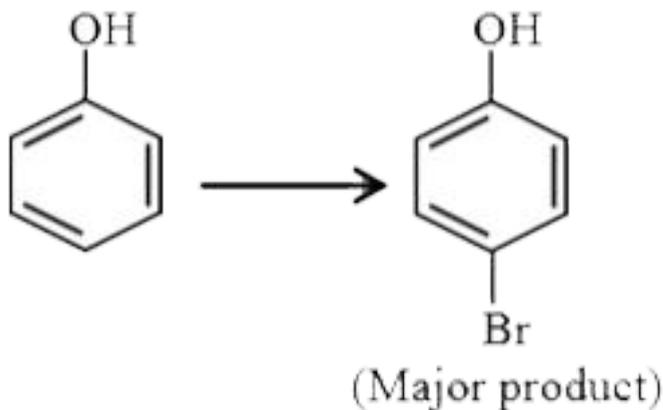**Answer:**

(Major product)
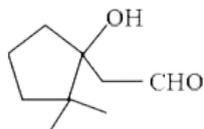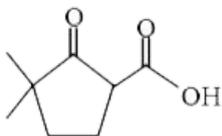
8.

The given reaction can occur in the presence of :

    A. Bromine water

    B. $Br_2 in CS_2$, $273K$

    C. $Br_2 / FeBr_3$

    D. $Br_2 in CHCl_3$, $273K$

Answer:

9. Given below are two statements, one is labelled as Assertion (A) and other is labelled as Reason (R).

Assertion (R) : Gabriel phthalimide synthesis cannot be used to prepare aromatic primary amines.

Reason : Aryl halides do not undergo nucleophilic substitution reaction.

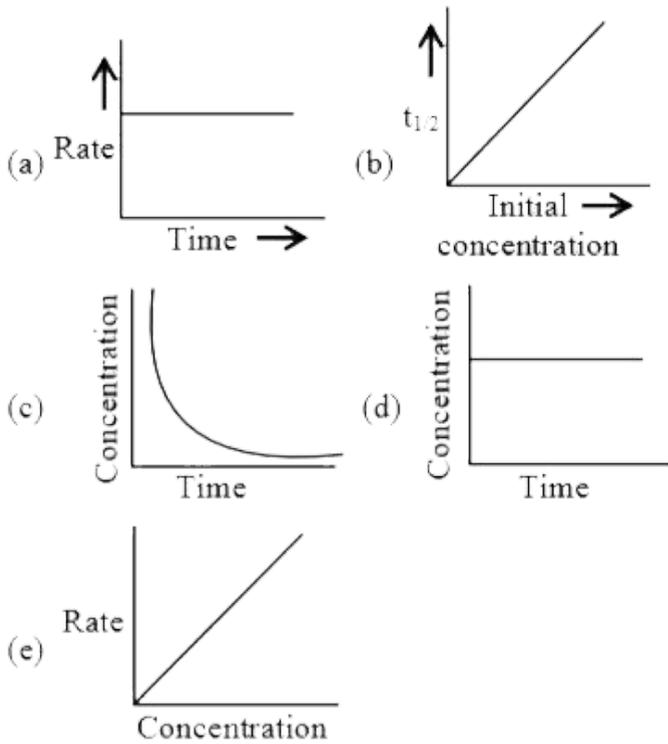In the light of the above statements, choose the correct answer from the options given below

A. Both (A) and (R) true but (R) is not the correct explanation of (A).

B. (A) is false but (R) is true

C. Both (A) and (R) true and (R) is correct explanation of (A).

D. (A) is true but (R) is false.
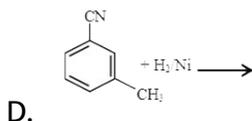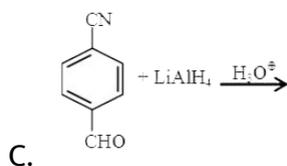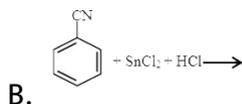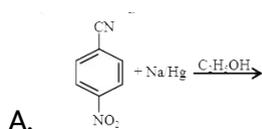
Answer:

10. For the following graphs,

Choose from the options given below, the correct one regarding order of

reaction is :

A. (b) zero order (c) and (e) First order

B. (a) and (b) Zero order (e) First order

C. (b) and (d) Zero order (e) First order

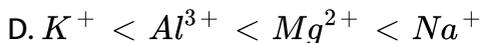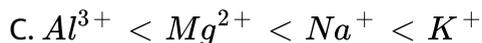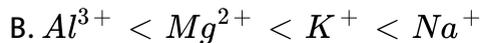D. (a) and (b) Zero order (c) and (e) First order

Answer:

11. Which one of the products of the following reactions does not react with Hinsberg reagent to form sulphonamide

A.
$+ Na\,Hg \xrightarrow{C_2H_5OH}$

B.
$+ SnCl_2 + HCl \longrightarrow$

C.
$+ LiAlH_4 \xrightarrow{H_3O^+}$

D.
$+ H_2/Ni \longrightarrow$

Answer: D

12. The ionic radii of K^+, Na^+, Al^{3+} and Mg^{2+} are in the order `

A. $Na^+ < K^+ < Mg^{2+} < Al^{3+}$

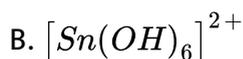B. $Al^{3+} < Mg^{2+} < K^+ < Na^+$

C. $Al^{3+} < Mg^{2+} < Na^+ < K^+$

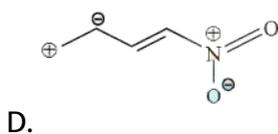D. $K^+ < Al^{3+} < Mg^{2+} < Na^+$

Answer:

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13. Which one of the following compounds of Group–14 elements is not known?

A. $[GeCl_6]^{2-}$

B. $[Sn(OH)_6]^{2+}$

C. $[SiCl_6]^{2-}$

D. $[SiF_6]^{2-}$

Answer:

14. Which one among the following resonating structures is not correct ?

A.

B.

C.

D.
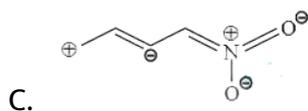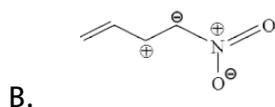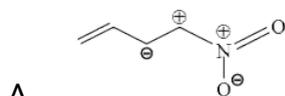
Answer:

15. Given below are two statements

Statement I : None of the alkaline earth metal hydroxides dissolve in alkali.

Srtatement II : Solubility of alkaline earth metal hydroxides in water increases down the group.

In the light of the above statements, choose the most appropriate answer from the options given below :

   A. Statement I is correct but Statement II is incorrect.

   B. Statement I is incorrect but Statement II is correct.

   C. Statement I and Statement II both are incorrect.

   D. Statement I and Statement II both are correct.

Answer:

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16. The correct order of following 3d metal oxides, according to their oxidation numbers is :

$(a)CrO_3$, $(b)Fe_2O_3$, $(c)MnO_2$, $(d)V_2O_5$, $(e)Cu_2O$

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

B. $(a) > (c) > (d) > (b) > (e)$

C. $(a) > (d) > (c) > (b) > (e)$

D. $(c) > (a) > (d) > (e) > (b)$

Answer:

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17. Which one of the following chemical agent is not being used for dry-cleaning of clothes?
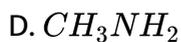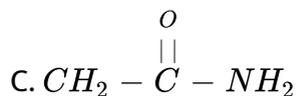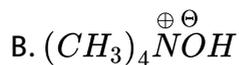
A. H_2O_2

B. CCl_4

C. Liquid CO_2
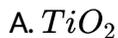
D. $Cl_2C = CCl_2$

Answer:

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18. Which one of the following compounds will liberate CO_2, when treated with $NaHCO_3$?

A. $CH_3\overset{\oplus}{N}H_3\overset{\ominus}{Cl}$

B. $(CH_3)_4\overset{\oplus}{N}\overset{\ominus}{OH}$

C. $CH_2 - \overset{\overset{O}{||}}{C} - NH_2$

D. CH_3NH_2

Answer:

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19. In the leaching of alumina from bauxite, the ore expected to leach out in the process by reacting with NaOH is :

A. TiO_2

B. Fe_2O_3

C. ZnO

D. SiO_2

Answer:

20. An organic compound A C_4H_8 on treatment with $KMnO_4/H^+$

Yields compound $'B' C_3H_5O$

Compound 'A' also yields compound 'B' an ozonolysis. Compound 'A' is :
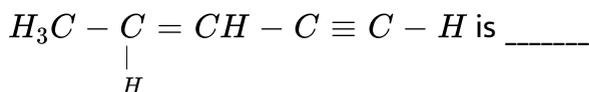
A. 2 - Methylopropene

B. 1 - Methylcyclopropane

C. But - 2 - ene

D. Cyclobutane

Answer:

---

21. The number of sigma bonds in

$$H_3C - \underset{\underset{H}{|}}{C} = CH - C \equiv C - H \text{ is } _____$$

Chemisry Section B

---

1. Three moles of AgCl get precipitated when one mole of an octahedral co-ordination compound with empirical formula $CrCl_3, 3NH_3 . 3H_2O$ reacts with excess of silver nitrate. The number of chloride ions satisfying the secondary valency of the metal ion is_____ .

2. A source of monochromatic radiation of wavelength 400 nm provides 1000 J of energy in 10 seconds. When this radiation falls on the surface of sodium, $x \times 10^{20}$ electrons are ejected per second. Assume that wavelength 400 nm is sufficient for ejection of electron from the surface of sodium metal. The value of x is _____ .

(Nearest integer)

$\left(h = 6.626 \times 10^{-34} \, Js \right)$

3. CO_2 gas is bubbled through water during a soft drink manufacturing process at 298 K. If CO_2 exerts a partial pressure of 0.835 bar then x m mol of CO_2 would dissolve in 0.9 L of water. The value of x is _____ .

(Nearest integer)

(Henry's law constant for CO_2 at 298 K is 1.67×10^3 bar)

4. For the reaction
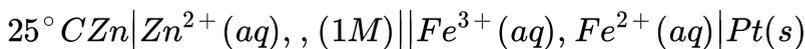
$$A + B \Leftrightarrow 2C$$

the value of equilibrium constant is 100 at 298 K. If the initial concentration of all the three species is 1 M each, then the equilibrium concentration of C is $x \times 10^{-1} M$. The value of x is _____ (Nearest integer)

5. Consider the cell at

$$25^\circ C\, Zn\left|Zn^{2+}(aq),\,,(1M)\right|\left|Fe^{3+}(aq),\,Fe^{2+}(aq)\right|Pt(s)$$

The fraction of total iron present as Fe^{3+} ion at the cell potential of $1.5000V\, is\, x \times 10^{-2}$. The value of x is _____ (Nearest integer)

(Given : $E^0_{Fe^{3+}/Fe^{2+}} = 0.77V$, $E^0_{Zn^{2+}/Zn} = -0.76V$

6. At 298 K, the enthalpy of fusion of a solid (X) is $2.8 kjmol^{-1}$ and the enthalpy of vaporisation of the liquid (X) is 98.2 kJ mol^{-1} The enthalpy of sublimation of the substance (X) in $kjmol^{-1}$ is _____(in nearest integer)

7. A home owner uses $4.00 \times 10^3 m^3$ of methane (CH_4) gas, (assume CH_4 is an ideal gas) in a year to heat his home. Under the pressure of 1.0 atm and 300 K , mass of gas used is $x \times 10^5$ g . The value of x is _____ (Nearest i nteger)

(Given R = 0. 083 L atm $K^- mol^-$)

8. When 10 mL of an aqueous solution of Fe^{2+} ions was titrated in the presence of dil H_2SO_4 using diphenylamine indicator, 15 mL of 0.02 M solution of $K_2Cr_2O_7$ was required to get the end point. The molarity of the solution containing Fe^{2+} ions is $x \times 10^{-2}$ The value of x is _____ (Nearest integer)

9. Consider the complete combustion of butane, the amount of butane utilized to produce 72.0 g of water is _____ $\times 10^{-1}$ g. (in nearest integer)

Chemistry

1. The single largest industrial application of dihydrogen is :

    A. In the synthesis of nitric acid

    B. Manufacture of metal hydrides

    C. Rocket fuel in space research
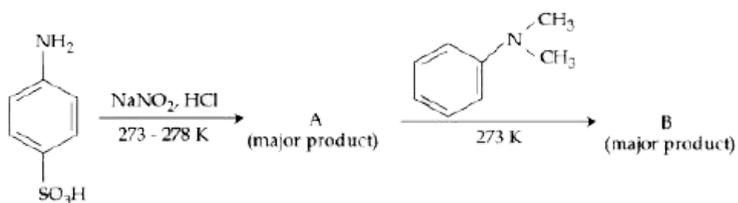
    D. In the synthesis of ammonia

Answer:

2. Spin only magnetic moment of an octahedral complex of Fe^{2+} in the presence of a strong field ligand in BM is:
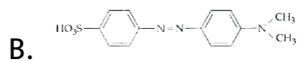
A. 0

B. 4.89

C. 2.82

D. 3.46

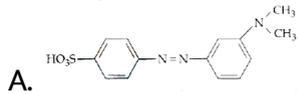**Answer:**

3.

Consider the above reaction, compound B is:

A.

B.

C.

D.
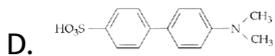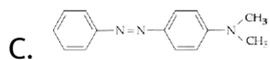
Answer:

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4. Cu^{2+} salt reacts with potassium iodide to give:

A. Cu_2I_2

B. CuI

C. $Cu(I_3)_2$

D. Cu_2I_3
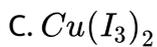
Answer:

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5. A solution is 0.1 M in Cl^- and 0.001 M in CrO_4^{2-}. Solid $AgNO_3$ is gradually added to it. Assuming that the addition does not change in volume and

$K_{SP}(AgCl) = 1.7 \times 10^{-10} M^2$ and $K_{SP}(Ag_2CrO_4) = 1.9 \times 10^{-12} M^3$

. Select correct statement from the following:

A. AgCl will preipitate first as the amount of Ag^+ needed to precipitate is low.

B. Ag_2CrO_4 precipitates first because the amount of Ag^+ needed is low.

C. AgCl precipitates first because its K_{SP} is hight.

D. Ag_2CrO_4 precipitates first as its K_{SP} is low.

Answer:

6. Bakelite is a cross – linked polymer of formaldehyde and:

A. Dacron

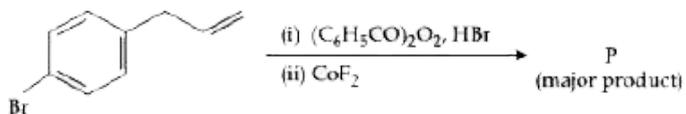B. Buna - S

C. Novolac

D. PHBV

Answer: C

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7. Benzene on nitration gives nitrobenzene in presence of HNO_3 and H_2SO_4 mixture, where:

A. both H_2SO_4 and HNO_3 act as an acids

B. both H_2SO_4 and HNO_3 act as a bases

C. HNO_3 acts as an acid and H_2SO_4 acts as a base
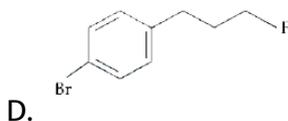
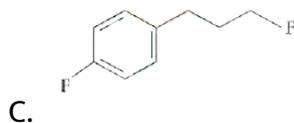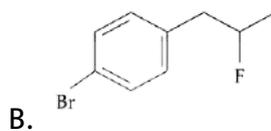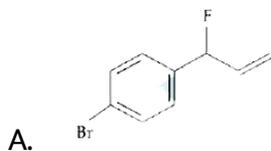D. HNO_3 acts as a base and H_2SO_4 acts as an acid

Answer:

$$\xrightarrow[\text{(ii) } CoF_2]{\text{(i) } (C_6H_5CO)_2O_2, \text{ HBr}}$$

P
(major product)

8.

Major product P of above reaction, is:

A.

B.

C.

D.

Answer:

9. Which one of the following species doesn't have a magnetic moment of 1.73 BM, (spin only value) ?

A. CuI

B. $\left[Cu(NH_3)_4\right]Cl_2$

C. O_2^+

D. O_2^-

Answer:

10. In Carius method, halogen containing organic compound is heated with funning nitric acid in the presence of:

A. $CuSO_4$
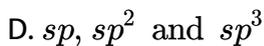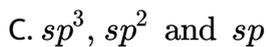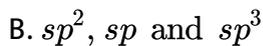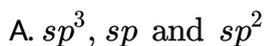
B. HNO_3

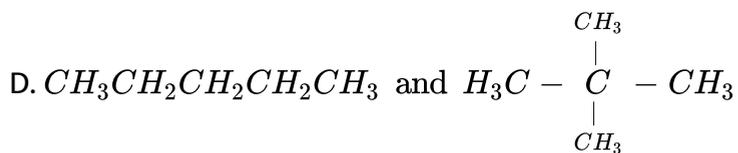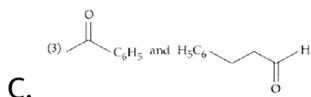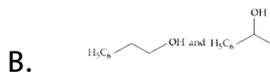C. $BaSO_4$

D. $AgNO_3$

Answer:

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11. The hybridisations of the atomic orbitals of nitrogen in NO_2^-, NO_2^+ and NH_4^+ respectively are:

A. sp^3, sp and sp^2

B. sp^2, sp and sp^3

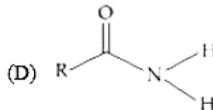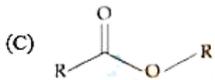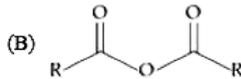C. sp^3, sp^2 and sp

D. sp, sp^2 and sp^3

Answer:

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12. Which one of the following pairs of isomers is an example of metamerism?

A.

B.

C.

D. $CH_3CH_2CH_2CH_2CH_3$ and $H_3C - \underset{\underset{CH_3}{|}}{\overset{\overset{CH_3}{|}}{C}} - CH_3$

Answer:

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(A)

(B)

(C)

(D)
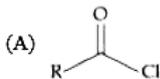
13.

The correct order of their reactivity towards hydrolysis at room temperature is:

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

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

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

D. $(D) > (B) > (A) > (C)$
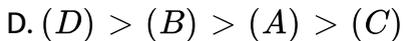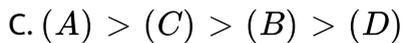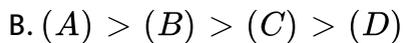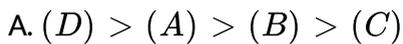
Answer:

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14. Which one of the following statements is not true about enzymes?

A. Almost all enzymes are proteins.

B. Enzymes work as catalysts by lowering the activation energy of a

biochemical reaction.

C. Enzymes are non – specific for a reaction and substrate.

D. The action of enzymes is temperature and pH specific.

Answer:

15. The major product (P) in the following reaction is:

(i) KOH (alc.)
(ii) H^+, Δ

P
(major product)

A.

B.

C.

D.
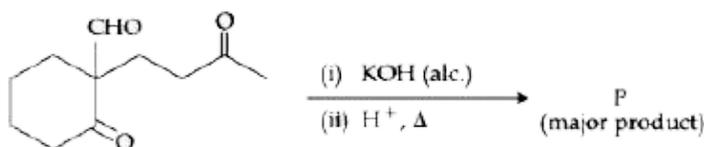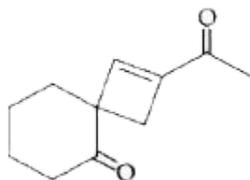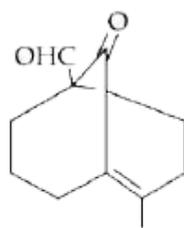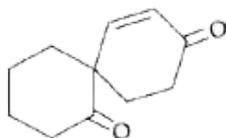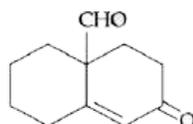
Answer:

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16. Metallic sodium does not react normally with :

A. But-2-yne

B. tert -butyl alcohol

C. gaseous ammonia

D. Ethyne

Answer:

---

17. Outermost electronic configuration of a group 13 element, E, is $4s^2, 4p^1$. The electronic configuration of an element of p- block period – five placed diagonally to element , E is:

A. $[Xe]5d^{10}6s^26p^2$

B. $[Xe]3d^{10}4s^24p^2$

C. $[Kr]3d^{10}4s^24p^2$

D. $[Kr]4d^{10}5s^25p^2$
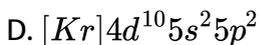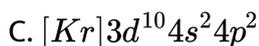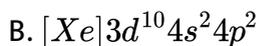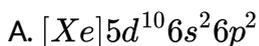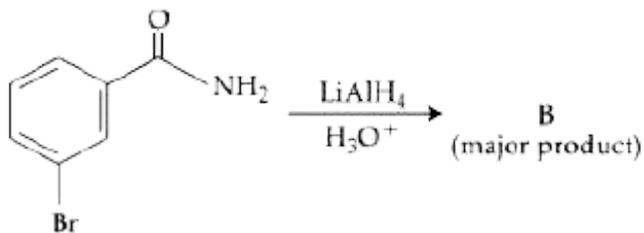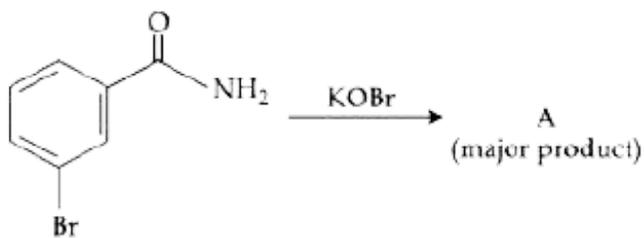
Answer:

18.

In the above reactions, product A and product B respectively are:

A.

B.

C.

D.
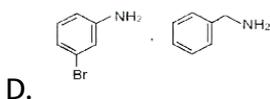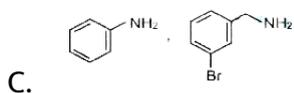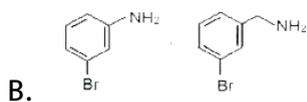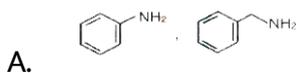
Answer:

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19. Which one of the following gases is reported to retard photosyntheis?

A. CFCs

B. CO

C. NO_2

D. CO_2

Answer:

20. Consider two chemical reactions (A) and (B) that take place during metallurgical process:

$(A) ZnCO_{3(s)} \xrightarrow{\Delta} ZnO_{(s)} + CO_{2(g)}$ $(B) 2ZnS_{(s)} + 3O_{2(g)} \xrightarrow{\Delta} Z$
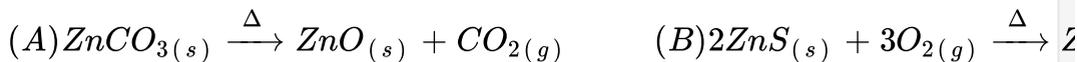
The correct options of names given to them respectively is:

A. Both (A) and (B) are producing same product so both are calcination

B. A) is roasting and (B) is calcination

C. (A) is calcination and (B) is roasting

D. Both (A) and (B) are producing same product so both are roasting.

Answer:

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21. 100 ml of 0.0018 % (w/v) solution of Cl^- ion was minimum concentration Cl^- required to precipitate a negative sol in one h. The coagulating value of Cl^- ion is _____ (Nearest integer)

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22. The vapour pressure of A and B at $25°$ C are 90 mm Hg and 15 mm Hg respectively. If A and B are mixed such that the mole fraction of A in the

mixture is 0.6, then the mole fraction of B in the vapour phase is xx 10^{-1}

The value of x is _____. (Nearest integer)

23. Diamond has a three dimensional structure of C atoms formed by covalent bonds. The structure of diamond has face centred cubic lattice where 50% of the tetrahedral voids are also occupied by carbon atoms. The number of carbon atoms present per unit cell of diamond is_____.

24. 4g equimolar mixture of NaOH and Na_2CO_3 contains x g of NaOH and y g of Na_2CO_3. The value of x is _____g .

25. For a given chemical reaction $A \rightarrow B$ at 300 K the free energy change is $-49.4kJmol^{-1}$ and the enthalpy of reaction is $51.4kJmol^{-1}$. The entropy change of the reaction is_____ $JK^{-1}mol^{-1}$.

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26. $PCl_5(g) \rightarrow PCl_3(g) + Cl_2(g)$

In the above first order reaction the concentration of PCl_5 reduces from initial concentration 50 mol L^{-1} to 10 mol L^{-1} m 120 minutes at 300K. The rate constant for the reaction at 300 K is $x \times 10^{-2}min^{-1}$. The value of x is _____ [Given log 5 = 0.69989]

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27. Potassium chlorate is prepared by electrolysis of KCl in basic solution as shown by following equation.

$6OH^- + Cl^- \rightarrow ClO_3^- + 3H_2O + 6e^-$

A current of x A has to be passed for 10 h to produce 10.0 g of potassium

chlorate. The value of x is _____ (Nearest integer)

(Molar mass of $KClO_3 = 122.6 gmol^{-1}$, $F = 96500C$)

28. The wavelength of electrons accelerated from rest through a potential difference of 40 kV is $x - 10^{-12}m$.

The value of x is _____ (Nearest integer)

Given : Mass of electron $= 9.1 \times 10^{-31} kg$

Charge on a electron $= 1.6 \times 10^{-19} C$

Planck's constant $= 6.63 \times 10^{-34} Js$

29. When 0.15 g of an organic compound was analyzed using Carius method for estimation of bromine, 0.2397 g of AgBr was obtained. The percentage of bromine in the organic compound is _____. (Nearest

integer)

$$\begin{bmatrix} \text{Atomic mass:} \\ \text{silver} = 108 \\ \text{Bromine} = 80 \end{bmatrix}$$

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30. An aqueous solution of $NiCl_2$ was heated with excess sodium cyanide in presence of strong oxidizing agent to form $\left[Ni(CN)_6\right]^{2-}$. The total change in number of unpaired electrons on metal centre is _____.

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Chemistry Section A

1. The water having more dissolved O_2 is

A. boiling water

B. water at $80°C$

C. polluted water

D. water at $4°C$

Answer:

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2. Which one of the following statements for D.I Mendeleeff, is incorrect?

A. He authored the textbook-Principles of Chemistry

B. At the time, he proposed Periodic Table of element structure of

atom was known

C. Element with atomic number 101 is named after him

D. He inventd accurate barometer

Answer:

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3. Which purification technique is used fo rhigh boiling organic liquid compound (decomposes near its boiling point)?

A. Simple distillation

B. Steam distillation

C. Fractional distillation

D. Reduced pressure distillation

Answer:

4. Which of the following compounds will provide a tertiary alcohol on reaction with excess of CH_3MgBr followed by hydrolysis?

A.

B.

C.

D.
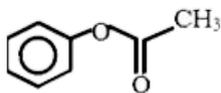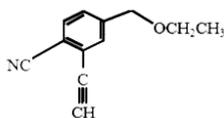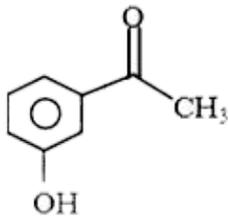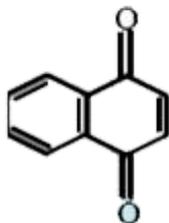
Answer:

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5. Which of the following compounds does not exhibit resonance?

A. $CH_3CH_2OCH = CH_2$

B.

C. $CH_3CH_2CH_2CONH_2$

D. $CH_3CH_2CH = CHCH_2NH_2$
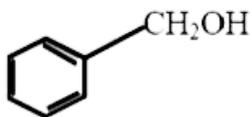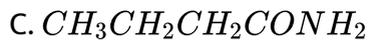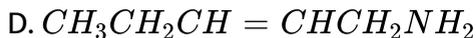
Answer:

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6. Match List-I with List-II

List-I (Elements)	List-II (Properties)
(a) Ba	(i) Organic solvent soluble compounds
(b) Ca	(ii) Outer electronic configuration $6s^2$
(c) Li	(iii) Oxalate insoluble in water
(d) Na	(iv) Formation of very strong monoacidic base

Choose the correct answer from the options given below:

A. $(a) - (ii), (b) - (iii), (c) - (i)$ and $(d) - (iv)$

B. $(a) - (iv), (b) - (i), (c) - (ii)$ and $(d) - (iii)$

C. $(a) - (iii), (b) - (ii), (c) - (iv)$ and $(d) - (i)$

D. $(a) - (i), (b) - (iv), (c) - (ii)$ and $(d) - (iii)$

Answer:

Major product

7.
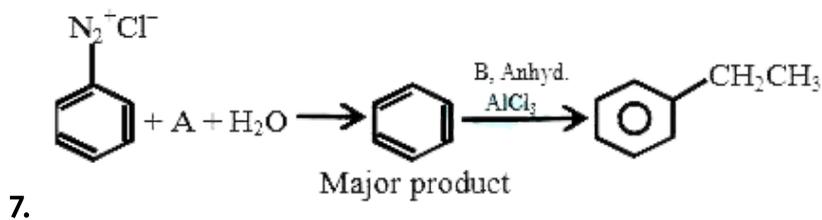
In the chemical reactions given above A and B respectively are

A. H_3PO_2 and CH_3CH_2Cl

B. CH_3CH_2OH and H_3PO_2

C. H_3PO_2 and CH_3CH_2OH

D. CH_3CH_2Cl and H_3PO_2

Answer:

8. Isotope(s) of hydrogen which emits low energy β^- particles with $t_{1/2}$ value > 12 years is/are

A. Protium

B. Tritium

C. Deuterium

D. Deuterium and Tritium

Answer:

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9. Match List-I with List-II

List-I (Species)		List-II (Hybrid Orbitals)
(a) SF_4	(i)	sp^3d^2
(b) IF_5	(ii)	d^2sp^3
(c) NO_2^+	(iii)	sp^3d
(d) NH_4^-	(iv)	sp^3
	(v)	sp

Choose the correct answer from the options given below:

A. $(a) - (i), (b) - (ii), (c) - (v)$ and $(d) - (iii)$

B. $(a) - (ii), (b) - (i), (c) - (iv)$ and $(d) - (v)$

C. $(a) - (iii), (b) - (i), (c) - (v)$ and $(d) - (iv)$

D. $(a) - (iv), (b) - (iii), (c) - (ii)$ and $(d) - (v)$

Answer:

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10. When silver nitrate solution is added to potassium iodide solution then the sol produced is

A. AgI/I^-

B. AgI/Ag^+

C. KI/NO_3^-

D. $AgNO_3/NO_3^-$
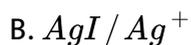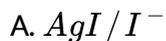
Answer:

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11. Which of the following molecules does not show stereo isomerism?

A. 3, 4-Dimethylhex-3-ene

B. 3-Methylhex-1-ene

C. 3-Ethylhex-3-ene

D. 4-Methylhex-1-ene

Answer:

12. Given below are the statements about diborane

(a) Diborane is prepared by the oxidation of $NaBH_4$ with I_2

(b) Each boron atom is in sp^2 hybridized state

(c) Diborane has one bridged 3 centre-2-electron bond

(d) Diborane is a planar molecule

The option with correct statement(s) is-

A. (c) and (d) only

B. (a) only

C. (c) only

D. (a) and (b) only

Answer:

13. Which one of the following group -15 hydride is the strongest reducing agent?

A. AsH_3

B. BiH_3

C. PH_3

D. SbH_3

Answer:

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14. Match List-I with List-II

List-I	List-II
(a) Chloroprene	(i)
(b) Neoprene	(ii) Cl
(c) Acrylonitrile	(iii) Cl
(d) Isoprene	(iv) $CH_2=CH-CN$
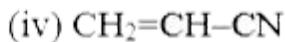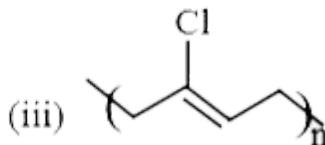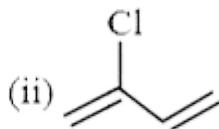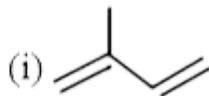
Choose the correct answer from the options given below:

A. $(a) - (iii), (b) - (v), (c) - (ii), (d) - (i)$

B. $(a) - (ii), (b) - (iii), (c) - (iv), (d) - (i)$

C. $(a) - (ii), (b) - (i), (c) - (iv), (d) - (iii)$

D. $(a) - (iii), (b) - (i), (c) - (iv), (d) - (ii)$

Answer:

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15. The set having ions which are coloured and paramagnetic both is-

A. Cu^{2+}, Cr^{3+}, Sc^{+}

B. $Cu^{2+}, Zn^{2+}, Mn^{4+}$

C. Sc^{3+}, V^{5+}, Ti^{4+}

D. $Ni^{2+}, Mn^{7+}, Hg^{2+}$
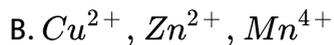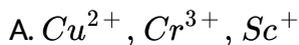
Answer:

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16. Thiamine and pyridoxine are also known respectively as

A. Vitamin B_2 and Vitamin E

B. Vitamin E and Vitamin B_2

C. Vitamin B_6 and Vitamin B_2

D. Vitamin B_1 and Vitamin B_6

Answer:

17. Sulphide ion is soft base and its ores are common for metals

(a) Pb (b) Al (c) Ag (d) Mg

Choose the correct answer the from the options given below:

A. (a) and (c)only

B. (a) and (d) only

C. (a) and (b) only

D. (c) and (d) only

Answer:

18. An organic compound $A(C_6H_6O)$ gives dark green colouration with ferric chloride. On treatment with $CHCl_3$ and KOH, followed by acidification gives compound B. Compound B can also be obtained from compound C on reaction with pyridinium chlorochromate (PCC). Identify A, B and C

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19. Which one of the following reactions does not occur?

A.

$$\text{(aniline, } NH_2 \text{)} + (CH_3CO)_2O/\text{Pyridine} \rightarrow \text{(} NHCOCH_3 \text{)}$$

B.

$$\text{(} NH_2 \text{)} + H_2SO_4 \rightarrow \text{(} NH_2, SO_3H \text{)}$$

C.

$$\text{(} NH_2 \text{)} + AlCl_3 + CH_3Cl \rightarrow \text{(} NH_2, CH_3 \text{)}$$

D.

$$\text{(} NH_2 \text{)} + HNO_3/H_2SO_4 \rightarrow \text{(} NH_2, NO_2 \text{)}$$
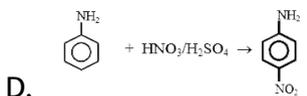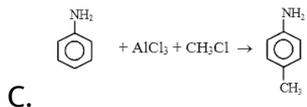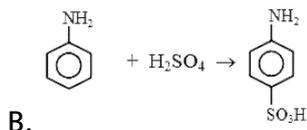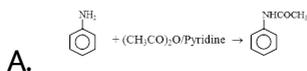
Answer:

20. Which one of the following 0.06M aqueous solutions has lowest freezing point?

A. $Al_2(SO_4)_3$

B. $C_6H_{12}O_6$

C. KI

D. K_2SO_4
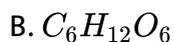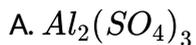
Answer:

21. In the following the correct bond order sequence is:

A. $O_2^{2-} > O_2^+ > O_2^- > O_2$

B. $O_2^+ > O_2^- > O_2^{2-} > O_2$

C. $O_2^+ > O_2 > O_2^- > O_2^{2-}$

D. $O_2 > O_2^- > O_2^{2-} > O_2^+$
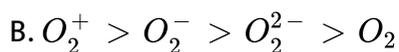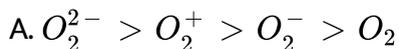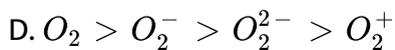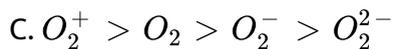
Answer:

22. A biodegradable polyamide can be made from:

A. Glycine and isoprene

B. Hexamethylene diamine and adipic acid

C. Glycine and aminocaproic acid

D. Styrene and caproic acid

Answer:

23. Match List I with List II :

	List-I Elements		List-II Properties
(a)	Li	(i)	Poor water solubility of I⁻ salt
(b)	Na	(ii)	Most abundant element in cell fluid
(c)	K	(iii)	Bicarbonate salt used in fire extinguisher
(d)	Cs	(iv)	Carbonate salt decomposes easily on heating

Choose the correct answer from the options given below :

A. (a)-(iv), (b)-(iii), (c)-(ii), (d)-(i)

B. (a)-(i), (b)-(iii), (c)-(ii), (d)-(iv)

C. (a)-(iv), (b)-(ii), (c)-(iii), (d)-(i)

D. (a)-(i), (b)-(ii), (c)-(iii), (d)-(iv)

Answer:

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24. Which one of the following metal complexes is most stable?

A. $[Co(en)(NH_3)_4]Cl_2$

B. $[Co(en)_3]Cl_2$

C. $[Co(en)_2(NH_3)_2]Cl_2$

D. $[Co(NH_3)_6]Cl_2$
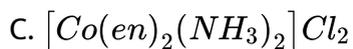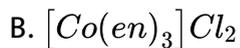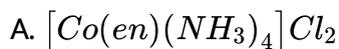
Answer:

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25. Match List I with List II : (Both having metallurgical terms)

	List-I		List-II
(a)	Concentration of Ag ore	(i)	Reverberatory furnace
(b)	Blast furnace	(ii)	Pig iron
(c)	Blister copper	(iii)	Leaching with dilute NaCN solution
(d)	Froth floatation method	(iv)	Sulfide ores

Choose the correct answer from the options given below :

A. (a)–(iii), (b)–(ii), (c)–(i), (d)–(iv)

B. (a)–(iii), (b)–(iv), (c)–(i), (d)–(ii)

C. (a)–(iv), (b)–(i), (c)–(iii), (d)–(ii)

D. (a)–(iv), (b)–(iii), (c)–(ii), (d)–(i)

Answer:

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26. The ionic radii of F^- and O^{2-} respectively are 1.33 Å and 1.4 Å, while the covalent radius of N is 0.74 Å.

The correct statement for the ionic radius of N^{3-} from the following is :

A. It is smaller than F^- and N

B. It is bigger than O^{2-} and F^-

C. It is bigger than F^- and N, but smaller than of O^{2-}

D. It is smaller than O^{2-} and F^-, but bigger than of N

Answer:

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27. The correct decreasing order of densities of the following compounds is :
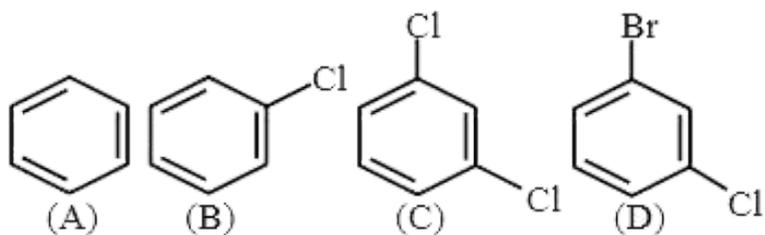
(A)   (B)   (C)   (D)

A. (D) > (C) > (B) > (A)

B. (C) > (D) > (A) > (B)

C. (C) > (B) > (A) > (D)

D. (A) > (B) > (C) > (D)

Answer:

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$$C_6H_5NO_2 \xrightarrow{Sn + HCl} \text{"A"} \xrightarrow[H^{\oplus}]{C_6H_5\overset{\oplus}{N}_2\overset{\ominus}{Cl}} P$$
(Yellow
coloured
compound)
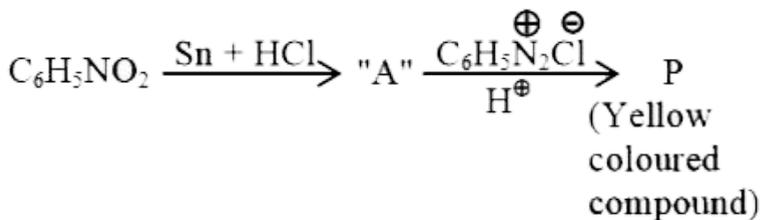
28.

Consider the above reaction, the Product "P" is :

A.

B.

C.

D.
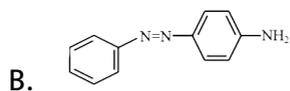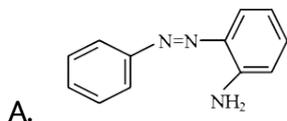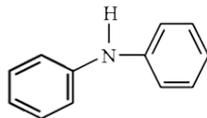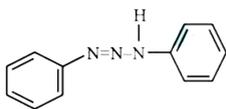
Answer:

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29. A reaction of benzonitrile with one equivalent CH_3MgBr followed by hydrolysis produces a yellow liquid "P". The compound "P" will give positive_____

    A. Iodoform test

    B. Schiff's test

    C. Ninhydrin's test

    D. Tollen's test

Answer:

30. The spin only magnetic moments (in BM) for free Ti^{3+}, V^{2+} and Sc^{3+} ions respectively are

(At.No. Sc : 21, Ti : 22, V : 23)

  A. 3.87, 1.73, 0

  B. 1.73, 3.87, 0

  C. 1.73, 0, 3.87

  D. 0, 3.87, 1.73

Answer:

31. Which one of the following is correct structure for cytosine ?

A.

B.

C.

D.
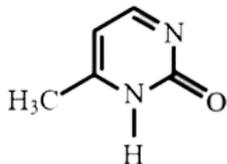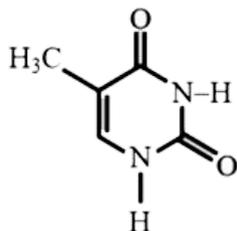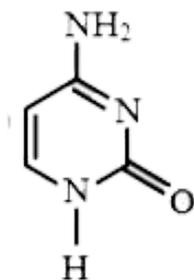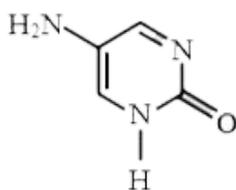
Answer:

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32. Identify the species having one π-bond and maximum number of canonical forms from the following :

A. SO_3

B. O_2

C. SO_2

D. CO_3^{2-}

Answer:

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33. Which one of the following metals forms interstitial hydride easily ?

A. Cr

B. Fe

C. Mn

D. Co

Answer:
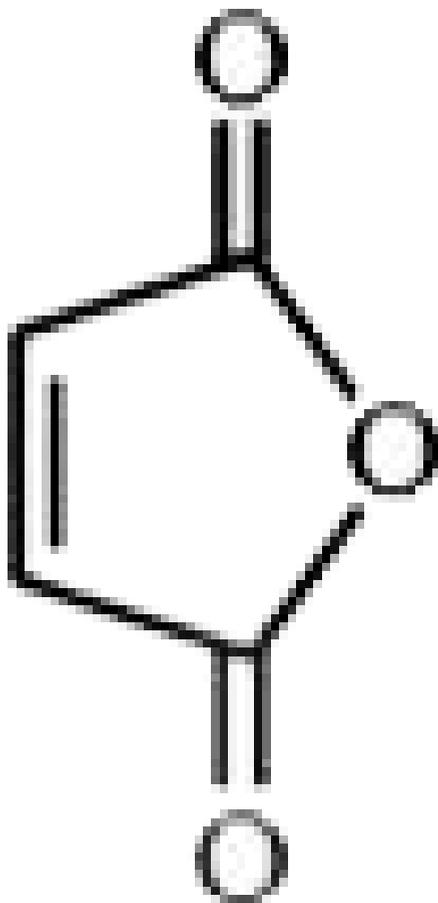
34.

Maleic anhydride

Maleic anhydride can be prepared by :

A. Heating trans-but-2-enedioic acid

B. Heating cis-but-2-enedioic acid

C. Treating cis-but-2-enedioic acid with alcohol and acid

D. Treating trans-but-2-enedioic acid with alcohol and acid

Answer:

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35. Given below are two statements :

Statement I : Chlorofluoro carbons breakdown by radiation in the visible energy region and release chlorine gas in the atmosphere which then reacts with stratospheric ozone.

Statement II : Atmospheric ozone reacts with nitric oxide to give nitrogen and oxygen gases, which add to the atmosphere.

For the above statements choose the correct answer from the options given below :

A. Statement I is incorrect but statement II is true

B. Both statement I and II are false

C. Statement I is correct but statement II is false

D. Both statement I and II are correct

Answer:

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$$Br\!\!\diagdown\!\!\diagup\!\!\diagdown CHO \xrightarrow[\text{dry HCl gas}]{\text{EtOH excess}} \text{"A"} \xrightarrow{\text{'BuO'K'}} \text{"B"}$$
$$\text{(major product)} \qquad \text{(major product)}$$

36.

[where $Et \Rightarrow -C_2H_5 Bu \Rightarrow (CH_3)_3C-$]

Consider the above reaction sequence, Product "A" and Product "B" formed respectively are :

A. $Br\!\!\diagup\!\!\diagdown$ with OEt, OEt groups ; H_2C with OEt, OEt groups

B. $EtO\!\!\diagdown\!\!\diagup CHO$; $EtO\!\!\diagdown\!\!\diagup$ with O'Bu, OH groups

C.

D.

Answer:

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37. Match List I with List II :

List-I	**List-II**
Example of colloids	**Classification**
(a) Cheese	(i) dispersion of liquid in liquid
(b) Pumice stone	(ii) dispersion of liquid in gas
(c) Hair cream	(iii) dispersion of gas in solid
(d) Cloud	(iv) dispersion of liquid in solid

Choose the most appropriate answer from the options given below

Choose the most appropriate answer from the options given below

A. (a)-(iv), (b)-(iii), (c)-(ii), (d)-(i)

B. (a)-(iv), (b)-(i), (c)-(iii), (d)-(ii)

C. (a)-(iii), (b)-(iv), (c)-(i), (d)-(ii)

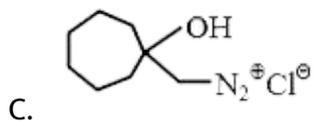D. (a)-(iv), (b)-(iii), (c)-(i), (d)-(ii)

Answer:

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38. What is the major product "P" of the following reaction ?

$$\xrightarrow[\text{(ii) H}_2\text{O}]{\text{(i) NaNO}_2\text{, HCl, 278K}}$$

P
(Major product)

A.

B.

C.

D.

Answer:

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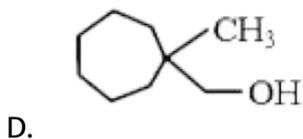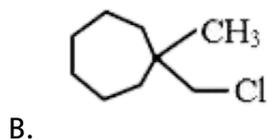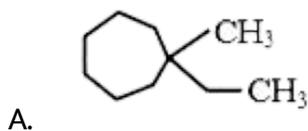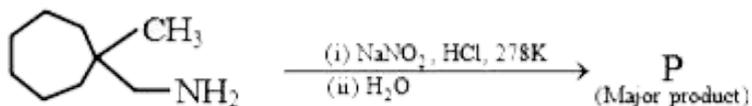
39. Identify the process in which change in the oxidation state is five :

A. $Cr_2O_7^{2-} \rightarrow 2Cr^{3+}$

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

C. $CrO_4^{2-} \rightarrow Cr^{3+}$

D. $C_2O_4^{2-} \rightarrow 2CO_2$

Answer:

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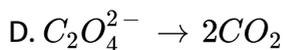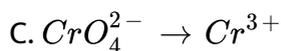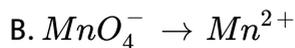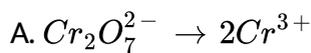
40. Which among the following is the strongest acid ?

A. $CH_3CH_2CH_2CH_3$

B.

C.

D.
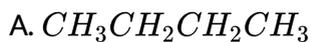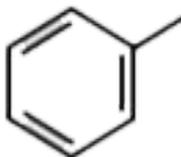
Answer:

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41. Which one of the following compounds will give orange precipitate when treated with 2,4- dinitrophenyl hydrazine ?

A.

B.

C.

D.
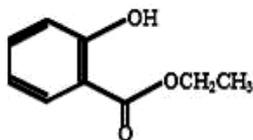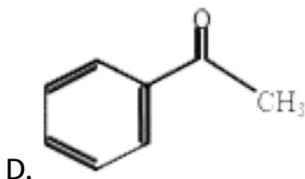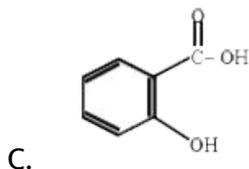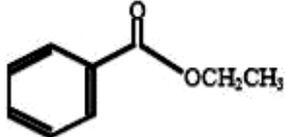
Answer: D

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42. The product obtained from the electrolytic oxidation of acidified sulphate solutions , is :

A. HSO_4^-

B. HO_3SOOSO_3H

C. HO_2SOSO_2H

D. HO_3SOSO_3H

Answer: B

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43. The parameters of the unit cell of a substance are $a = 2.5, b = 2.0, c = 4.0, \alpha = 90°, \beta = 120° \gamma = 90°$. The crystal system of the substance is :

A. Hexagonal

B. Orthorhombic

C. Monoclinic

D. Triclinic

Answer: C

44. Oxidation state of P in $H_4P_2O_5$, $H_4P_2O_6$, $H_4P_2O_7$ are respectively

A. 7, 5 and 6

B. 5, 4 and 3

C. 5, 3 and 4

D. 6, 4 and 5

Answer: C

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45. For a reaction of order n, the unit of the constant is :

A. $mol^{1-n}L^{1-n}s$

B. $mol^{1-n}L^{2n}s^{-1}$

C. $mol^{-1}L^{n-1}s^{-1}$

D. $mol^{1-n}L^{1-n}s^{-1}$

Answer: C

---

46. Given below are two statements :

Statement I : Aniline is less basic than acetamide.

Statement II : In aniline, the pair of electrons on nitrogen atom is delocalised over benzene ring due to resonance and hence less available to a proton.

Choose the most appropriate option ,

    A. Statement I is true but statement II is false

    B. Statement I is false but statement II is true

    C. Both statement I and statement II is true

    D. Both statement I and statement II is false

Answer: B

47. The type of hybridisation and magnetic property og the complex $[MnCl_6]^{3-}$, respectively, are :

A. sp^3d^2 and diamagnetic

B. d^2sp^3 and diamagnetic

C. d^2sp^3 and paramagnetic

D. sp^3d^2 and paramagnetic

Answer: D

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48. The number of geometrical isomers found in the metal complexes $[PtCl_2(NH_3)_2]$, $[Ni(CO)_4]$, $[Ru(H_2O)_3Cl_3]$ and $[CoCl_2(NH_3)_4]^+$ respectively, are :

A. 1, 1, 1, 1

B. 2, 1, 2, 2

C. 2, 0, 2, 2

D. 2, 1, 2, 1

Answer: B

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49. Which one of the following statements is not correct ?

A. Eutrophication indicates that water body is polluted

B. The dissolved oxygen concentration below 6 ppm inhibits fish

growth

C. Eutrophication leads to increase in the oxygen level in water

D. Eutrophication leads to anaerobic conditions

Answer: C

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50. Given below are two statements :

Statement I : Rutherfods's gold foil experiment cannot explain the line spectrum of hydrogen atom.

Statement II : Bohr's model of hydrogen atom contradicts Heisenberg's uncertainity principle.

In the light of the above statements, choose the most appropriate answr from the options given below :

    A. Statement I is false but statement II is true

    B. Statement I is true but statement II is false

    C. Both statement I and statement II is false

    D. Both statement I and statement II is true

Answer: D

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51. Presence of which reagent will affect the reversibility of the following reaction, and change it to a irreversible reaction :

$$CH_4 + I_2 \underset{\text{Reversible}}{\overset{h\nu}{\rightleftharpoons}} CH_3 - I + HI$$
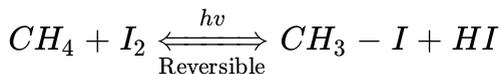
A. HOCl

B. dilute HNO_2

C. Liquid HNO_2

D. Concentrated HNO_3

Answer: D

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52. Which one among the following chemical tests is used to distinguish monosaccharide from disaccharide ?

A. Saliwanoff's test

B. Iodine test

C. Barfoed test

D. Tollen's test

Answer: C

53. Match List-I with List -II :

List-I (Drug)	List-II (Class of Drug)
(a) Furacin	(i) Antibiotic
(b) Arsphenamine	(ii) Tranquilizers
(c) Dimetone	(iii) Antiseptic
(d) Valium	(iv) Synthetic antihistamines

Choose the most appropriate match :

A. (a)-(i), (b)-(iii), (c)-(iv), (d)-(ii)

B. (a)-(iii), (b)-(iv), (c)-(ii), (d)-(i)

C. (a)-(ii), (b)-(i), (c)-(iii), (d)-(iv)

D. (a)-(iii), (b)-(i), (c)-(iv), (d)-(ii)
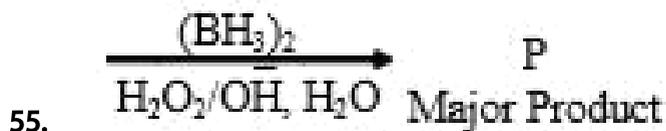
Answer: D

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54. The statement that is INCORRECT about Ellingham diagram is

    A. provides idea about the reaction rate.

    B. provides idea about free energy change

    C. provides idea about changes in the phases during the reaction.

    D. provides idea about reduction of metal oxide.

Answer: D

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$$\overset{OH}{\underset{\displaystyle}{\bigcirc}} \xrightarrow[120°C]{H_3PO_4} \begin{array}{c} A \\ \text{Major Product} \end{array}$$

$$\xrightarrow[H_2O_2/OH,\ H_2O]{(BH_3)_2} \begin{array}{c} P \\ \text{Major Product} \end{array}$$

55.
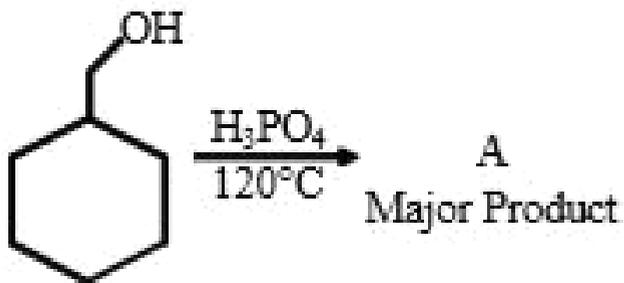
Consider the above reaction and identify the Product P :

A.

B.

C.

D.

Answer: D

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(A)
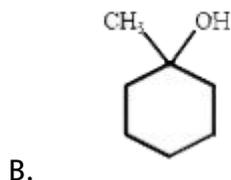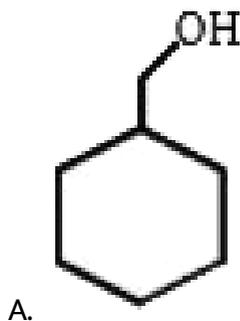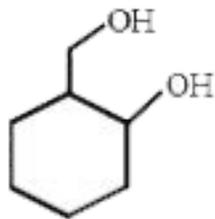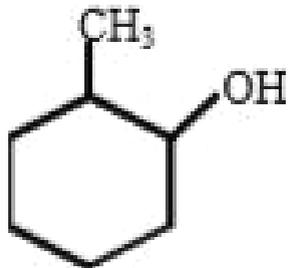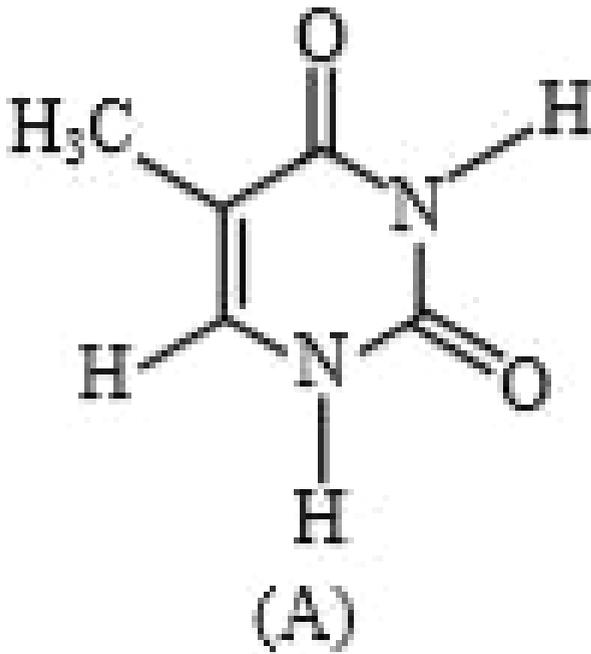
56.

The compound 'A' is a complementary base of _____ in DNA stands.

A. Uracil

B. Guanine

C. Adenine

D. Cytosine

Answer: C

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57. Staggered and eclipsed conformers of ethane are :

A. Polymers

B. Rotamers

C. Enantiomers

D. Mirror images

Answer: B

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58. Match List-I with List -II :

List - I	List - II
(a) NaOH	(i) Acidic
(b) Be(OH)$_2$	(ii) Basic
(c) Ca(OH)$_2$	(iii) Amphoteric
(d) B(OH)$_3$	
(e) Al(OH)$_3$	

:
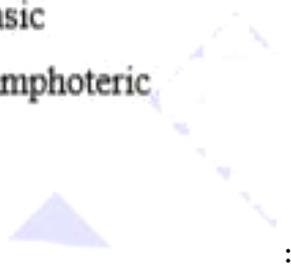
Choose the most appropriate answer from the options given below :

A. (a)-(ii), (b)-(ii), (c)-(iii), (d)-(ii), (e)-(iii)

B. (a)-(ii), (b)-(iii), (c)-(ii), (d)-(i), (e)-(iii)

C. (a)-(ii), (b)-(ii), (c)-(iii), (d)-(i), (e)-(iii)

D. (a)-(ii), (b)-(i), (c)-(ii), (d)-(iii), (e)-(iii)

Answer: B

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$CH_2=CH$ CH_3-CH_2 $HC≡C$
   B   C   D

A

59.

The correct order of stability of given carbocation is :

A. $A > C > B > D$

B. $D > B > C > A$

C. $D > B > A > C$

D. $C > A > D > B$

Answer: A

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60. Given below are two statements : One is labelled as Assertion A and the other labelled as Reason R.
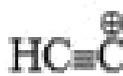
Assertion A : Lithium halides are some what covalent in nature.

Reason R : Lithium possess high polarisation capability.

In the light of the above statements, choose the most appropriate answer from the options given below :

A. A is true but R is false

B. A is false but R is true

C. Both A and R are true but R is NOT the correct explanation of A

D. Both A and R are true but R is the correct explanation of A

Answer: D

61. Which one of the following set of elements can be detected using sodium fusion extract ?

    A. Sulfur, Nitrogen, Phosphorous, Halogens

    B. Phosphorous, Oxygen, Nitrogen, Halogens

    C. Nitrogen, Phosphorous, Carbon, Sulfu

    D. Halogens, Nitrogen, Oxygen, Sulfur

Answer: A

62.
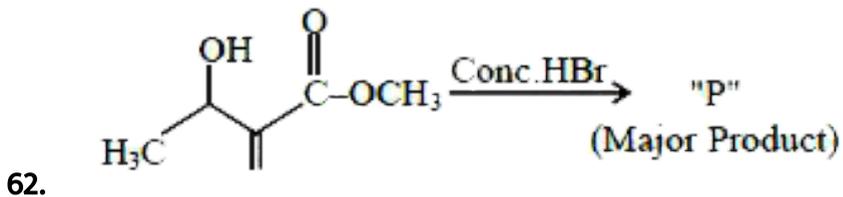
Consider the above reaction, the major product "P" formed is :-

A.

B.

C.

D.
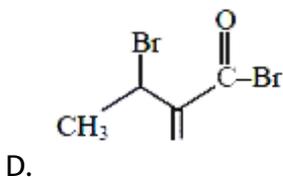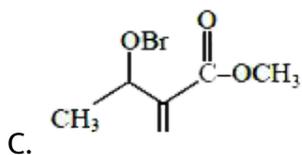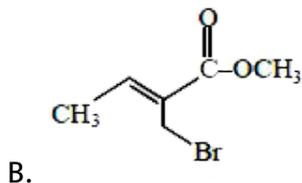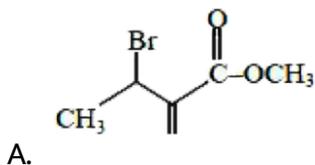
Answer: B

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63. The number of neturons and electrons, respectively, present in the radioative isotope of hydrogen is :-

A. 1 and 1

B. 3 and 1

C. 2 and 1

D. 2 and 2

Answer: C

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64. Match List -I with List II:

List - I		List - II	
(a)	Li	(i)	photoelectric cell
(b)	Na	(ii)	absorbent of CO_2
(c)	K	(iii)	coolant in fast breeder nuclear reactor
(d)	Cs	(iv)	treatment of cancer
		(v)	bearings for motor engines

A. $(a) - (v), (b) - (i), (c) - (ii), (d) - (iv)$

B. $(a) - (v), (b) - (ii), (c) - (iv), (d) - (i)$

C. $(a) - (iv), (b) - (iii), (c) - (i), (d) - (ii)$

D. $(a) - (v), (b) - (iii), (c) - (ii), (d) - (i)$

Answer: D

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65. Given below are two statement : one is labelled as

Assertion A and the other is labelled as Reason R.

Assertion A : $SO_2(g)$ is adsorbed to a large extent than $H_2(g)$ on

activated charcoal.

Reason R : $SO_2(g)$ has a higher critical temperature than $H_2(g)$.

In the light of the above statements, choose the most appropriate

answer from the options given below.

A. Both A and R are correct but R is not the correct explanation for of

A

B. Both A and R are correct and R is the correct explanation of A.
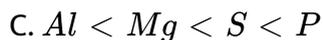
C. A is not correct but R is correct.

D. A is correct but R is not correct.

Answer: B

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66. The CORRECT order of first ionisation enthalpy is :

A. $Mg < S < Al < P$

B. $Mg < Al < S < P$

C. $Al < Mg < S < P$

D. $Mg < Al < P < S$
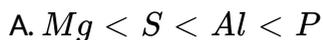
Answer: C

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67. Given below are two statements :

Statement I : Hyperconjugation is a permanent effect.

Statement II: Hyperconjgation is ethyl cation $\left(CH_3 - \overset{+}{C}H_2 \right)$ involves the overlapping of $C_{sp^2} - H_{1s}$ bond with empty 2p orbial of other carbon.

Choose the correct option :

A. Both statement I and statement II are false

B. Statement I is incorrect but statement II is true

C. Statement I is correct but statement II is false

D. Both Statement I and statement II are true.

Answer: C

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68. Given below are two statements :

Statement I: $\left[Mn(CN)_6\right]^{3-}$, $\left[Fe(CN)_6\right]^{3-}$ and $\left[Co(C_2O_4)_3\right]^{3-}$ are d^2sp^3 hybridised.

Statement II: $\left[MnCl_6\right]^{3-}$ and $\left[FeF_6\right]^{3-}$ are paramagnetic and have 4 and 5 unpaired electrons, respectively.

In the light of the above statements, choose the correct answer from the options given below :

A. Statement I is correct but statement II is false

B. Both statement I and statement II are false

C. Statement I is incorrect but statement II is true

D. Both statement I and statement II are are true

Answer: D

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69. To an aqueous solution containing ions such as

Al^{3+}, Zn^{2+}, Ca^{2+}, Fe^{3+}, Ni^{2+}, Ba^{2+} and Cu^{2+} was added conc.

HCl, followed by H_2S.

The total number of cations precipitated during this reaction is/are:
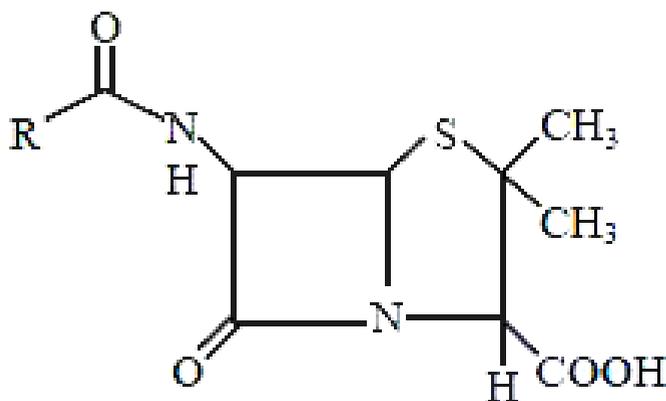
A. 1

B. 3

C. 4

D. 2

Answer: A

70. Given below are two statements :

Statement I : Pencillin is a bacterioustatic type antibiotic.

Statement II: The general structure of Pencillini is :

Choose the correct option:

A. Both statement I and statement II are false

B. Statement I is incorrect but statement II is true

C. Both statement I and statement II are true

D. Statement I is correct but statement II is false

Answer: B

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71. Compound A gives D-Galactose and D-Glucose on hydrolysis. The compound A is :
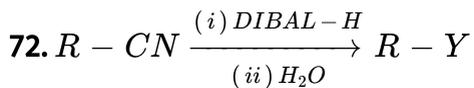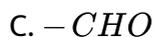
A. Amylose

B. Sucrose

C. Maltose

D. Lactose

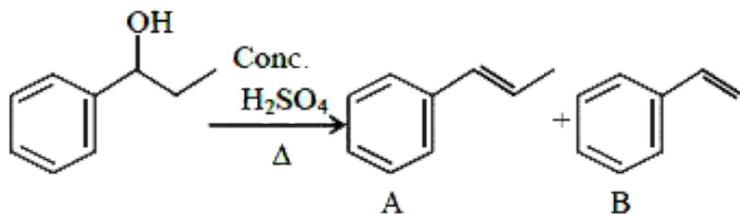**Answer: D**

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72. $R - CN \xrightarrow[\ (ii)\, H_2O\ ]{(i)\, DIBAL - H} R - Y$

Consider the above reaction and identify Y

A. $-CH_2NH_2$

B. $-CONH_2$

C. $-CHO$

D. $-COOH$

Answer: C

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73.

consider the above reaction, and choose the correct statement :

A. The reaction is not possible in acidic medium

B. Both compounds A and B are formed equally

C. Compound A will be the major product

D. Compound B will be the major product

Answer: C

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74. Match List -I with List -II:

List - I (compound)		List - II (effect/affected species)	
(a)	Carbon monoxide	(i)	Carcinogenic
(b)	Sulphur dioxide	(ii)	Metabolized by pyrus plants
(c)	Polychlorinated biphenyls	(iii)	Haemoglobin
(d)	Oxides of Nitrogen	(iv)	Stiffness of flower buds

Choose the correct answer from the option given below :

A. $(a) - (iii), (b) - (iv), (c) - (i), (d) - (ii)$

B. $(a) - (iv), (b) - (i), (c) - (iii), (d) - (ii)$

C. $(a) - (i), (b) - (ii), (c) - (iii), (d) - (iv)$

D. $(a) - (iii), (b) - (iv), (c) - (ii), (d) - (i)$

Answer: A

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75. If the Thompson model of the atom was correct, then the result of Rutherford's gold foil experiment would have been :

A. All of the α-particles pass through the gold foil without decrease in speed.

B. $\alpha -$ Particles are deflected over a wide range of angles

C. All $\alpha -$ practice get bounced back by $180°$

D. $\alpha -$ Particles pass through the gold foil deflected by small angles and with reduced speed.

Answer: D

76. Number of Cl = O bonds in chlorous acid, chloric acid and perchloric acid respectively are :

A. 3, 1 and

B. 4,1 and 0

C. 1,1 and 3

D. 1,2 and 3

Answer: C

77. Select the correct statements.

(A) Crystalline solids have long range order.

(B) Crystalline solids are isotropic.

(C) Amorphous solid are sometimes called pseudo solids.

(D) Amorphous solids soften over a range of temperatures.

(E) Amorphous solids have a definite heat of fusion.

Choose the most appropriate answer from the options given below.

A. (A), (B), (E) only
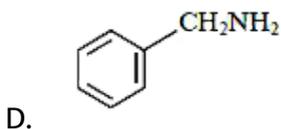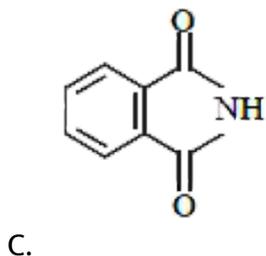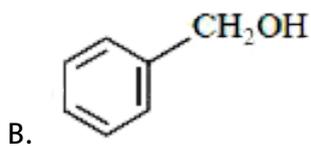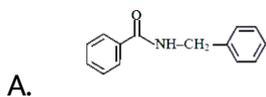
B. (B), (D) only

C. (C), (D) only

D. (A), (C), (D) only

Answer: A

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78. What is A in the following reaction ?
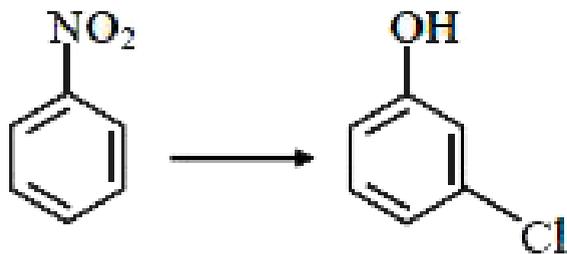

A.

B.

C.

D.
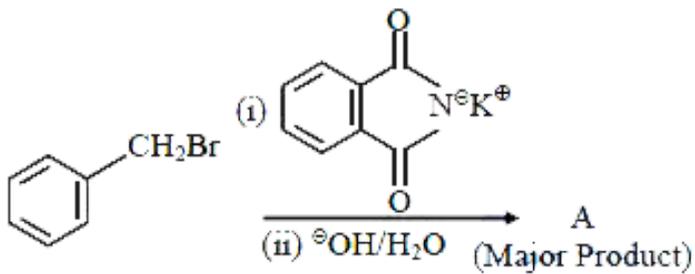
Answer: D

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79. The correct sequence of correct reagents for the following transformation is :-

A. $(i)Fe,HCl$ $(ii)Cl_2,HCl$
$(iii)NaNO_2,HCl,0°C$ $(iv)H_2O/H^+$

B. $(i)Fe,HCl$ $(ii)NaNO_2,HCl,0°C$
$(iii)H_2O/H^+$ $(iv)Cl_2,FeCl_3$

C. $(i)Cl_2,FeCl_3$ $(ii)Fe,HCl$
$(iii)NaON_2,HCl,0°C$ $(iv)H_2O/H^+$

D. $(i)Cl_2,FeCl_3$ $(ii)NaNO_2,HCl,0°C$
$(iii)Fe,HCl$ $(iv)H_2O/H^+$

Answer: C

80. The addition of silica during the extraction of copper from its sulphide ore :-

A. converts copper sulphide into copper silicate

B. converts iron oxide into iron silicate

C. reduces copper sulphide into metallic copper

D. reduces the melting point of the reaction mixture

Answer: B

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Chemistry Section B

1. The total number of unpaired electrons present in $[Co(NH_3)_6]Cl_2$ and $[Co(NH_3)_6]Cl_3$ is
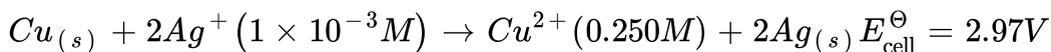
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2. Methylation of 10g of benzene gave 9.2g of toluene. Calculate the percentage yield of toluene _____(Nearest integer)

3. The number of acyclic structural isomers (including geometrical isomers) for pentene are ____

4. Assume a cell with the following reaction

$$Cu_{(s)} + 2Ag^+ \left(1 \times 10^{-3}M\right) \rightarrow Cu^{2+}(0.250M) + 2Ag_{(s)} \, E^{\ominus}_{\text{cell}} = 2.97V$$

E_{cell} for the above reaction is _____V (Nearest integer). [Given: log 2.5= 0.3979, T=298K]

5. Value of K_p for the equilibrium reaction $N_2O_{4(g)} \Leftrightarrow 2NO_{2(g)}$ at $288K$ is 47.9. The K_C for this reaction at same temperature is _____(Nearest integer) $\left(R = 0.083Lbar\,K^{-1}mol^{-1}\right)$

6. If the standard molar enthalpy change for combustion of graphite powder is $-2.48 \times 10^2 kJmol^{-1}$, the amount of heat generated on combustion of 1g of graphite powder is _____kJ. (Nearest integer).

7. A copper complex crystallising in a CCP lattice with a cell edge of 0.4518 nm has been revealed by employing X-ray diffraction studies. The density of a copper complex is found to be $7.62gcm^{-3}$. The molar mass of copper complex is _____$gmol^{-1}$ (Nearest integer) [Given: $N_A = 6.022 \times 10^{23}mol^{-1}$]

8. Number of electrons that Vanadium (Z=23) has in p-orbitals is equal to

_____

9. $N_2O_{5(g)} \rightarrow 2NO_{2(g)} + \frac{1}{2}O_{2(g)}$. In the above first order reaction the initial concentration of N_2O_5 is $2.40 \times 10^{-2} molL^{-1}$ at 318 K. The concentration of N_2O_5 after 1 hour was $1.60 \times 10^{-2} molL^{-1}$. The rate constant of the reaction at 318K is _____ $\times 10^{-3} min^{-1}$. (Nearest integer) [Given: log3= 0.477, log 5= 0.699]

10. If the concentration of glucose $(C_6H_{12}O_6)$ in blood is $0.72 gL^{-1}$, the molarity of glucose in blood is ____ $\times 10^{-3} M$. (Nearest integer) [Given: Atomic mass of C=12, H=1, O=16u]

11. A system does 200 J of work and at the same time absorbs 150 J of heat. The magnitude of the change in internal energy is _____ J. (Nearest integer)

12. An accelerated electron has a speed of $5 \times 10^6 ms^{-1}$ with an uncertainty of 0.02%. The uncertainty in finding its location while in motion is $x \times 10^{-9}$ m. The value of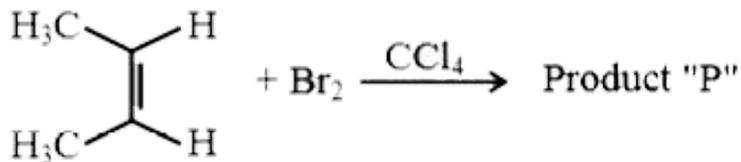 x is _____ . (Nearest integer) [Use mass of electron $= 9.1 \times 10^{-31} kg, h = 6.63 \times 10^{-34} Js, \pi = 3.14$]

13. Number of electrons present in 4f orbital of Ho^{3+} ion is _____ . (Given Atomic No. of Ho = 67)

$$H_3C \diagdown \diagup H$$
$$ \diagup\diagdown + Br_2 \xrightarrow{\ CCl_4\ } Product\ "P"$$
$$H_3C \diagup \diagdown H$$

14.

Consider the above chemical reaction. The total number of stereoisomers possible for Product 'P' is _____ .

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15. For a chemical reaction $A \rightarrow B$, it was found that concentration of B is increased by $0.2\ mol L^{-1}$ in 30 min. The average rate of the reaction is _____ $\times 10^{-1} mol L^{-1} h^{-1}$. (in nearest integer)

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16. The number of significant figures in 0.00340 is _____ .

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17. Assuming that $Ba(OH)_2$ is completely ionised in aqueous solution under the given conditions the concentration of H_3O^+ ions in 0.005 M aqueous solution of $Ba(OH)_2$ at 298 K is _____ $\times 10^{-12} mol L^{-1}$. (Nearest integer)

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18. 0.8 g of an organic compound was analysed by Kjeldahl's method for the estimation of nitrogen. If the percentage of nitrogen in the compound was found to be 42%, then _____ mL of 1 M H_2SO_4 would have been neutralized by the ammonia evolved during the analysis.

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19. When 3.00 g of a substance 'X' is dissolved in 100 g of CCl_4, it raises the boiling point by 0.60 K. The molar mass of the substance 'X' is _____

$g\ mol^{-1}$. (Nearest integer).

[Given Kb for CCl_4 is 5.0 K kg mol^{-1}]

20. An LPG cylinder contains gas at a pressure of 300 kPa at $27°C$. The cylinder can withstand the pressure of 1.2×10^6Pa. The room in which the cylinder is kept catches fire. The minimum temperature at which the bursting of cylinder will take place is _____ $°C$. (Nearest integer)

21. The density of NaOH solution is $1.2gcm^{-3}$. The molality of this solution is _____ m.

(Round off to the Nearest Integer)

[Use : Atomic masses : Na : 23.0 u O : 16.0 u H : 1.0 u]

Density of H_2O : $1.0gcm^{-3}$]

22. CO_2 gas adsorbs on charcoal following Freundlich adsorption isotherm. For a given amount of charcoal, the mass of CO_2 adsorbed becomes 64 times when the pressure of CO_2 is doubled.

The value of n in the Freundlich isotherm equation is _____ $\times 10^{-2}$.

(Round off to the Nearest Integer)

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23. The conductivity of a weak acid HA of concentration 0.001 mol L^{-1} is $2.0 \times 10^{-5} Scm^{-1}$. If $\Lambda_m^0(HA) = 190Scm^2mol^{-1}$, the ionization constant (K_a) of HA is equal to _____ $\times 10^{-6}$.

(Round off to the Nearest Integer)

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24. 1.46 g of a biopolymer dissolved in a 100 mL water at 300 K exerted an osmotic pressure of 2.42×10^{-3} bar.

The molar mass of the biopolymer is _____ $\times 10^4 gmol^{-1}$. (Round off to the Nearest Integer)

25. An organic compound is subjected to chlorination to get compound A using 5.0 g of chlorine. When 0.5 g of compound A is reacted with $AgNO_3$ [Carius Method], the percentage of chlorine in compound A is _____ when if forms 0.3849 g of AgCl. (Round off to the Nearest Integer) (Atomic masses of Ag and Cl are 107.87 and 35.5 respectively)

26. The number of geometrical isomers possible in triamminetrinitrocobalt (III) is X and in trioxalatohromate (III) is Y. Then the value of X + Y is _____ .

27. In gaseous triethyl amine "-C-N-C-" bond angle is _____ degree.

28. For water at $100°C$ and 1 bar, $\Delta_{vap}H - \Delta_{vap}U =$ _____ $\times 10^2 Jmol^{-1}$.

(Round off to the Nearest Integer)

[Use : $R = 8.31 Jmol^{-1}K^{-1}$]

[Assume volume of $H_2O(l)$ is much smaller than volume of $H_2O(g)$. Assume $H_2O(g)$ treated as an ideal gas]

29. $PCl_5 \Leftrightarrow PCl_3 + Cl_3$ $K_c = 1.844$

3.0 moles of PCl_5 is introduced in a 1 L closed reaction vessel at 380 K. The number of moles of PCl_5 at equilibrium is _____ $\times 10^{-3}$.

(Round off to the Nearest Integer)

30. The difference between bond orders of CO and $NO^{\oplus}$ is $\dfrac{x}{2}$ where x = _____ .

(Round off to the Nearest Integer)

31. The equilibrium constant for the reaction

$$A(s) \Leftrightarrow M(s) + \frac{1}{2}O_2(g)$$
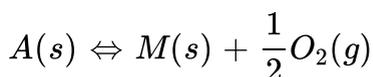
is $K_P = 4$. At equilibrium, the partial pressrue of O_2 is _____ atm.

(Round off to the nearest integer)

32. When 400 mL of $0.2M H_2SO_4$ soltution is mixed with 600 mL of $0.1M$

NaOH solution, the increase in temperature of the final solution is _____

$\times \ 10^{-2}K$. (Round off to the nearest integer).

[Use: $H^+(aq) + OH^-(aq) \rightarrow mol^{-1}$]

$$\Delta H = -57.1 kJmol^{-1}]$$

Specific heat of $H_2O = 4.18 JK^{-1}g^{-1}$

density of $H_2O = 1.0gcm^{-3}$

Assume no change in volume of solutio on mixing.

33. $2SO_2(g) + O_2(g) \rightarrow 2SO_3(g)$
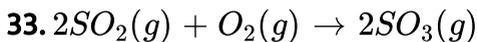
The above reaction is carried out in a vessel starting with partial pressure

$P_{SO_2} = 250m$ bar $P_{O_2} = 750m$ bar and $P_{SO_3} = 0$ bar . When the reaction

is complete, the total pressure in the reaction vessel is ____ m bar.

(Round off to the nearest integer)

34. 10.0 mL of 0.05 M KMnO4 solution was consumed in a titration with

10.0 mL of given oxalic acid dihydrate solution. The strength of given

oxalic acid solution is .... $\times 10^{-2}g/L$.

(Round off to the nearest integer)

35. The total number of electrons in all bonding molecular orbitals of

O_2^{2-} is ....

(Round off to the nearest integer)

36. 3 moles of metal complex with formula $Co(en)_2Cl_3$ gives 3 moles of

silver chloride on treatment with excess of silver nitrate . The secondary

valency of Co in the complex is _____.

(Round off to the nearest integer)

37. In a solvent 50% of an acid HA dimerizes and the rest dissociates. The

van't Hoff factor of the acid is _____ $\times 10^{-2}$.

(Round off to the nearest integer)

(Round off to the nearest integer)

38. The dihedral angle in staggered form of Newman projection of 1, 1, 1-Trichloro ethane is .... degree. (Round off to the nearest integer) (Round off to the nearest integer)

(Round off to the nearest integer)

39. For the first order reaction $A \rightarrow 2B$, 1 mole of reactant A gives 0.2 moles of B after 100 minutes. The half life of the reaction is ...... min. (Round off to the nearest integer).

[Use $\ln 2 = 0.69$, $\ln 10 = 2.3$

Properties of logarithms : $\ln x^y = y \ln x$, $\ln \left(\dfrac{x}{y} \right) = \ln x - \ln y$]

Round off to the nearest integer)

40. For the cell

$$Cu(s)\big|Cu^{2+}(aq)(0.1M)\big|\big|Ag^+(aq)(0.01M)\big|Ag(s)$$
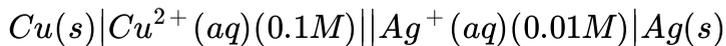
the cell potential $E_1 = 0.3095V$

For the cell

$$Cu(s)\big|Cu^{+2}(aq)(0.01M)\big|\big|Ag^+(aq)(0.\,001M)\big|Ag(s)$$
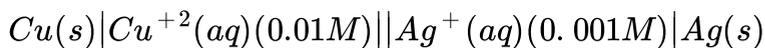
the cell potential = _____ $\times 10^{-2}V$.

(Round off the Nearest Integer).

[Use : $\dfrac{2.303RT}{F} = 0.059$]

Chemistry Section A

1. Calamine and Malachite, respectively, are the ores of

A. Nickel and Aluminium

B. Copper and Iron

C. Zinc and Copper

D. Aluminium and Zinc

Answer:

2. Match List - I with List - II.

List - I		List - II	
(Colloid Preparation Method)		(Chemical Reaction)	
(a)	Hydrolysis	(i)	$2AuCl_3 + 3HCHO + 3H_2O \rightarrow$ $2Au(sol) + 3HCOOH + 6HCl$
(b)	Reduction	(ii)	$As_2O_3 + 3H_2S \rightarrow As_2S_3(sol) + 3H_2O$
(c)	Oxidation	(iii)	$SO_2 + 2H_2S \rightarrow 3S(sol) + 2H_2O$
(d)	Double Decomposition	(iv)	$FeCl_3 + 3H_2O \rightarrow Fe(OH)_3(sol) + 3HCl$

Choose the most appropriate answer from the options given below :

A. a - (i) , b - (iii), c - (ii) , d - (iv)

B. a - (iv), b - (ii) , c - (iii), d - (i)

C. a - (iv), b - (i), c - (iii), d - (ii)

D. a - (i), b - (ii), c - (iv), d - (iii)

Answer:

---

3. Monomer units of Dacron polymer are :

    A. glycerol and terephthalic acid

    B. glycerol and phthalic acid

    C. ethylene glycol and terephthalic acid

    D. ethylene glycol and phthalic acid

Answer:

---

4. The oxide without nitrogen-nitrogen bond is:

    A. N_2O_3

B. N_2O_5

C. N_2O_4

D. N_2O

Answer:

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5. The stereoisomers that are formed by electrophilic addition of bromine to trans-but-2-ene is/ are :

    A. 2 enantionmers and 2 mesomers

    B. 1 racemic and 2 enantiomers

    C. 2 identical mesomers

    D. 2 enantiomers

Answer:

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6. In the given chemical reaction, colors of the Fe^{2+} and Fe^{3+} ions, are respectively :

$$5Fe^{2+} + MnO_4^- + 8H^+ \rightarrow Mn^{2+} + 4H_2O + 5Fe^{3+}$$
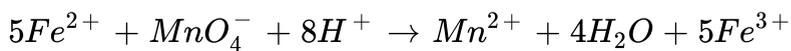
A. Green, Yellow

B. Yellow, Green

C. Green, Orange

D. Yellow, Orange

Answer:

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7. Which one of the following given graphs represents the variation of rate constant (k) with temperature (t) for an endothermic reaction ?

A.

B.

C.

D.
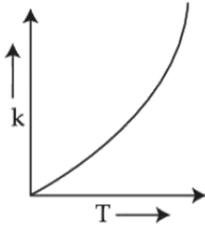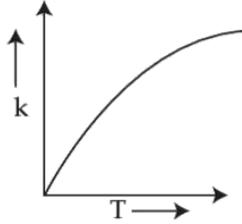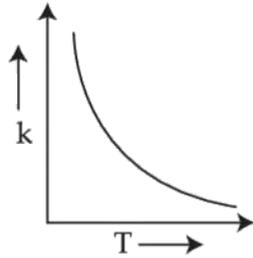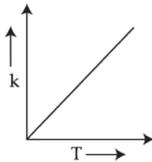
Answer:

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8. Given below are two statements :

Statement I : The nucleophilic addition of sodium hydrogen sulphite to an aldehyde or a ketone involves proton transfer to form a stable ion.

Statement II : The nucleophilic addition of hydrogen cyanide to an aldehyde or a ketone yields amine as final product.

In the light of the above statements, choose the most appropriate answer from the options given below :

   A. Both Statement I and Statement II are true .

   B. Statement I is true but Statement II is false.

   C. Both Statement I and Statement II are false.

   D. Statement I is false but Statement II is true.

Answer:

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9. Identify the element for which electronic con.figuration in +3 oxidation state is $[Ar]3d^5$:

A. Mn

B. Ru

C. Co

D. Fe

Answer:

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10. Which one of the following compounds is aromatic in nature ?

A.

B.

C.

D.
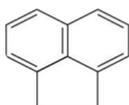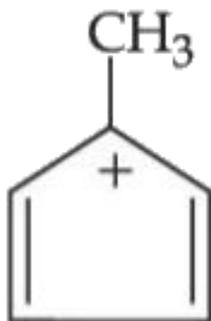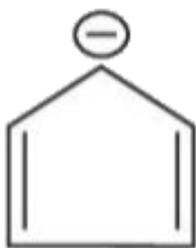
Answer:

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11. Which one of the following gives the most stable Diazonium salt ?

A. $CH_3 - \underset{\underset{H}{|}}{\overset{\overset{CH_3}{|}}{C}} - NH_2$

B.

C. $CH_3 - CH_2 - CH_2 - NH_2$

D.
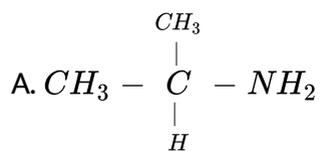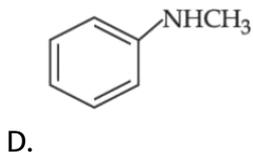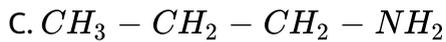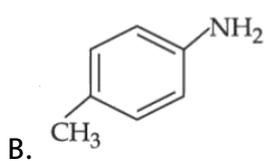
Answer:

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12. The potassium ferrocyanide solution gives a prussian blue colour when added to

A. $FeCl_3$

B. $CoCl_3$

C. $CoCl_2$

D. $FeCl_2$

Answer:

13. In the following sequence of reactions a compound A, (molecular formula $C_6H_{12}O_2$) with a straight chain structure gives a C_4 carboxylic acid. A is :

$$A \xrightarrow[H_3O^+]{LiAlH_4} B \xrightarrow{\text{Oxidation}} C_4 - \quad \text{carboxylic acid}$$

A. $CH_3 - CH_2 - CH_2 - COO - CH_2 - CH_3$

B. $CH_3 - CH_2 - COO - CH_2 - CH_2 - CH_3$

C. $CH_3 - CH_2 - \overset{\overset{\displaystyle OH}{|}}{CH} - CH_2 - O - CH = CH_2$

D. $CH_3 - CH_2 - CH_2 - O - CH = CH - CH_2 - OH$
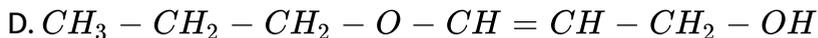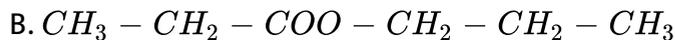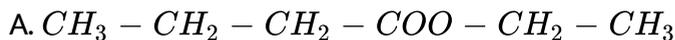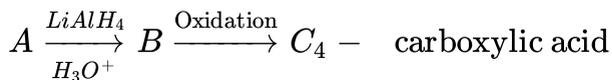
Answer:

14. Number of paramagnetic oxides among the following given oxides is

_____ .

$Li_2O, CaO, Na_2O_2, KO_2, MgO$ and K_2O

A. 0

B. 2

C. 1

D. 3

Answer:

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15. Water sample is called cleanest on the basis of which one of the BOD values given below :

A. 3 ppm

B. 21 ppm

C. 15 ppm

D. 11 ppm

Answer:

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16. Hydrogen peroxide reacts with iodine in basic medium to give:

A. I^-

B. IO_3^-

C. IO^-

D. IO_4^-

Answer:

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17. Experimentally reducing a functional group cannot be done by which one of the following reagents?

A. $Pd - C/H_2$

B. $Pt - C/H_2$

C. Na/H_2

D. Zn/H_2O
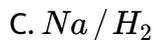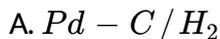
Answer:

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18. The Crystal Field Stabilization Energy (CFSE) and magnetic moment (spin-only) of an octahedral aqua complex of a metal ion (M^{Z+}) are - 0.8 Δ_0 and 3.87 BM, respectively. Identify (M^{Z+}) :

A. V^{3+}

B. Co^{2+}

C. Cr^{3+}

D. Mn^{4+}

Answer:

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19. In the following sequence of reactions,

$$C_3H_6 \xrightarrow{H^+ / H_2O} A \xrightarrow[dil\,KOH]{KIO} B + C$$

The compounds B and C respectively are ·

A. $CH_3I, HCOOK$

B. CHI_3, CH_3COOK

C. CI_3COOK, CH_3I

D. $CI_3COOK, HCOOH$
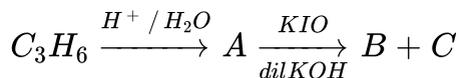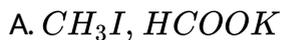
Answer:

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20. Identify A in the following reaction.

$$\text{Aniline} \xrightarrow{K_2Cr_2O_7} A$$

A.

B.

C.

D.
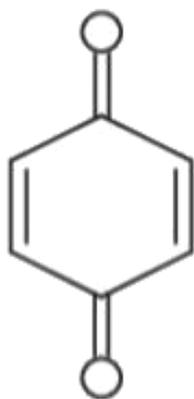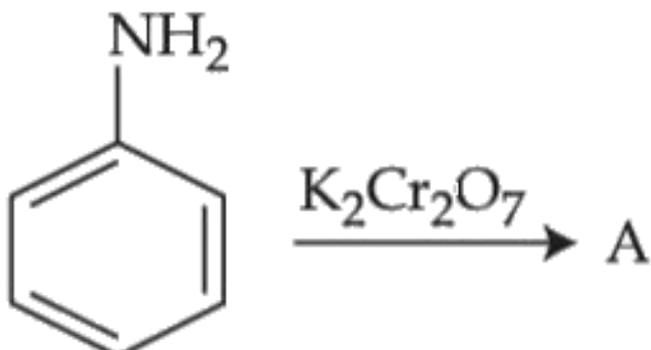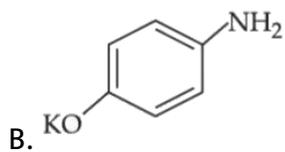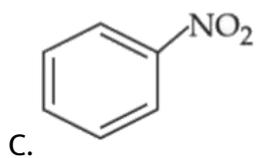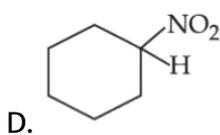
Answer:

21. Which of the following is NOT an example of fibrous protein ?

A. Collagen

B. Albumin

C. Keratin

D. Myosin

Answer:

22. The Eu^{2+} ion is a strong reducing agent in spite of its ground state electronic configuration (outermost : {Atomic number of Eu =63]

A. $4f^7$

B. $4f^6$

C. $4f^6 6s^2$

D. $4f^7 6s^2$

Answer:

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23. Match List - I with List -II

List - I		List - II	
(Parameter)		(Unit)	
(a)	Cell constant	(i)	$S\,cm^2\,mol^{-1}$
(b)	Molar conductivity	(ii)	Dimensionless
(c)	Conductivity	(iii)	m^{-1}
(d)	Degree of dissociation of electrolyte	(iv)	$\Omega^{-1}m^{-1}$

Choose the most appropriate answer from the options given below :

A. $(a) - (iii), (b) - (i), (c) - (ii), (d) - (iv)$

B. $(a) - (ii), (b) - (i), (c) - (iii), (d) - (iv)$

C. $(a) - (iii), (b) - (i), (c) - (iv), (d) - (ii)$

D. $(a) - (i), (b) - (iv), (c) - (iii), (d) - (ii)$

Answer:

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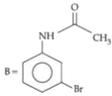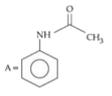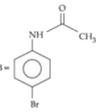**24.** Identify correct A,B and C in the raction sequence given below :

A.

B.

C.

D.
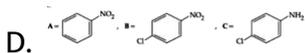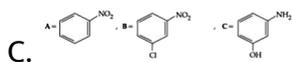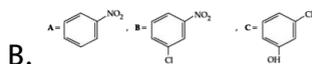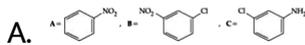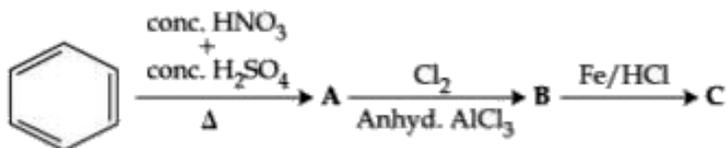
Answer:

25. The major products A and B formed in the following reaction sequence are :
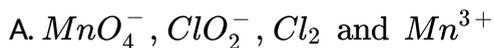

A.

B.

C.

D.
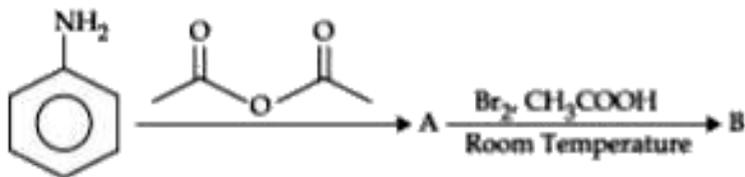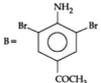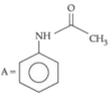
Answer:

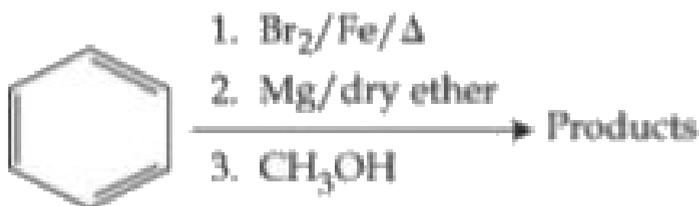26. In which one of the following sets all species show disproportionation reaction ?

A. MnO_4^- , ClO_2^- , Cl_2 and Mn^{3+}
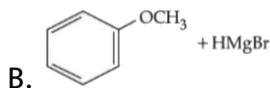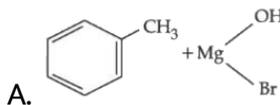
B. $Cr_2O_7^{2-}$, MnO_4^- , ClO_2^- and Cl_2

C. ClO_2^- , F_2, MnO_4^- and $Cr_2O_7^{2-}$

D. ClO_4^- , MnO_4^- , ClO_2^- and F_2
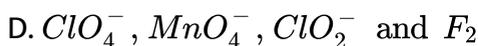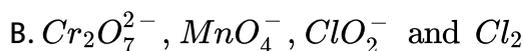
Answer:

27. For the following sequence of reactions , the correct products are
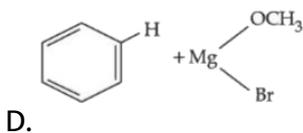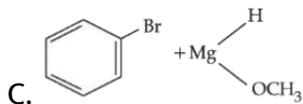
1. $Br_2/Fe/\Delta$
2. $Mg/dry\ ether$
3. CH_3OH

→ Products

A.

B.

C.

D.

Answer:

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28. Given below are two statements : one is labelled as Assertion (A) and the other is labelled as Reason (R).

Assertion (A) : Lithium salts are hydrated

Reason (R): Lithium has higher polarising power than other alkali metal group members .

In the light of the above statements ,choose the most appropriate answer from the options given below :

A. (A) is not correct but (R) is correct.

B. Both (A) and (R) are correct and (R) is the correct explanation of

(A) .

C. (A) is correct but (R) is not correct .

D. Both (A) and (R) are correct but (R) is not the correct explanation

of (A) .

Answer:

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29. The number of S=O bonds present in sulphurous acid ,
peroxodisulphuric acid and pyrosulphuric acid respectively are :

A. 1 , 4 and 4

B. 2 , 3 and 4

C. 2 , 4 and 3

D. 1 , 4 and 3

Answer:

30. The deposition of X and Y on groung surfaces is referred as wet and dry depositions respectively .X and Y are :

A. X= Ammonium salts , $Y = SO_2$

B. $X = SO_2, Y = SO_2$

C. $X = SO_2$, Y= Ammonium salts

D. X= Ammonium salts , $Y = CO_2$

Answer:

31. The incorrect expression among the following is :

A. $InK = \dfrac{\Delta H^\circ - T\Delta S^\circ}{RT}$

B. $K = e^{-\Delta G^\circ / RT}$

C. $\dfrac{\Delta G_{System}}{\Delta S_{Total}} = -\,T$ (at constant P)

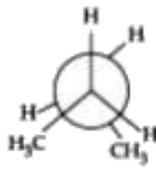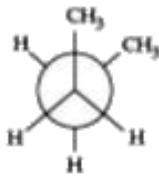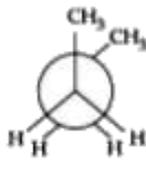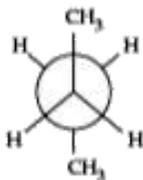D. For isotheramal process $W_{reversible} = nRT\dfrac{\ln(V_f)}{V_i}$

Answer:

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32. Arrange the following conformational isomers of n - butane in order of their increasing potential energy :

A. $I < IV < III < II$

B. $I < III < IV < II$

C. $II < III < IV < I$

D. $II < IV < III < I$

Answer:

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33. Match List -I with List -II :

List - I (Metal Ion)		List - II (Group in Qualitative analysis)	
(a)	Mn^{2+}	(i)	Group - III
(b)	As^{3+}	(ii)	Group - IIA
(c)	Cu^{2+}	(iii)	Group - IV
(d)	Al^{3+}	(iv)	Group - IIB

Choose the most appropriate answer from the options given below :

A. $(a) - (iii), (b) - (iv), (c) - (ii), (d) - (i)$
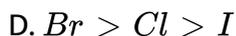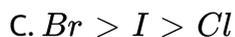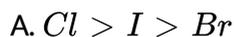
B. $(a) - (i), (b) - (ii), (c) - (iii), (d) - (iv)$

C. $(a) - (iv), (b) - (ii), (c) - (iii), (d) - (i)$

D. $(a) - (i), (b) - (iv), (c) - (ii), (d) - (iii)$

Answer:

---

34. Which one of the following correctly represents the order of stability of oxides , X_2O, (X=halogen)?

A. $Cl > I > Br$

B. $I > Cl > Br$

C. $Br > I > Cl$

D. $Br > Cl > I$

Answer:

---

35. The structures of A and B formed in the following reaction are ,[Ph $= -C_6H_5$]

A.

B.

C.

D.
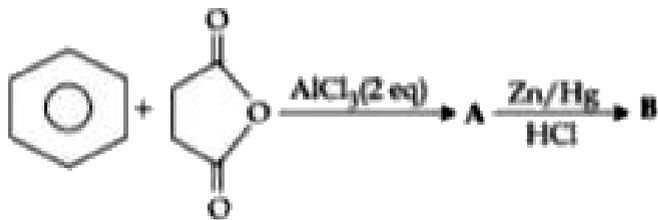
Answer:

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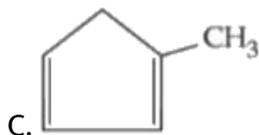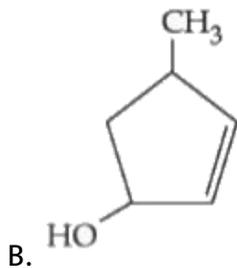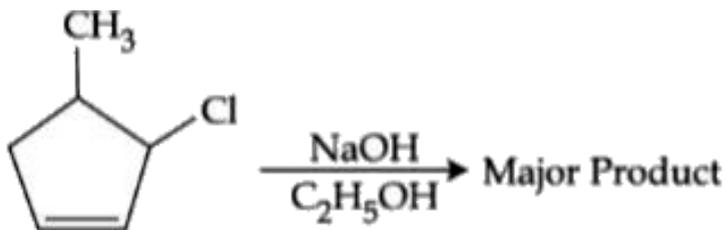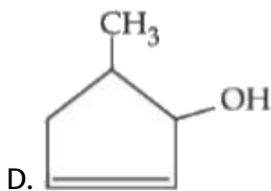**36.** Spin only magnetic moment in BM of $[Fe(CO)_4(C_2O_4)]^+$ is :

A. 1.73

B. 1

C. 5.92

D. 0

Answer:

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37. The major product of the following reaction is :

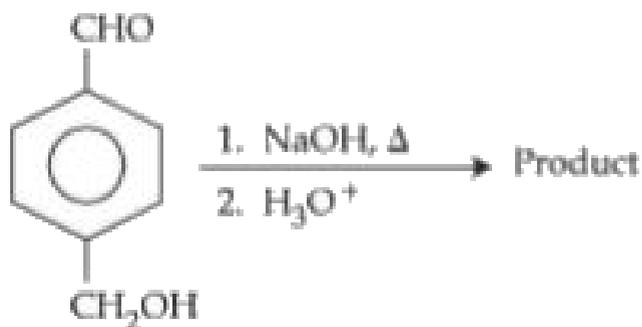$$\xrightarrow[C_2H_5OH]{NaOH} \text{Major Product}$$

A.

B.

C.

D.

Answer:

38. For the reaction given below :

The compound which is not formed as a product in the reaction is a :

A. diol

B. dicarboxylic acid

C. compound with both alcohol and acid funtional groups

D. monocarboxylic acid

Answer:

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39. Which among the following is not a polyester ?

A. Glyptal

B. Dacron

C. PHBV

D. Navolac

Answer:

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40. Which one of the following statements is incorrect ?

A. Bond dissociation enthalpy of H_2 is highest among diatomic gaseous molecules which contain a single bond.

B. At around 2000 K , the dissociation of dihydrogen into its atoms is nealy 8.1 % .

C. Atomic hydrogen is prodeced when H_2 molecules at a high temperature are inrradiated with UV radiation .

D. Dihydrogen is produced on reactin zinc with HCl as well as $NaOH_{(aq)}$.

Answer:

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Chemistry Section B

1. If 80 g ofcopper sulphate $CuSO_4 . 5H_2O$ is dissolved in deionised water to make 5L. Of solution. The concentration of the copper sulphate

solution is $x \times 10^{-3} molL^{-1}$. The value of x is _____.

[Atomic masses Cu : 63.54 u, S : 32 u, O : 16 u, H : 1 u]

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2. The molar solubility of $Zn(OH)_2$ in 0.1 M NaOH solution is $x \times 10^{-18} M$. The value of x is _____. (Nearest integer)

(Given: The solubility product of $Zn(OH)_2$ is 2×10^{-20})

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3. The sum of oxidation states of two silver ions in $[Ag(NH_3)_2][Ag(CN)_2]$ complex is

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4. For the reaction $2NO_2(g) \Leftrightarrow N_2O_4(g)$, when $\Delta S = -176.0 JK^{-1}$ and $\Delta H = -57.8 kJmol^{-1}$, the magnitude of

ΔG at 298 K for the reaction is _____ kJ mol^{-1}. (Nearest integer)

5. An empty LPG cylinder weighs 14.8 kg. When full, it weighs 29.0 kg and shows a pressure of 3.47 atm. In the course of use at ambient temperature, the mass of the cylinder is reduced to 23.0 kg. The final pressure inside the cylinder is atm. (Nearest integer) (Assume LPG to be an ideal gas)

6. The spin-only magn etic moment value of B_2^+ species is _____ $\times 10^{-2}$ BM. (Nearest integer)

[Given : $\sqrt{3} = 1.73$]

7. The number of atoms in 8 g of sodium is $x \times 10^{23}$. The value of x is

_____.

(Nearest integer)

[Given : $N_A = 6.02 \times 10^{23} mol^{-1}$

Atomic mass of Na = 23.0 u]

8. A peptide synthesized by the reactions of one molecule each of Glycine, Leucine, Aspartic acid and Histidine will have _____peptide linkages.

9. If the conductivity of mercury at 0°C is $1.07 \times 10^6 Sm^{-1}$ and the resistance of a cell containing mercury is 0.243Ω, then the cell constant of the cell is $x \times 10^4 m^{-1}$. The value of x is _____ (Nearest integer)

10. A 50 watt bulb emits monochromatic red light of wavelength of 795 nm. The number of photons emitted per second by the bulb is $x \times 10^{20}$. The value of x is _____.

(Nearest integer)

[Given : $h = 6.63 \times 10^{-34} Js$ and $c = 3.0 \times 10^8 ms^{-1}$]

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11. 1.22 g of an organic acid is separately dissolved in 100 g of benzene $\left(K_b = 2.6 K kgmol^{-1}\right)$ and 100 g of acetone $\left(K_b = 1.7 K kgmol^{-1}\right)$. The acid is known to dimerize in benzene but remain as a monomer in acetone. The boiling point of the solution in acetone increases by $0.17°C$. The increase in boiling point of solution in benzene in $°C$ is $x \times 10^{-2}$. The value of x is _____ . (Nearest integer)
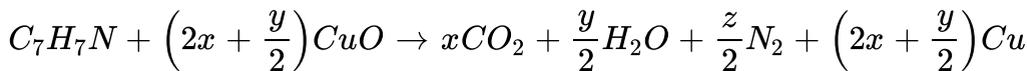
[Atomic mass : $C = 12.0, H = 1.0, O = 16.0$]

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12. The transformation occuring in Duma's method is given below

$$C_7H_7N + \left(2x + \frac{y}{2}\right)CuO \rightarrow xCO_2 + \frac{y}{2}H_2O + \frac{z}{2}N_2 + \left(2x + \frac{y}{2}\right)Cu$$

The value of y is _____. (Integer answer)

13. The empirical formula for a compound with a cubic close packed arrangement of anions and with cations occupying all the octahedral sites in A_xB. The value of x is _____.

14. Sodium oxide reacts with water to produce sodium hydroxide. 20.0 g of sodium oxide is dissolved in 500 mL of water. Neglecting the change in volume, the concentration of the resulting NaOH solution is _____ $\times 10^{-1}M$. (Nearest integer)

[Atomic mass : $a = 23.0, O = 16.0, H = 1.0$]

15. For the reaction $A \rightarrow B$, the rate constant k (in s^{-1}) is given by

$$\log_{10} k = 20.35 - \frac{(2.47 \times 10^3)}{T}$$

The energy of activation in kJ mol^{-1} is _____ . (Nearest integer)

[Given : $R = 8.314 JK^{-1}mol^{-1}$]

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16. According to molecular orbital theory, the number of unpaired electron(s) in O_2^{2-} is _____.

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17. CH_4 is adsorbed on 1g charcoal at $0°C$ following the Freundlich adsorption isotherm. 10.0 mL of CH_4 is adsorbed at 100 mm of Hg, whereas 15.0 mL is adsorbed at 200 mm of Hg. The volume of CH_4 adsorbed at 300 mm of Hg is $10^x mL$. The value of x is _____ $\times 10^{-2}$.

(Nearest integer)

[Use $\log_{10} 2 = 0.3010, \log_{10} 3 = 0.4771$]

18. The pH of a solution obtained by mixing 50 mL of 1 M HCl and 30 mL of 1M NaOH is $x \times 10^{-4}$. The value of x is _____. (Nearest inetger)

$[\log 2.5 = 0.3979]$

19. The value of magnetic quantum number of outermost electron of Zn^+ ion is _____.

20. In the electrolytic refining of blister copper, the total number of main impurities, from the following, removed as anode mud is _____.
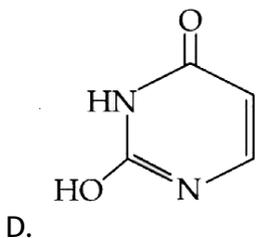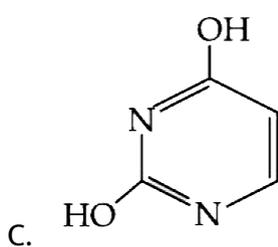
Pb, Sb, Te, Ru, Ag, Au and Pt

Chemistry Section A

1. Out of the following isomeric forms of uracil, which one is present in
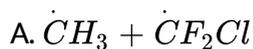
RNA ?

A.

B.

C.

D.
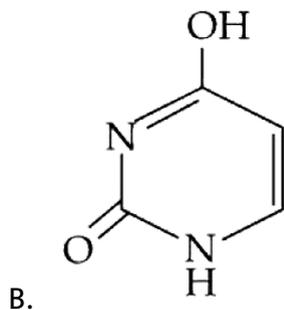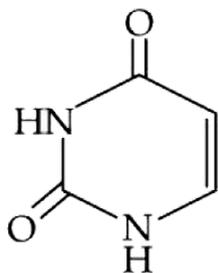
Answer:

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2. The gas 'A' is having very low reactivity reaches to stratosphere. It is non-toxic and non-flammable but dissociated by UV-radiations in stratosphere. The intermediates formed initially from the gas 'A' are :

A. $\dot{C}H_3 + \dot{C}F_2Cl$

B. $Ci\dot{O} + \dot{C}F_2Cl$

C. $\dot{C}l + \dot{C}F_2Cl$

D. $\dot{ClO} + \dot{CH_3}$
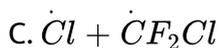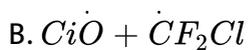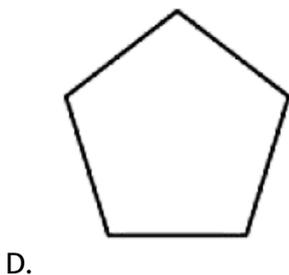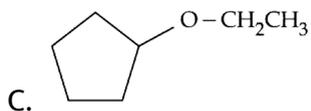
Answer:

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3. Which of the following is not a correct statement for primary aliphatic amines ?

A. Primary amines can be prepared by the Gabriel phthalimide synthesis .

B. The intermolecular association in primary amines is less than the intermolecular association in secondary amines.

C. Primary amines are less basic than the secondary amines

D. Primary amines on treating with nitrous acid solution form corresponding alcohols except methyl amine

Answer:

4. In the following sequence of reaction the P is :

$$+ Mg \xrightarrow[\text{ether}]{\text{dry}} [A] \xrightarrow{\text{ethanol}} \underset{(\text{Major Product})}{P}$$

A.

B.

C.

D.
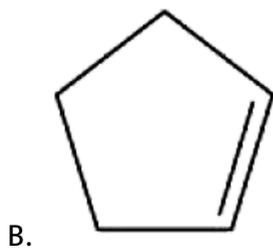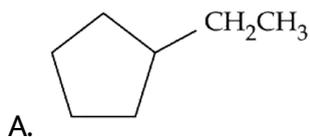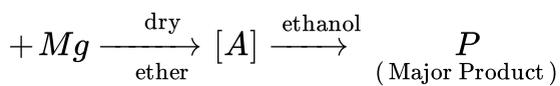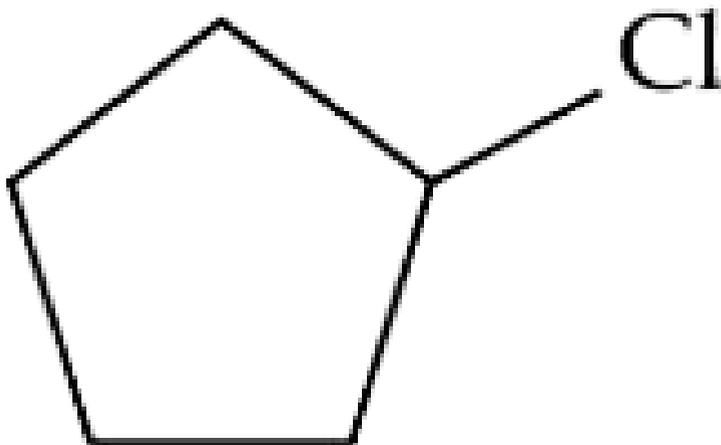
Answer:

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5. The number of water molecules in gypsum, dead burnt and plaster of Paris, respectively are :
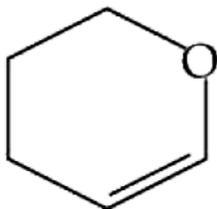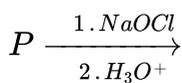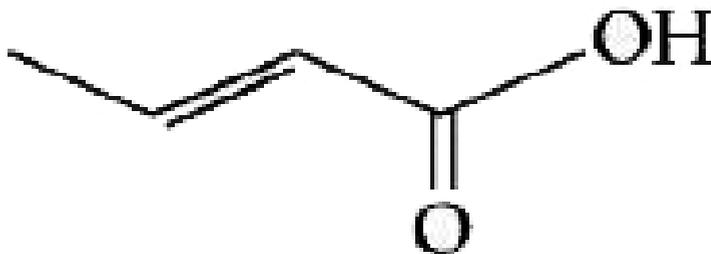
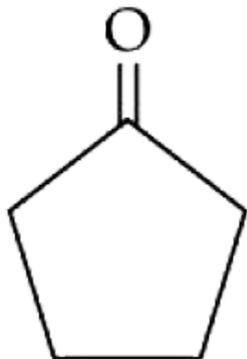A. 0.5, 0 and 2

B. 2,0 and 0.5

C. 5,0 and 0.5

D. 2,0 and 1

Answer:

6. The structure of the starting compound P used in the reaction given below is

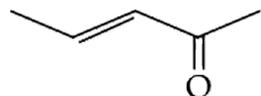$$P \xrightarrow[\;2.H_3O^+\;]{1.NaOCl}$$

A.

B.

C.

D.
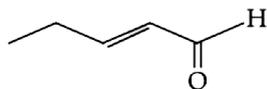
Answer:

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7. In which one of the following molecules strongest back donation of an electron pair from halide to boron is expected ?

A. BI_3

B. BF_3

C. BCI_3

D. BBr_3

Answer:

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8. Match List-I with List-II :

List - I (Species)		List - II (No. of lone pairs of electrons on the central atom)	
(a)	XeF_2	(i)	0
(b)	XeO_2F_2	(ii)	1
(c)	XeO_3F_2	(iii)	2
(d)	XeF_4	(iv)	3

Choose the most appropriate answer from the options given below :

A. (a)-(iv), (b)-(ii), (c)-(i),(d)-(iii)

B. (a)-(iv), (b)-(i), (c)-(ii),(d)-(iii)

C. (a)-(iii), (b)-(iv), (c)-(ii),(d)-(i)

D. (a)-(iii), (b)-(ii), (c)-(iv),(d)-(i)

Answer:

9. Which refining process is generally used in the purification of low melting metals ?
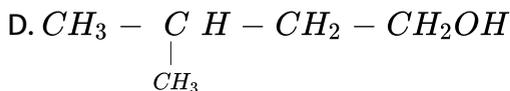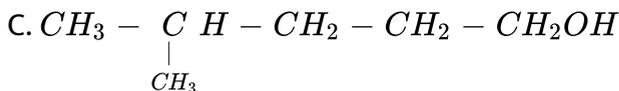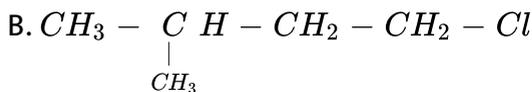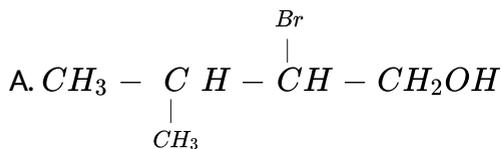
A. Electrolysis

B. Liquation

C. Zone refining

D. Chromatographic method

Answer:

10. The major product of the following reaction is :

$$CH_3-\overset{\underset{|}{CH_3}}{CH}-CH_2-CH_2-\overset{\underset{\|}{O}}{C}-Cl \xrightarrow[\text{(iii) NaNO}_2\text{, HCl}]{\begin{array}{l}\text{(i) alcoholic NH}_3\\\text{(ii) NaOH, Br}_2\\\text{(iv) H}_2\text{O}\end{array}} \text{Major Product}$$

A. $CH_3 - \overset{\underset{|}{CH_3}}{C}H - \overset{\overset{Br}{|}}{C}H - CH_2OH$

B. $CH_3 - \overset{\underset{|}{CH_3}}{C}H - CH_2 - CH_2 - Cl$

C. $CH_3 - \overset{\underset{|}{CH_3}}{C}H - CH_2 - CH_2 - CH_2OH$

D. $CH_3 - \overset{\underset{|}{CH_3}}{C}H - CH_2 - CH_2OH$
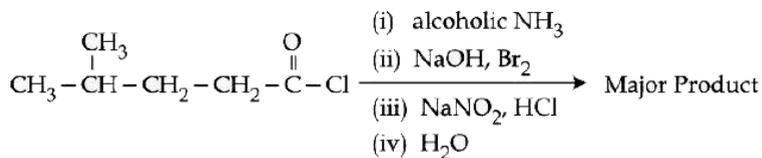
Answer:

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11. In polythionic acid, $H_2S_xO_6$(x=3 to 5) the oxidation state(s) of sulphur is/are
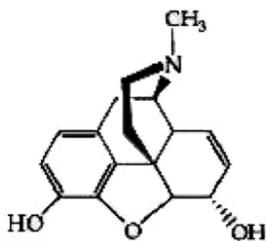
A. $+3$ and $+5$only
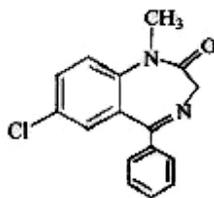
B. $+5$ only

C. 0 and $+5$ only
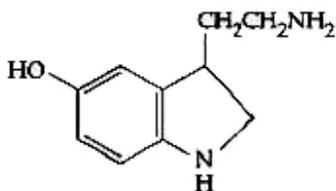
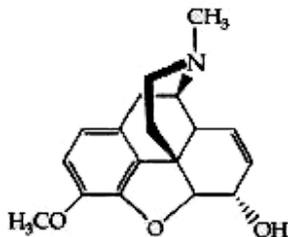D. $+6$ only

Answer:

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(A)

(B)

(C)

(D)

12.

The correct statement about (A), (B) , (C) and (D) is :

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

B. (A), (B) and (C) are narcotic analgesics

C. (B) and (C) are tranquillizers

D. (A) and (D) are tranquillzers

Answer:

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13. Tyndall effect is more effectively shown by
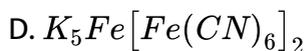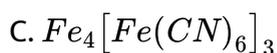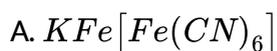
A. lyohobic colloid

B. suspension

C. lyophilic colloid

D. true solution

Answer:

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14. Acidic ferric chloride solution on treatment with excess of potassium ferrocyanide gives a Prussian blue cloured colloidal species. It is

A. $KFe\left[Fe(CN)_6\right]$

B. $HFe\left[Fe(CN)_6\right]$

C. $Fe_4\left[Fe(CN)_6\right]_3$

D. $K_5Fe\left[Fe(CN)_6\right]_2$

Answer:

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15. Deuterium resembles hydrogen in chemical properties but reacts

A. emits β^+ particles

B. reacts just as hydrogen

C. reacts vigorously than hydrogen

D. reacts slower than hydrogen

Answer:

16. The nature of oxides V_2O_3 and CrO is in indexed as 'X' and 'Y' type respectively. The correct set of X and Y is

A. $X =$ amphoteric $\quad Y =$ basic

B. $X =$ basic $\quad Y =$ basic

C. $X =$ basic $\quad Y =$ amphoteric

D. $X =$ acidic $\quad Y =$ acidic

Answer:

17. The unit of the van der Waals gas equation parameter 'a' in

$$\left(P + \frac{an^2}{V^2}\right)(V - nb) = nRT \text{ is :}$$
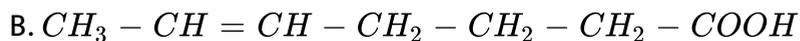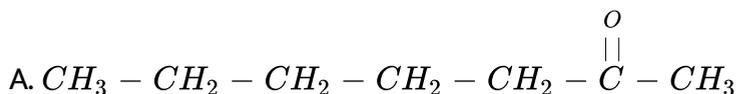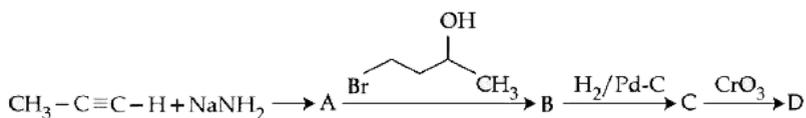
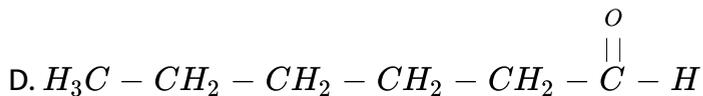A. $kgms^{-2}$

B. dm^3mol^{-1}

C. $kgms^{-1}$

D. $atmdm^6mol^{-2}$

Answer:

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18. In the following sequence of reactions, the final product D is :

$$CH_3-C\equiv C-H+NaNH_2 \longrightarrow A \xrightarrow{\underset{Br}{\overset{OH}{\text{~~~~}}}\overset{CH_3}{}} B \xrightarrow{H_2/Pd-C} C \xrightarrow{CrO_3} D$$

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

B. $CH_3 - CH = CH - CH_2 - CH_2 - CH_2 - COOH$

C. $H_3C - CH = CH - CH(OH) - CH_2 - CH_2 - CH_3$

D. $H_3C - CH_2 - CH_2 - CH_2 - CH_2 - \overset{\overset{\displaystyle O}{\|}}{C} - H$

Answer:

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19. Given below are two statements : one is labelled as Assertion (A) and the other is labelled as Reason (R) :

Assertion (A) : Synthesis of ethyl phenyl ether may be achieved by Williamson synthesis.

Reason (R) : Reaction of bromobenzene with sodium ethoxide yields ethyl phenyl ether. In the light of the above statements, choose the most appropriate answer from the options given below :

  A. Both (A) and (R) are correct and (R) is the correct explanation of

    (A)

B. Both (A) and (R) are correct but (R) is NOT the correct explanation

of (A)

C. (A) is not correct but (R) is correct

D. (A) is correct but (R) is NOT correct

Answer:

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20. Match List-I with List-II :

	List - I (Property)		List - II (Example)
(a)	Diamagnetism	(i)	MnO
(b)	Ferrimagnetism	(ii)	O_2
(c)	Paramagnetism	(iii)	NaCl
(d)	Antiferromagnetism	(iv)	Fe_3O_4

Choose the most appropriate answer from the options given below :

A. (a)-(i), (b)-(iii), (c)-(iv),(d)-(ii)

B. (a)-(iii), (b)-(iv), (c)-(ii),(d)-(i)

C. (a)-(iv), (b)-(ii), (c)-(i),(d)-(iii)

D. (a)-(ii), (b)-(i), (c)-(iii),(d)-(iv)

Answer:

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21. Which one of the following is used to remove most of plutonium from spent nuclear fuel ?
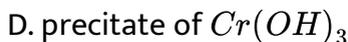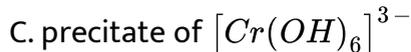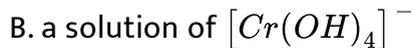
A. O_2F_2

B. ClF_3

C. BrO_3

D. I_2O_5

Answer:

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22. The addition of dilute NaOH to Cr^{3+} salt solution will give :

A. precitate of $Cr_2O_3(H_2O)_n$

B. a solution of $[Cr(OH)_4]^-$

C. precitate of $[Cr(OH)_6]^{3-}$

D. precitate of $Cr(OH)_3$

Answer:

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23. Which one of the following reactions will not yield propionic acid ?

A. $CH_3CH_2COCH_3 + OI^-/H_3O^+$

B. $CH_3CH_2CH_3 + KMnO_4(\text{Heat}), OH^-/H_3O^+$

C. $CH_3CH_2CH_3Br + Mg, CO_2$ dry ether/H_3O^+
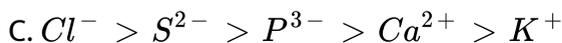
D. $CH_3CH_2CCl_3 + OH^-/H_3O^+$
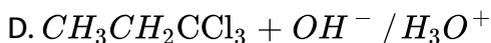
Answer:

24. Choose the correct statement from the following:

  A. The standard enthalpy of formation for alkali metal bromides becomes less negative on descending the group.

  B. Among the alkali metal halides, LiF is least soluble in water.

  C. LiF has least negative standard enthalpy of formation among alkali metal fluorides.

  D. The low solubility of CsI in water is due to its high lattice enthalpy.

Answer:

25. The correct order of ionic radii for the ions, $P^{3-}, S^{2-}, Ca^{2+}, K^+, Cl^-$ is

A. $P^{3-} > S^{2-} > Cl^- > Ca^{2+} > K^+$

B. $P^{3-} > S^{2-} > Cl^- > K^+ > Ca^{2+}$

C. $Cl^- > S^{2-} > P^{3-} > Ca^{2+} > K^+$

D. $K^+ > Ca^{2+} > P^{3-} > S^{2-} > Cl^-$

Answer:

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26. In stratosphere most of the ozone formation is assisted by :
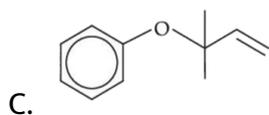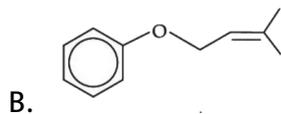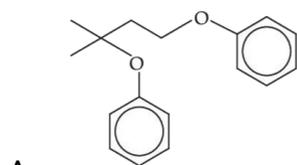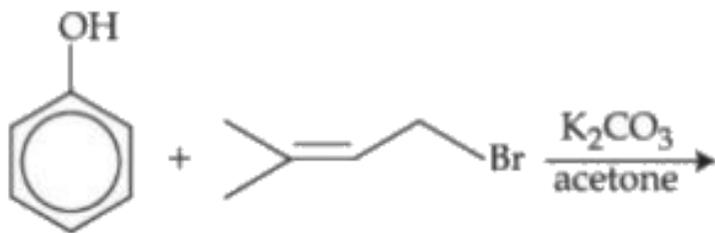
A. visible radiations.

B. γ - rays.

C. cosmic rays.

D. ultraviolet radiation.
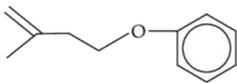
Answer:

27. The major product of the following reaction, if it occurs by S_N2

mechanism is :

A.

B.

C.

D.

Answer: D

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28. Given below are two statements :

Statement I: Ethyl pent-4-yn-oate on reaction with CH_3MgBr gives a $3°$-alcohol.

Statement II : In this reaction one mole of ethyl pent-4-yn-oate utilizes two moles of CH_3MgBr.

In the light of the above statements, choose the most appropriate answer from the options given below:

A. Statement I is true but Statement II is false
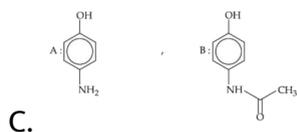
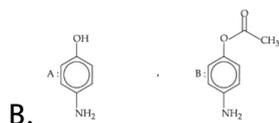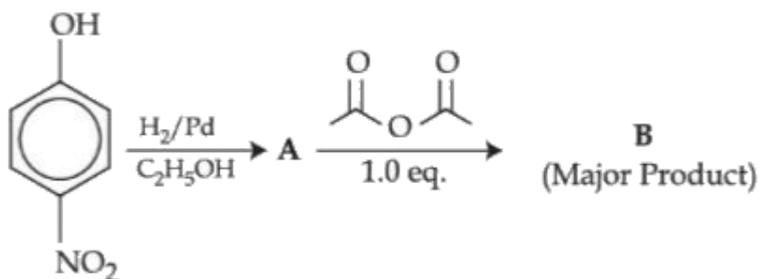B. Statement I is false but Statement II is true
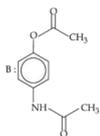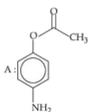
C. Both Statement I and Statement II are false

D. Both Statement I and Statement II are true

Answer:

29. The correct structures of A and B formed in the following reactions are :

A.

B.
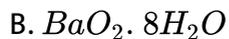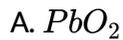

C.

D.

Answer:

30. The oxide that gives H_2O_2 most readily on treatment with H_2O is :

A. PbO_2

B. $BaO_2 . 8H_2O$

C. Na_2O_2

D. SnO_2

Answer:

**31.** Potassium permanganate on heating at 513 K gives a product which is :

A. paramagnetic and green

B. diamagnetic and green

C. diamagnetic and colourless

D. paramagnetic and colourless

Answer:

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32. Which one of the following chemicals is responsible for the production of HCl in the stomach leading to irritation and pain ?

A.

B.

C.

D.

Answer:

▶ **Watch Video Solution**

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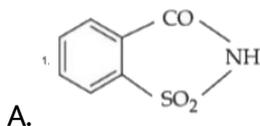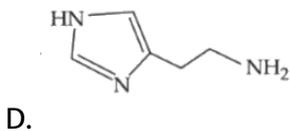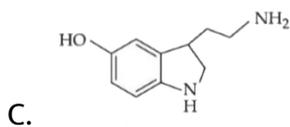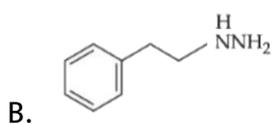
33. Which one of the following is the major product of the given reaction ?

$$\xrightarrow[\text{(iii) } H_2SO_4, \text{ heat}]{\begin{array}{l}\text{(i) } 2CH_3MgBr \\ \text{(ii) } H_3O^+ \end{array}} \text{Major Product}$$

A.

B.

C.

D.
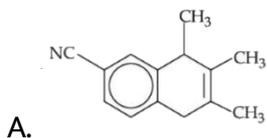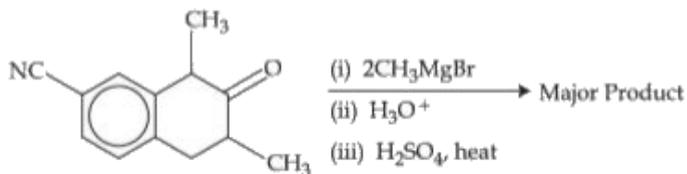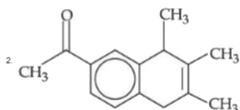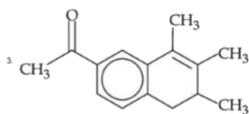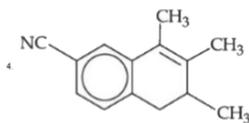
Answer:

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34. Which one of the following is formed (mainly) when red phosphorus is heated in a sealed tube at 803 K?

A. β -Black phosphorus

B. White phosphorus

C. Yellow phosphorus

D. α - Black phosphorus

Answer:

35. Which one of the following tests used for the identification of functional groups in organic compounds does not use copper reagent?

A. Barfoed's test

B. Benedict's test

C. Biuret test for peptide bond

D. Seliwanoff's test

Answer:

36. Match List - I with List - II :

	List - I (Name of ore/mineral)		List - II (Chemical formula)
(a)	Calamine	(i)	ZnS
(b)	Malachite	(ii)	$FeCO_3$
(c)	Siderite	(iii)	$ZnCO_3$
(d)	Sphalerite	(iv)	$CuCO_3 \cdot Cu(OH)_2$

A. $(a) - (iii), (b) - (iv), (c) - (i), (d) - (ii)$

B. $(a) - (iii), (b) - (iv), (c) - (ii), (d) - (i)$

C. $(a) - (iii), (b) - (ii), (c) - (iv), (d) - (i)$

D. $(a) - (iv), (b) - (iii), (c) - (i), (d) - (ii)$

Answer:

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37. Hydrolysis of sucrose gives :

A. α - D-(+)-Glucose and α-D-(-)-Fructose

B. α-D-(+)-Glucose and β -D-(-)-Fructose

C. α-D-(-)-Glucose and α -D-(+)-Fructose

D. α-D-(-)-Glucose and β-D-(-)-Fructose

Answer:

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38. Lyophilic sols are more stable than lyophobic sols because.

A. there is a strong electrostatic repulsion between the negatively

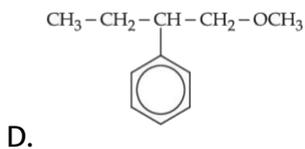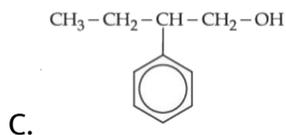charged colloidal particles.

B. the colloidal particles are solvated.

C. the colloidal particles have no charge.

D. the colloidal particles have positive charge.

Answer:

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39. The major product (A) formed in the reaction given below is :

$$CH_3-CH_2-CH-CH_2-Br$$

$$+ CH_3\overset{\ominus}{O} \xrightarrow{CH_3OH} \underset{\text{(Major Product)}}{A}$$

A.
$$CH_3-CH_2-CH-CH_2Br$$

$$OCH_3$$

B.
$$CH_3-CH_2-C=CH_2$$

C.
$$CH_3-CH_2-CH-CH_2-OH$$

D.
$$CH_3-CH_2-CH-CH_2-OCH_3$$
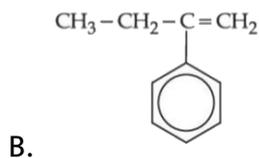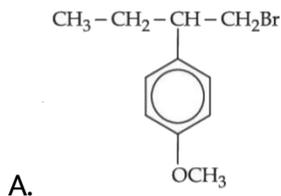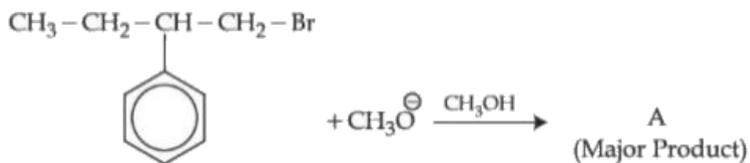
Answer: D

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40. The compound/s which will show significant intermolecular H-bonding is/are

(a) (b) (c)

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

B. (b) only

C. (c) only

D. (a) and (b) only

Answer:

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41. The major component/ingredient of Portland Cement is

A. dicalcmm silicate
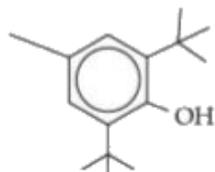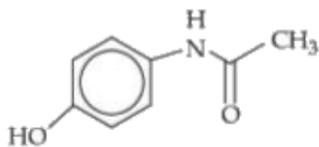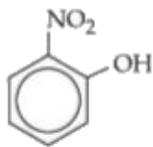
B. tricalcium silicate

C. tricalcium aluminate

D. dicalcitim aluminate

Answer:

42. Given below are two statements : one is labelled as Assertion (A) and the other is labelled as

Reason (R). Assertion (A) : Aluminium is extracted from bauxite by the electrolysis of molten mixture of Al_2O_3 with cryolite.

Reason (R) : The oxidation state of Al in cryolite is + 3.

In the light of the above statements, choose the most appropriate answer from the options given below:

A. (A) is false but (R) is true.

B. (A) is true but (R) is false.

C. Both (A) and (R) are correct but (R) is not the correct explanation of

(A).

D. Both (A) and (R) are correct and (R) is the correct explanation of (A).

Answer:

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43. Monomer of Novolac is

A. 3-Hydroxybutanoic acid.

B. 1,3-Butadiene and styrene.

C. phenol and melamine.

D. o-Hydroxy methylphenol

Answer:

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44. Which one of the following lanthanides exhibits +2 oxidation state with diamagnetic nature ? (Given Z for Nd = 60, Yb = 70, La = 57, Ce = 58)
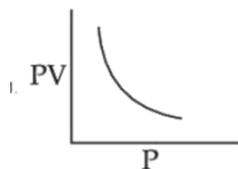
A. Nd

B. Ce

C. La

D. Yb

Answer:

45. Which one of the following is the correct PV vs P plot at constant temperature for an ideal gas ? (P and V stand for pressure and volume of the gas respectively)

A.

B.

C.

D.
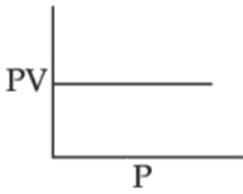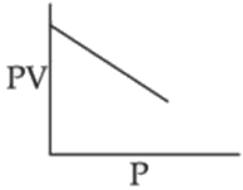
Answer: D

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46. Given below are two statements : one is labelled as Assertion (A) and

the other is labelled as

Reason (R).

Assertion (A) : Metallic character decreases and non-metallic character

increases on moving from left to right in a period.

Reason (R) : It is due to increase in ionisation enthalpy and decrease in electron gain enthalpy, when one moves from left to right in a period. In the light of the above statements, choose the most appropriate answer from the options given below :
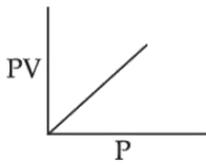
A. Both (A) and (R) are correct and (R) is the correct explanation of (A).

B. (A) is true but (R) is false.

C. Both (A) and (R) are correct but (R) is not the correct explanation of

(A).

D. Both (A) and (R) are correct but (R) is not the correct explanation of

(A).

Answer:

▶ Watch Video Solution

47. Which one of the following compounds contains $\beta - C_1 - C_4$ glycoside linkage ?

A. Amy lose

B. Maltose

C. Sucrose

D. Lactose

Answer:

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

$$CH_3 - \underset{\underset{CH_3}{|}}{\overset{\overset{CH_3}{|}}{C}} - \underset{\underset{OH}{|}}{\overset{|}{C}H} - CH_3 \xrightarrow[\text{a few drops}]{concH_2SO_4} \text{Major product}$$

A.
$$CH_3 - \underset{\underset{CH_3}{|}}{\overset{\overset{CH_3}{|}}{C}} - CH = CH_2$$

B.
$$\underset{CH_3}{\overset{CH_3}{>}}C = CH - CH_3$$

C.

D. $CH_3 - C = CH - CH_2CH_3$
$\quad\quad\quad |$
$\quad\quad\quad CH_3$
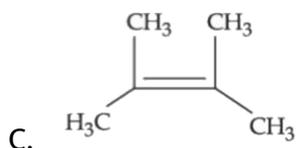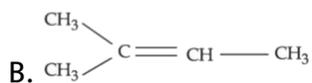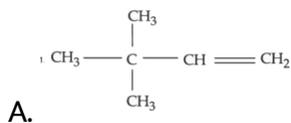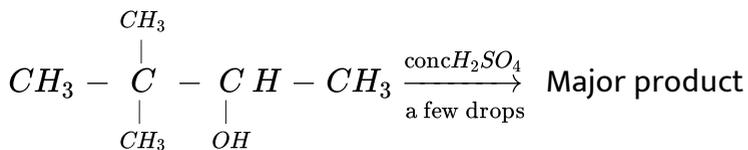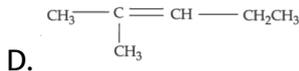
Answer:

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49. Given below are two statements :

Statement I : The process of producing syn-gas is called gasification of coal.

Statement II : The composition of syn-gas is $CO + CO_2 + H_2, (1:1:1)$.

In the light of the above statements, choose the most appropriate answer from the options given below:

A. Both statement I and Statement II are true.

B. Statement I is true but Statement II is false.

C. Statement I is false but Statement II is true.
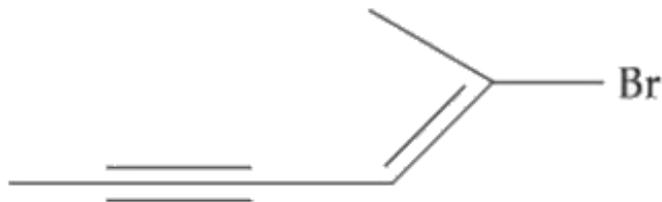
D. Both Statement I and Statement II are false.

Answer:

50. Choose- the correct name for compound given below :

A. (4E)-5-Bromo-hex-4-yn-2-yne

B. (2E)-2-Bromo-hex-2-en-4-yne

C. (4E)-5-Bromo-hex-2-en-4-yne

D. (2E)-2-Bromo-hex-4-yn-2-ene

Answer:

51. BOD values (in ppm) for clean water (A) and polluted water (B) are expected respectively as :

A. $A > 15, B > 47$

B. $A > 50, B < 27$

C. $A < 50, B > 27$

D. $A > 5, B < 15$

Answer:

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52. Given below are two statements : one is labelled as Assertion (A) and the other is labelled as

Reason (R).

Assertion (A) : Treatment of bromine water with propene yields l-bromopropan-2-ol.

Reason (R) : Attack of water on bromonium ion follows Markovnikov rule

and results in l-bromopropan-2-ol. In the light of the above statements, choose the most appropriate answer from the options given below :

A. Both (A) and (R) are true and (R) is the correct explanation of (A).

B. (A) is false but (R) is true.

C. (A) is true but (R) is false.

D. Both (A) and (R) are true but (R) is NOT the correct explanation of (A).

Answer:

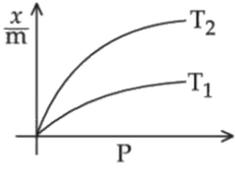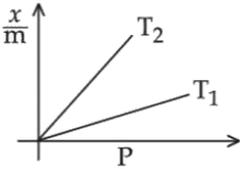53. Select the graph that correctly describes the adsorption isotherms at two temperatures T_1 and $T_2(T_1 > T_2)$ for a gas : (x — mass of the gas adsorbed m-mass of adsorbent P - pressure)
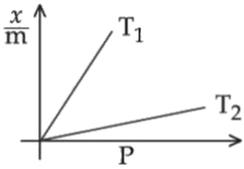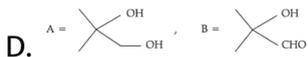
A.

B.

C.

D.
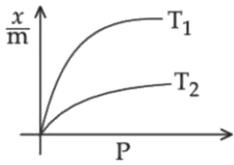
Answer:

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54. The major products A and B in the following set of reactions are :

$$A \xleftarrow[\text{H}_3\text{O}^+]{\text{LiAlH}_4} \quad \begin{array}{c} \text{OH} \\ \diagdown \diagup \\ \text{CN} \end{array} \quad \xrightarrow[\text{H}_2\text{SO}_4]{\text{H}_3\text{O}^+} B$$

A. A = (structure with OH and NH₂), B = (structure with COOH)

B. A = (structure with OH and NH₂), B = (structure with OH and CHO)

C. A = (structure with OH and CHO), B = (structure with OH and CO₂H)

D. A = (structure with OH and OH), B = (structure with OH and CHO)
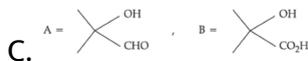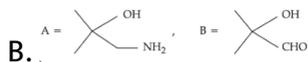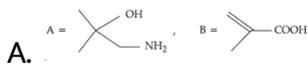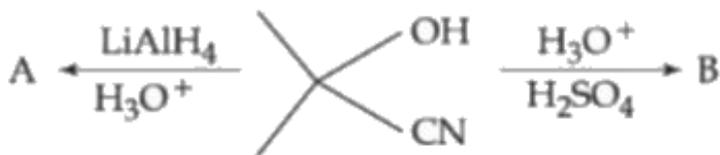
Answer:

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55. The denticity of an organic ligand, biuret is :

A. 6

B. 3

C. 4

D. 2

Answer:

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56. The correct order of reactivity of the given chlorides with acetate in acetic acid is :

A.

B.

C.

D.
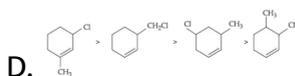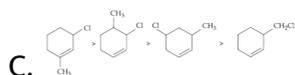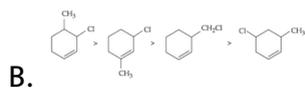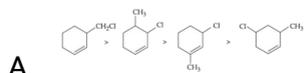
Answer:

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57. In the structure of the dichromate ion, there is

  A. linear symmetrical Cr-O-Cr bond.

  B. linear unsymmetrical Cr — O - Cr bond.

  C. non-linear symmetrical Cr-O —Cr bond.

  D. non-linear unsymmetrical Cr-O - Cr bond.

Answer:

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58. The structure of product C, formed by the following sequence of

$$CH_3COOH + SOCl_2 \rightarrow A \xrightarrow[\text{AlCl}_3]{\text{Benzene}} B \xrightarrow[\text{OH-}]{\text{KCN}} C$$

A.
CH$_2$–CH$_2$CN

B.
H, C, COOH, CH$_3$

C.

D.
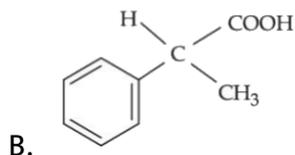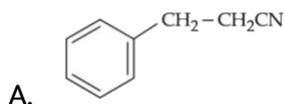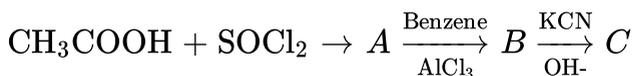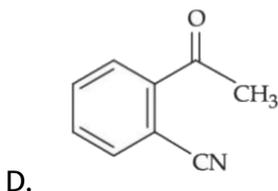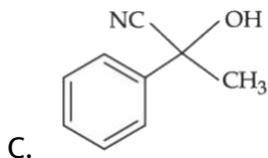
Answer:

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59. Given below are two statements : one is labelled as Assertion (A) and the other is labelled as

Reason (R).

Assertion (A) : A simple distillation can be used to separate a mixture of propanol and propanone.

Reason (R) : Two liquids with a difference of more than $20°$ C in their boiling points can be separated by simple distillations. In the light of the

above statements, choose the most appropriate answer from the options given below :

A. (A) is true but (R) is false.

B. Both (A) and (R) are correct and (R) is the correct explanation of (A).

C. (A) is false but (R) is true.

D. Both (A) and (R) are correct but (R) is not the correct explanation of (A).

Answer:

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60. Which one of the following 0.10 M aqueous solutions will exhibit the largest freezing point depression ?

A. glycine

B. hydrazine

C. $KHSO_4$

D. glucose

Answer:

61. Calamine and Malachite, respectively, are the ores of

A. Nickel and Aluminium

B. Copper and Iron

C. Zinc and Copper

D. Aluminium and Zinc

Answer:

62. Match List - I with List - II.

List - I (Colloid Preparation Method)		List - II (Chemical Reaction)	
(a)	Hydrolysis	(i)	$2AuCl_3 + 3HCHO + 3H_2O \rightarrow$ $2Au(sol) + 3HCOOH + 6HCl$
(b)	Reduction	(ii)	$As_2O_3 + 3H_2S \rightarrow As_2S_3(sol) + 3H_2O$
(c)	Oxidation	(iii)	$SO_2 + 2H_2S \rightarrow 3S(sol) + 2H_2O$
(d)	Double Decomposition	(iv)	$FeCl_3 + 3H_2O \rightarrow Fe(OH)_3(sol) + 3HCl$

Choose the most appropriate answer from the options given below :

A. a - (i) , b - (iii), c - (ii) , d - (iv)

B. a - (iv), b - (ii) , c - (iii), d - (i)

C. a - (iv), b - (i), c - (iii), d - (ii)

D. a - (i), b - (ii), c - (iv), d - (iii)

Answer:

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63. Monomer units of Dacron polymer are :

A. glycerol and terephthalic acid

B. glycerol and phthalic acid

C. ethylene glycol and terephthalic acid

D. ethylene glycol and phthalic acid

Answer:

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64. The oxide without nitrogen-nitrogen bond is:

A. N_2O_3

B. N_2O_5

C. N_2O_4

D. N_2O

Answer:

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65. The stereoisomers that are formed by electrophilic addition of bromine to tmns-but-2-ene is/ are :

A. 2 enantionmers and 2 mesomers

B. 1 racemic and 2 enantiomers

C. 2 identical mesomers

D. 2 enantiomers

Answer:

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66. In the given chemical reaction, colors of the Fe^{2+} and Fe^{3+} ions, are respectively :

$$5Fe^{2+} + MnO_4^- + 8H^+ \rightarrow Mn^{2+} + 4H_2O + 5Fe^{3+}$$
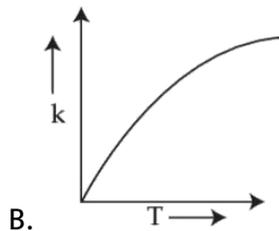
A. Green, Yellow

B. Yellow, Green

C. Green, Orange

D. Yellow, Orange

Answer:

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67. Which one of the following given graphs represents the variation of rate constant (k) with temperature (f) for an endothermic reaction ?

A.

B.

C.

D.

Answer:

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68. Given below are two statements :

Statement I : The nucleophilic addition of sodium hydrogen sulphite to an aldehyde or a ketone involves proton transfer to form a stable ion.

Statement II : The nucleophilic addition of hydrogen cyanide to an aldehyde or a ketone yields amine as final product.

In the light of the above statements, choose the most appropriate answer from the options given below :

A. Both Statement I and Statement II are true .

B. Statement I is true but Statement II is false.

C. Both Statement I and Statement II are false.

D. Statement I is false but Statement II is true.

Answer:

69. Identify the element for which electronic configuration in +3 oxidation state is $[Ar]3d^5$:
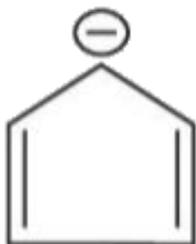
A. Mn

B. Ru

C. Co

D. Fe

Answer:

70. Which one of the following compounds is aromatic in nature ?

A.

B.

C.

D.
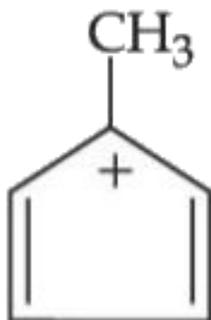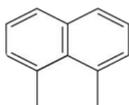
Answer:

71. Which one of the following gives the most stable Diazonium salt ?

A. $CH_3 - \underset{\underset{H}{|}}{\overset{\overset{CH_3}{|}}{C}} - NH_2$

B.

C. $CH_3 - CH_2 - CH_2 - NH_2$

D.
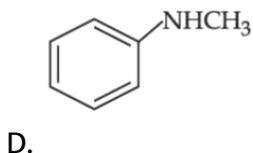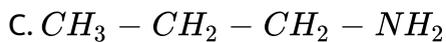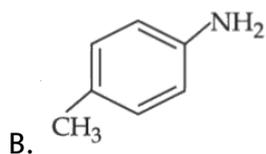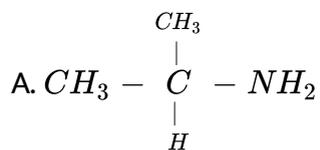
Answer:

72. The potassium ferrocyanide solution gives a prussian blue color when added to ?

A. $FeCl_3$

B. $CoCl_3$

C. $CoCl_2$

D. $FeCl_2$

Answer:

73. In the following sequence of reactions a compound A, (molecular formula $C_6H_{12}O_2$) with a straight chain structure gives a C_4 carboxylic acid. A is :

$$A \xrightarrow[H_3O^+]{LiAlH_4} B \xrightarrow{\text{Oxidation}} C_4 - \quad \text{carboxylic acid}$$

A. $CH_3 - CH_2 - CH_2 - COO - CH_2 - CH_3$

B. $CH_3 - CH_2 - COO - CH_2 - CH_2 - CH_3$

$$\overset{\displaystyle OH}{\underset{\displaystyle |}{}}$$

C. $CH_3 - CH_2 - \overset{OH}{\overset{|}{CH}} - CH_2 - O - CH = CH_2$

D. $CH_3 - CH_2 - CH_2 - O - CH = CH - CH_2 - OH$
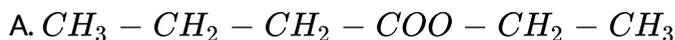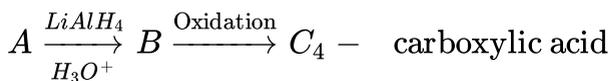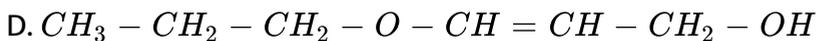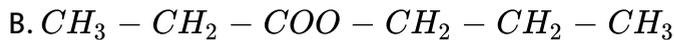
Answer:

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74. Number of paramagnetic oxides among the following given oxides is

_____ .

$Li_2O, CaO, Na_2O_2, KO_2, MgO$ and K_2O

A. 0

B. 2

C. 1

D. 3

Answer:

75. Water sample is called cleanest on the basis of which one of the BOD values given below :

  A. 3 ppm

  B. 21 ppm

  C. 15 ppm

  D. 11 ppm

Answer:

76. Hydrogen peroxide reacts with iodine in basic medium to give:

  A. I^{-}

  B. IO_3^{-}

C. IO^-

D. IO_4^-

Answer:

77. Experimentally reducing a functional group cannot be done by which one of the following reagents?

A. $Pd - C/H_2$

B. $Pt - C/H_2$

C. Na/H_2

D. Zn/H_2O
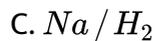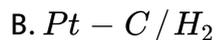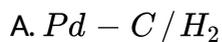
Answer:

78. The Crystal Field Stabilization Energy (CFSE) and magnetic moment (spin-only) of an octahedral aqua complex of a metal ion $\left(M^{Z+}\right)$ are - 0.8 Δ_0 and 3.87 BM, respectively. Identify $\left(M^{Z+}\right)$:

A. V^{3+}

B. Co^{2+}

C. Cr^{3+}

D. Mn^{4+}

Answer:

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79. In the following sequence of reactions,
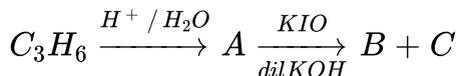
$$C_3H_6 \xrightarrow{H^+ \, / \, H_2O} A \xrightarrow[dil\,KOH]{KIO} B + C$$

The compounds B and C respectively are ·

A. $CH_3I, HCOOK$
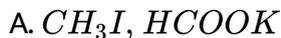
B. CHI_3, CH_3COOK

C. CI_3COOK, CH_3I

D. $CI_3COOK, HCOOH$

Answer:

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80. Identify A in the following reaction.

A.

B.

C.

D.

Answer:

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Chemistry Section B
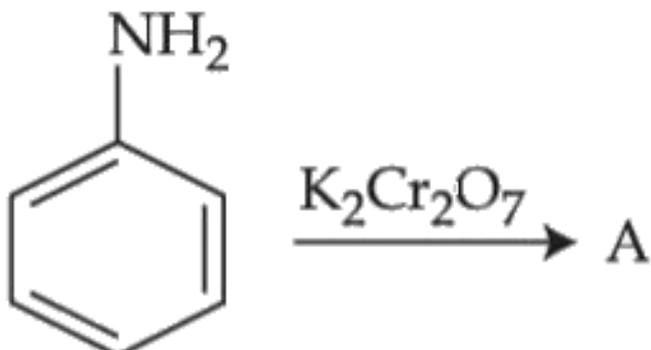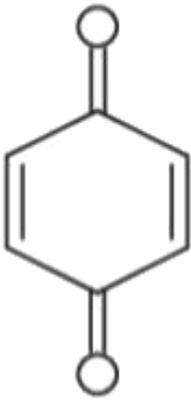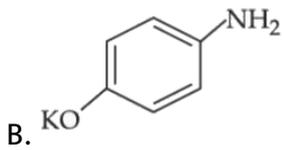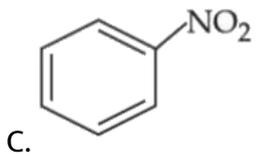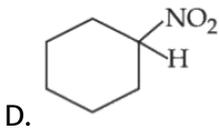
1. The reaction that occurs in a breath analyser, a device used to determine the alcohol level in a person's blood stream is

$$2K_2Cr_2O_7 + 8H_2SO_4 + 3C_2H_6O \rightarrow 2Cr_2(SO_4)_3 + 3C_2H_4O_2 + 2K_2SO_4$$
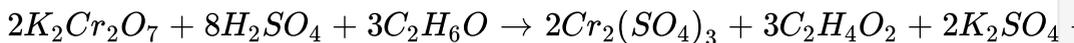
If the rate of appearance of $Cr_2(SO_4)_3$ is 2.67 mol min^{-1} at a particular time , the rate of disappearance of C_2H_6O at the same time is _____mol min^{-1} . (Nearest integer)

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2. 1Kg of an aqueous solution of Sucrose is cooled and maintained at $-4°C$. How much ice will be seperated out if the molality of the solution is 0.75? $K_F(H_2O) = 1.86Kg\ mol^{-1}K$

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3. 200mL of 0.2M HCl is mixed with 300 m L of 0.1M NaOH. The molar heat of neutralization of this reaction is $-57.1kJ$. The increase in temperature in $.°C$ of the system on mixing is $x \times 10^{-2}$. The value of x is _____.

(Nearest integer)

[Given : Specific heat of water $= 4.18 Jg^{-1}K^{-1}$ Density of water $= 1.00 gcm^{-3}$]

(Assume no volume change on mixing)

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4. In Carius method for estimation of halogens, 2 g of an organic compound gave 1.88 g of AgBr. The percentage of bromine in the compoun is _____.(Nearest integer)

[Atomic mass : Ag=108,Br=80]

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5. 1 mol of an octahedral metal complex with formula $MCl_3 \cdot 2L$ on reaction with excess of $AgNO_3$ gives 1 mol of AgCl. The denticity of Ligand L is _____. (Integer answer)

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6. The kinetic energy of an electron in the second Bohr orbit of a hydrogen atom is equal to $\dfrac{h^2}{xma_0^2}$. The value of 10x is _____. (a_0 is radius of Bohr's orbit)

(Nearest integer)

[Given : $\pi = 3.14$]

7. The number of moles of NH_3, that must be added to 2L of 0.80M $AgNO_3$ in order to reduce the concentration of Ag^+ ions to $5.0 \times 10^{-8}M$ ($K_{\text{formation}}$ for $\left[Ag(NH_3)_2\right]^+ = 1.0 \times 10^8$) is _____.

(Nearest integer)

[Assume no volume change on adding NH_3]

8. The number of moles of CuO, that will be utilized in Dumas method for estimating nitrogen in a sample of 57.5g of N,N-dimethylaminopentane is _____ $\times 10^{-2}$. (Nearest integer)

9. When 10mL of an aqueous solution of $KMnO_4$ was titrated in acidic medium , equal volume of 0.1M of an aqueous solution of ferrous sulphate was required for complete discharge of colour. The strength of $KMnO_4$ in grams per litre is _____ $\times 10^{-2}$. (Nearest integer)

[Atomic mass of K=39, Mn=55, O=16]

10. The number of f electrons in the ground state electronic configuration of Np (Z=93) is _____. (Integer answer)

11. When 5.1 g of solid NH_4 HS is introduced into a two litre evacuated flask at $27°C$, 20% of the solid decomposes into gaseous ammonia and hydrogen sulphide. The K_p for the reaction at $27°C$ is $x \times 10^{-2}$. The value of x is _____ (Integer answer)

[Given R = 0.082 L atm K^{-1} mol^{-1}]

12. The resistance of a conductivity cell with cell constant $1.14cm^{-1}$, containing 0.001 M KCl at 298 K is 1500Ω. The molar conductivity of 0.001 M KCl solution at 298 K in S cm^2mol^{-1} is _____ (Integer answer)

13. The first order rate constant for the decomposition of $CaCO_3$, at 700 K is $6.36 \times 10^{-3}s^{-1}$ and activation energy is $209kJ$ mol^{-1}. Its rate constant (in s^{-1}) at 600 K is $x \times 10^{-6}$. The value of x is _____ .(Nearest integer)

[Given

$$R = 8.31 JK^{-1}mol^{-1}, \log 6.36 \times 10^{-3} = -2.19, 10^{-4.79} = 1.62 \times 10^{-5}$$

]

14. Data given for the following reaction is as follows:

$$FeO_{(s)} + C_{(graphite)} \rightarrow Fe_{(s)} + CO_{(g)}$$

$$FeO_{(s)} + C_{(graphite)} \longrightarrow Fe_{(s)} + CO_{(g)}$$
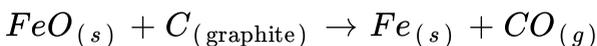
Substance	$\Delta_f H^\circ$ (kJ mol^{-1})	ΔS° (J mol^{-1} K^{-1})
$FeO_{(s)}$	−266.3	57.49
$C_{(graphite)}$	0	5.74
$Fe_{(s)}$	0	27.28
$CO_{(g)}$	−110.5	197.6

The minimum temperature in K at which the reaction becomes

spontaneous is _____ .

(Integer answer)

15. 40 g of glucose (Molar mass=180) is mixed with 200 mL of water. The freezing point of solution is ____ K. (Nearest integer)

[Given : $K_f = 1.86 K kg\text{mol}^{-1}$, Density of water $= 1.00\text{g cm}^{-3}$, Freezing point of water = 273.15 K]

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16. The number of optical isomers possible for $\left[Cr(C_2O_4)_3\right]^{3-}$ is

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17. The number of photons emitted by a monochromatic (single frequency) infrared range finder of power 1 mW and wavelength of 1000 nm, in 0.1 second is x $\times 10^{13}$. The value of r is . (Nearest integer)

$\left(h = 6.63 \times 10^{-34} Js, c = 3.00 \times 10^8 ms^{-1}\right)$

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18. The number of species having non-pyramidal shape among the following is ____.

A. SO_3

B. NO_3^-

C. PCl_3

D. CO_3^{2-}

Answer:

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19. 100 g of propane is completely reacted with 1000 g of oxygen. The mole fraction of carbon dioxide in the resulting mixture is $x \times 10^{-2}$ The value of x is _____ .
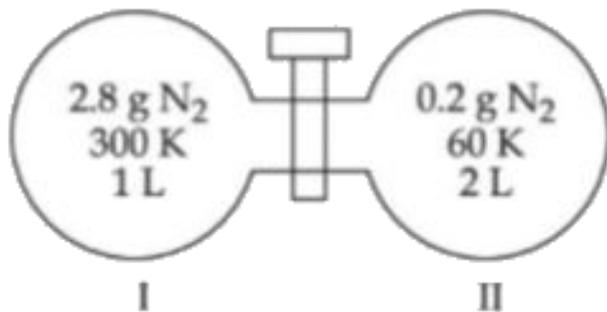
(Nearest integer)

[Atomic weight : H=1.008, C=12.00, O=16.00]

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20. Two flasks I and II shown below are connected by a valve of negligible volume.
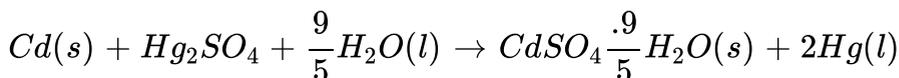

When the valve is opened, the final pressure of the system in bar is $x \times 10^{-2}$ The value of x is _____ (Integer answer)

[Assume - Ideal gas, 1 bar = 10^5 Pa, Molar mass of $N_2 = 28.0$g mol^{-1}, $R = 8.31 Jmol^{-1}K^{-1}$]

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21. Consider the following cell reaction

$$Cd(s) + Hg_2SO_4 + \frac{9}{5}H_2O(l) \rightarrow CdSO_4 \cdot \frac{9}{5}H_2O(s) + 2Hg(l)$$

The value of E^0_{cell} n is 4.315 V at $25°$ C. If $\triangle H° = -825.2 kjmol^{-1}$ the

standard entropy change $\triangle S°$ in J K^{-1} is_____ (Nearest integer)

[Given : Faraday constant = 96487 C mol^{-1}]

22. The total number of reagents from those given below, that can convert nitrobenzene into aniline is_____(Integer answer)

I. Sn - HCl

II. Sn - NH_4OH

III. Fe - HCl

IV. Zn - HCl

V.$H_2 - Pd$

VI. H_2 - Raney Nickel

23. The molarity of the solution prepared by dissolving 6.3 g of oxalic acid $(H_2C_2O_4. 2H_2O)$ in 250 ml of water in mol L^{-1} is x × 10^{-2}M . The value of x is_____ (Nearest integer) [Atomic mass : H : 1.0, C : 12.0, O : 16.0]

24. A_3, B_2 is a sparingly soluble salt of molar mass M $\left(gmol^{-1}\right)$ and solubility x g L^{-1} The solubility product satisfies $K_{sp} = a\dfrac{x}{(M)^5}$. The value of a is_____(Integer answer)

25. According to the following figure, the magnitude of the enthalpy change of the reaction A + B $\rightarrow$ M + N in kj mol^{-1} is equal to_____ (Integer answer)

$x = 20$ kJ mol^{-1}
$y = 45$ kJ mol^{-1}
$z = 15$ kJ mol^{-1}
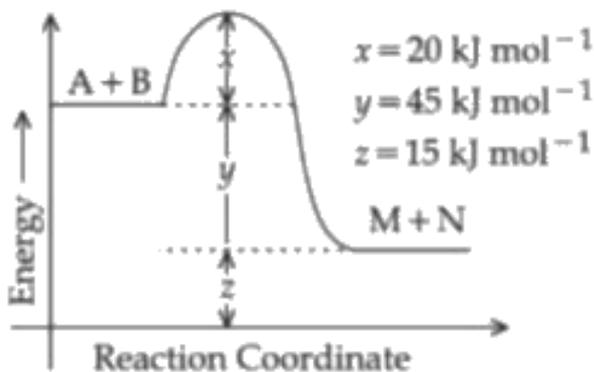
26. Ge (Z = 32) in its ground state electronic configuration has x completely filled orbitals with $m_l = 0$. The value of x is_____

27. the number of halogen/ (s) forming halic (v) acid is_____

28. For a first order reaction, the ratio of the time for 75% completion of a reaction to the time for 50% completion is_____(Integer answer)

29. The number of hydrogen bonded water molecule(s) associated with stoichiometry $CuSO_4. 5H_2O$ is_____

30. Consider the sulphides HgS, PbS, CuS, Sb_2S_3, As_2S_3 and CdS. Number of these sulphides soluble in 50% HNO_3 is_____

31. If 80 g ofcopper sulphate $CuSO_4.5H_2O$ is dissolved in deionised water to make 5L. Of solution. The concentration of the copper sulphate solution is $x \times 10^{-3} molL^{-1}$. The value of x is _____.

[Atomic masses Cu : 63.54 u, S : 32 u, O : 16 u, H : 1 u]

32. The molar solubility of $Zn(OH)_2$ in 0.1 M NaOH solution is $x \times 10^{-18} M$. The value of x is _____. (Nearest integer)

(Given: The solubility product of $Zn(OH)_2$ is 2×10^{-20})

33. The sum of oxidation states of two silver ions in $\left[Ag(NH_3)_2\right]\left[Ag(CN)_2\right]$ complex is

34. For the reaction $2NO_2(g) \Leftrightarrow N_2O_4(g)$, when $\Delta S = -176.0JK^{-1}mol^{-1}$ and $\Delta H = -57.8kJmol^{-1}$, the magnitude of ΔG at 298 K for the reaction is _____ kJ mol^{-1}. (Nearest integer)

35. An empty LPG cylinder weighs 14.8 kg. When full, it weighs 29.0 kg and shows a pressure of 3.47 atm. In the course of use at ambient temperature, the mass of the cylinder is reduced to 23.0 kg. The final

pressure inside the cylinder is atm. (Nearest integer) (Assume LPG to be an ideal gas)

36. The spin-only magn etic moment value of B_2^+ species is _____ $\times 10^{-2}$ BM. (Nearest integer)

[Given : $\sqrt{3} = 1.73$]

37. The number of atoms in 8 g of sodium is $x \times 10^{23}$. The value of x is _____.

(Nearest integer)

[Given : $N_A = 6.02 \times 10^{23} mol^{-1}$

Atomic mass of Na = 23.0 u]

38. A peptide synthesized by the reactions of one molecule each of Glycine, Leucine, Aspartic acid and Histidine will have _____peptide linkages.

39. If the conductivity of mercury at 0°C is $1.07 \times 10^6\,Sm^{-1}$ and the resistance of a cell containing mercury is 0.243Ω, then the cell constant of the cell is $x \times 10^4 m^{-1}$. The value of x is _____ (Nearest integer)

40. A 50 watt bulb emits monochromatic red light of wavelength of 795 nm. The number of photons emitted per second by the bulb is $x \times 10^{20}$. The value of x is _____.

(Nearest integer)

[Given : $h = 6.63 \times 10^{-34}\,Js$ and $c = 3.0 \times 10^8 ms^{-1}$]

1. The interaction energy of London forces between two particles is proportional to r^x, where r is the distance between the particles. The value of x is :
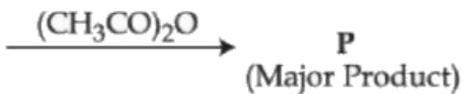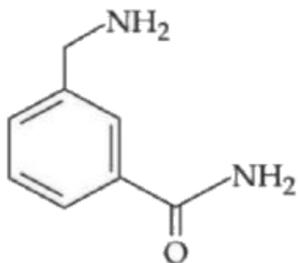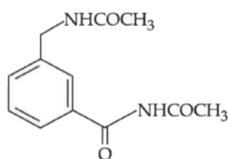
A. 6

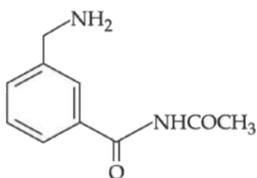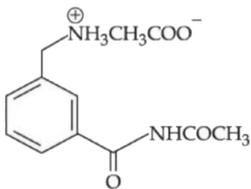B. 3

C. -6

D. -3

Answer:

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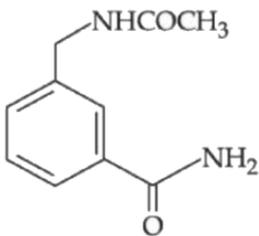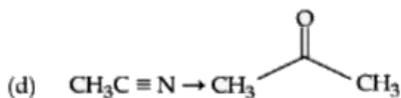
2.

The Major Product in the above reaction is:

A.

B.

C.

D.

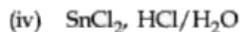**Answer: D**
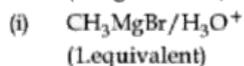
3. Match List - I with List - II.

	List - I (Chemical Reaction)		**List - II** (Reagent used)
(a)	$CH_3COOCH_2CH_3 \rightarrow CH_3CH_2OH$	(i)	CH_3MgBr/H_3O^+ (1.equivalent)
(b)	$CH_3COOCH_3 \rightarrow CH_3CHO$	(ii)	H_2SO_4/H_2O
(c)	$CH_3C \equiv N \rightarrow CH_3CHO$	(iii)	$DIBAL\text{-}H/H_2O$
(d)	$CH_3C \equiv N \rightarrow CH_3\overset{O}{\underset{}{C}}CH_3$	(iv)	$SnCl_2, HCl/H_2O$

Choose the most appropriate match.

A. (a)-(ii), (b)-(iv), (c)-(iii), (d)-(i)

B. (a)-(ii), (b)-(iii), (c)-(iv), (d)-(i)

C. (a)-(iii), (b)-(ii), (c)-(i), (d)-(iv)

D. (a)-(iv),, (b)-(ii), (c)-(iii),, (d)-(i)

Answer:

4. Given below are two statements :

Statement I : Sphalerite is a sulphide ore of zinc and copper glance is a sulphide ore of copper.

Statement II : It is possible to separate two sulphide ores by adjusting proportion of oil to water or by using 'depressants' in a froth flotation method.

Choose the most appropriate answer from the options given below :

    A. Statement I is false but Statement II is true.

    B. Both Statement I and Statement II are true . .

    C. Statement I is true but Statement II is false.

    D. Both Statement I and Statement II are false.

Answer:

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5. Indicate the complex/complex ion which did not show any geometrical isomerism:

A. $\left[CoCl_2(en)_2\right]$

B. $\left[Co(NH_3)_3(NO_2)_3\right]$

C. $\left[Co(NH_3)_4Cl_2\right]^+$

D. $\left[Co(CN)_5(NC)\right]^{3-}$
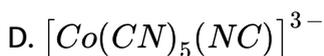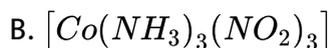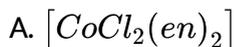
Answer:

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6. Given below are two statements : one is labelled as Assertion (A) and the other is labelled as Reason (R).

Assertion (A) : Photochemical smog causes cracking of rubber.

Reason (R) : Presence of ozone, nitric oxide, acrolein, formaldehyde and peroxyacetyl nitrate in photochemical smog makes it oxidizing.
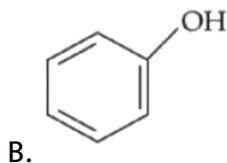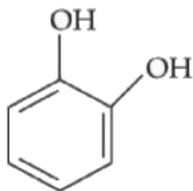
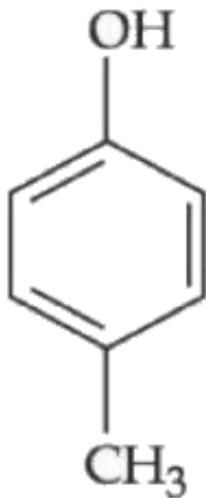Choose the most appropriate answer from the options given below :

A. Both (A) and (R) are true but (R) is not the true explanation of (A)

B. (A) is false but (R) is true.

C. Both (A) and (R) are true and (R) is the true explanation of (A).
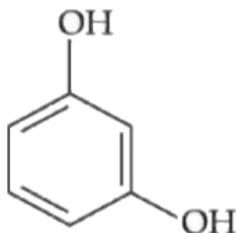
D. (A) is true but (R) is false.

Answer:

7. Which one of the following phenols does not give colour when condensed with phthalic anhydride in presence of conc. H_2SO_4 ?

A.

B.

C.

D.

Answer:

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8. The number of stereoisomers possible for 1,2-dimethyl cyclopropane is :

A. Two

B. Three

C. Four

D. One

Answer:

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9. Chalcogen group elements are .
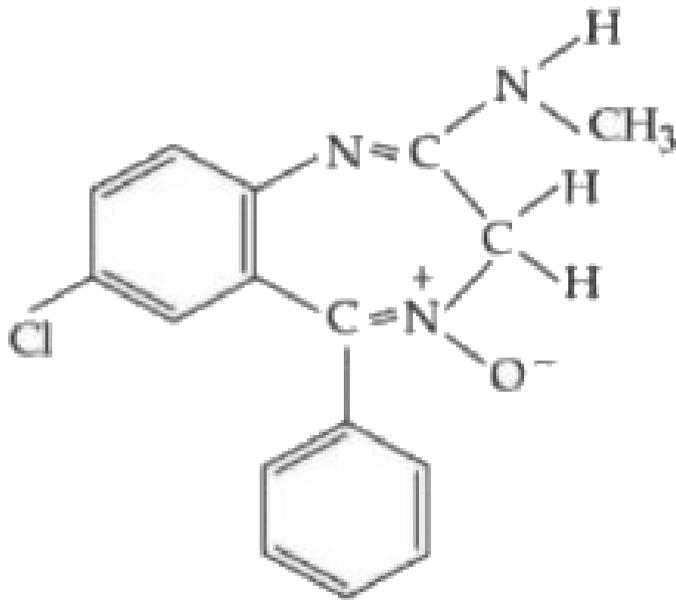
A. S, Te and Pm.

B. O, Ti and Po.

C. Se, Tb and Pu.

D. Se, Te and Po.

Answer:

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Chlordiazepoxide

10.

The class of drug to which chlordiazepoxide with above structure belongs

is :

A. Antacid

B. Tranquilizer

C. Antibiotic

D. Analgesic

Answer:

11. The sol given below with negatively charged colloidal particles is :

A. $AgNO_3$ added to KI solution

B. $Al_2O_3 . \, xH_2O$ in water

C. $FeCl_3$ added to hot water

D. KI added to $AgNO_3$ solution

Answer:

12. Arrange the following Cobalt complexes in the order of increasing Crystal Field Stabilization Energy (CFSE) value.

Complexes   : $\underset{A}{[CoF_6]^{3-}}$, $\underset{B}{[Co(H_2O)_6]^{2+}}$, $\underset{C}{[Co(NH_3)_6]^{3+}}$ and

$\underset{D}{[Co(en)_3]^{3+}}$

Choose the correct option :

A. $B < C < D < A$

B. $A < B < C < D$

C. $B < A < C < D$

D. $C < D < B < A$

Answer:

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13. The bond order and magnetic behaviour of O_2^- ion are, respectively :

A. 1.5 and dimagnetic

B. 1 and paramagnetic.

C. 1.5 and paramagnetic.

D. 2 and diamagnetic.

Answer:

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14. The number of non-ionisable hydrogen atoms present in the final product obtained from the hydrolysis of PCl_5 is :

A. 2

B. 3

C. 0

D. 1

Answer:

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15. Given below are two statements: one is labelled as Assertion (A) and the other is labelled as Reason (R).

Assertion (A) : Heavy water is used for the study of reaction mechanism.

Reason (R) : The rate of reaction for the cleavage of O - H bond is slower

than that of O - D bond.

Choose the most appropriate answer from the options given below :

A. Both (A) and (R) are true but (R) is not the true explanation of (A).

B. (A) is true but (R) is false.

C. (A) is false but (R) is true.

D. Both (A) and (R) are true and (R) is the true explanation of (A).

Answer:

16. Given below are two statements: one is labelled as Assertion (A) and the other is labelled as Reason (R).

Assertion (A) : Barium carbonate is insoluble in water and is highly stable.

Reason (R) : The thermal stability of the carbonates increases with increasing cationic size.

Choose the most appropriate answer from the options given below :
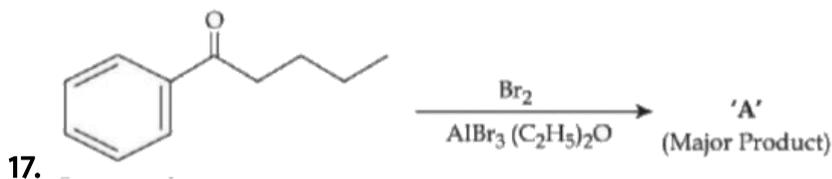
A. (A) is false but (R) is true.

B. (A) is true but (R) is false.

C. Both (A) and (R) are true and (R) is the true explanation of (A).
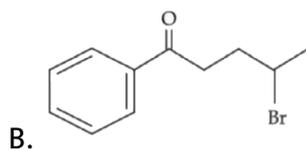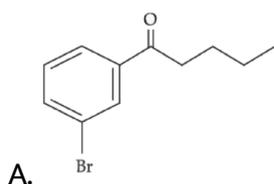
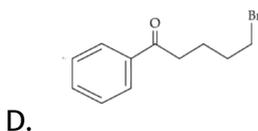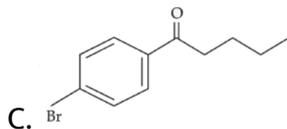D. Both (A) and (R) are true but (R) is not the true explanation of (A).

Answer:

17.

$$\xrightarrow[\text{AlBr}_3 \ (C_2H_5)_2O]{Br_2}$$ 'A' (Major Product)

Consider the given reaction, the Product A is :

A. Br

B. Br

C.

D.

Answer:

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18. Given below are two statements: one is labelled as Assertion (A) and the other is labelled as Reason (R).

Assertion (A) : Sucrose is a disaccharide and a non-reducing sugar.

Reason (R) : Sucrose involves glycosidic linkage between C_1 of D-glucose and C_2 of a-fructose.

Choose the most appropriate answer from the options given below :

    A. Both (A) and (R) are true and (R) is the true explanation of (A).
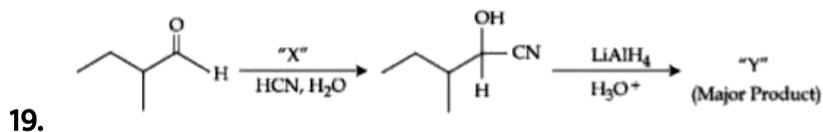
    B. (A) is true but (R) is false.

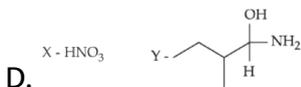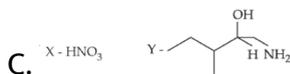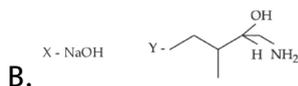   C. Both (A) and (R) are true but (R) is not the true explanation of (A).
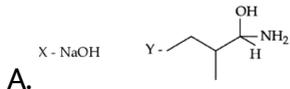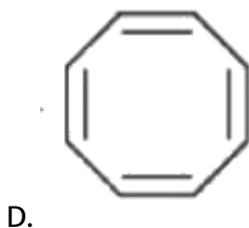
D. (A) is false but (R) is true.

Answer:

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19.
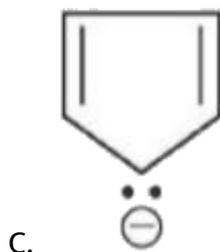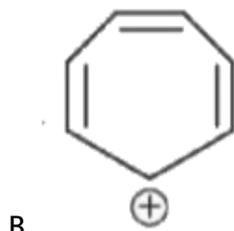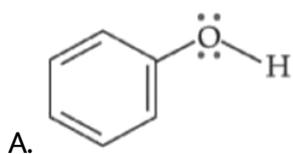

Consider the given reaction, Identify 'X' and 'Y' :

A.

X - NaOH   Y -

B.

X - NaOH   Y -

C.

X - HNO₃   Y -

D.

X - HNO₃   Y -

Answer:

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20. Which one of the following compounds is not aromatic ?

A.

B.

C.

D.

Answer: D

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1. The reaction rate for the reaction

$$[PtCl_4]^{2-} + H_2O = [Pt(H_2O)Cl_3]^- + Cl^-$$
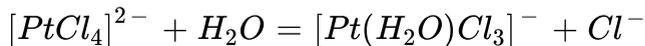
was measured as a function of conccntrations of different species. It was observed that

$$\frac{-d\left[[PtCl_4]^{2-}\right]}{dt} = 4.8 \times 10^{-5}\left[[PtCl_4]^{2-}\right] - 2.4 \times 10^{-3}\left[[Pt(H_2O)Cl_3]^-\right]$$

where square brackets arc used to denote molar concentrations. The equilibrium constant K_c = _____. (Nearest integer)

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2. The overall stability constant of the complex ion $[Cu(NH_3)_4]^{2+}$ is 2.1 $\times 10^{13}$. The overall dissociation constant is y $\times 10^{-14}$. Then y is _____ (Nearest integer)
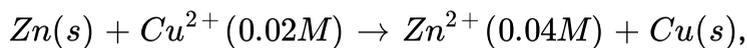
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3. In the sulphur estimation. 0.471 g of an organic compound gave 1.44 g of barium sulfate. The percentage of sulphur in the compound is _____ % . (Nearest integer)

(Atomic Mass of Ba = 137 u)

4. For the galvanic cell,

$$Zn(s) + Cu^{2+}(0.02M) \rightarrow Zn^{2+}(0.04M) + Cu(s),$$

E_{cell} = _____ $\times 10^{-2}$V. (Nearest integer)

5. A chloro compound "A".

(i) forms aldehydes on ozonolysis followed by the hydrolysis.

(ii) when vaporized completely 1.53 g of A, gives 448 mL of vapour at STP.

The number of carbon atoms in a molecule of compound A is _____.

**6.** 83 g of ethylene glycol dissolved in 625 g of water. The freezing point of the solution is ____ K. (Nearest integer)

7. For water mol $\triangle_{vap} H = 41 kj mol^{-1}$ at 373 Kand 1 bar pressure. Assuming that water vapour is an ideal gas fhat occupies a much larger volume than liquid water, the internal energy change during evaporation of water is _____kJ mol^{-1}.

8. The equilibrium constant K_c at 298 K for the reaction

A + B = C + D
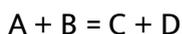
is 100. Starting with an equimolar solution with concentrations of A, B, C

and D all equal to 1 M, the equilibrium concentration of D is $\times 10^{-2}$ M. (Nearest integer)

9. 100 mL of Na_3PO_4 solution contains 3.45 g of sodium. The molarity of the solution is ___ $\times 10^{-2} mol L^{-1}$. (Nearest integer)

10. A metal surface is exposed to 500 nm radiation. The threshold frequency of the metal for photoelectric current is 4.3×10^{14} Hz. The velocity of ejected electron is ___ $\times 10^5 ms^{-1}$. (Nearest integer)