CHEMISTRY

AAKASH INSTITUTE ENGLISH

MOCK TEST 3

Example

1. The percentage of ethyl alchol by weight is 46% in a mixture of ethanol and water. The mole fraction of alcohol in this solution is

A. 0.25

B. 0.75

C. 0.46

D. 0.54

Answer: A

2. The molality of a sulphuric acid solution is 0.6 'mol//kg'. The total weight of the solution which contains 1 kg of solvent.

A. 1000 g

B. 980.3 g

C. 1058.8 g

D. 1013.3 g

Answer: C

3. A solution of urea received from some research laboratory has been marked mole fraction (x) and molality (m) at '10^@C'. While calculating its molality and mole fraction in the laboratory at '24^@C', you will find

A. Mole fraction (X) and molality (m)

B. Mole fraction (2X) and molality (2m)

C. Mole fraction (X/2) and molality (m/2)

D. Mole fraction (X) and molality (2m)

Answer: A

4. If x molal solution of a compound is benzene has mole fraction of solute equal to 0.4. Then the value of x is

A. 4.2

B. 8.5

C. 3.2

D. 5.1

Answer: B

5. Equal weight of NaCl and KCl are dissolved separately in equal volumes of solutions, then the molarity

    A. Will be equal for the two solutions

    B. For NaCl solution will be greater than that of KCl solution

    C. For KCl solution will be greater than that of NaCl solution

    D. For NaCl solution will be half of that of KCl solution

Answer: B

6. 20 ml of 1N HCl, 10 ml of 'N/2 H_2SO_4 and $30 ml of' \frac{N}{3} HNO_3$ are mixed together and volume made to 1000 ml. Find out the normality of 'H^+ ions in the resulting solution

A. '7/100N'

B. 7/200N'

C. 7/18N'

D. 7/9N'

Answer: B

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7. Molarity of pure water is

A. 1M

B. 55.55M

C. 27.73M

D. 80.55M

Answer: B

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8. Calculate the volume of water to be added to 400 ml of seminormal HCl solution to make it decinormal

    A. 1000 ml

    B. 1200 ml

    C. 1600 ml

    D. 2000 ml

Answer: C

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9. Calculate the amount of 'AgNO_3` which should be added to 60 ml of solution to perpare a concentration of 0.03 g 'ml^(-1)'

    A. 1.8 g

    B. 1.8 mg

C. 0.018 g

D. 0.018 mg

Answer: A

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10. The relation between molarity (M) and molality (m) is given by :

(p=density of solution (g/mL), M_1= molecular mass of solute)

A. 'm=(1000M)/(1000p-M_1)'

B. 'm=(1000pM)/(1000p-MM_1)'

C. 'm=(1000MM_1)/(1000p-MM_1)'

D. 'm=(1000M)/(1000p-MM_1)'

Answer: D

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11. Given that 10g of a dibasic acid (molar mass = 100) are present in 600 mL of the solution. The density of the solution is ' 1.02 g/mL. Molality of solution is

A. 0.17

B. 0.34

C. 0.99

D. 0.01

Answer: A

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12. Compare mass of pure NaOH in each of the aqueous solution

50 g of 40% (w/w) NaOH

50 ml of 50% (w/v) NaOH ['d_(soln)=1.2 g/(mL)']

A. (ii)>(i)

B. (i) >(ii)

C. (i) =(ii)

D. Mass in (i) is double the mass in (ii)

Answer: A

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13. Aqueous solution of urea is 20% by mass of solution. Then the percentage of urea by mass of solvent is

A. 0.2

B. 0.25

C. 0.4

D. 0.8

Answer: B

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14. The quantity remaining constant on dilution is

A. Number of moles of solute

B. Molarity of the solution

C. Mole fraction of solute

D. Mass of the solution

Answer: A

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15. A concentration of 1 ppm means that

A. 1 kg of solution contains 1 mg of solute

B. 1 kg of solution contains 1 g of solute

C. 1 kg of solution contains 1 mL of solute

D. 1 g of solution contains 1 g of solute

Answer: A

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16. Rutherford's alpha(α) particles scattering experiment resulted into discovery of

    A. Nucleus

    B. Distribution of electrons around the nucleus

    C. Presence of neutrons in the nucleus

    D. Both (1) and (3)

Answer: A

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17. The charge on the atom containing 8 protons, 9 neutrons and 9 electrons is

A. -1

B. $+1$

C. $zero$

D. -2

Answer: A

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18. Among the following the heaviest subatomic particle is

A. Electron

B. Neutron

C. Proton

D. Positron

Answer: B

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19. What are Alkyl halides or halo alkanes (R—X)

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20. Which of the following species has maximum charge to mass ratio?

A. D^+

B. H^+

C. He^+

D. He^{2+}

Answer: B

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21. Benzylic halides are

22. The threshold frequency $v_\circ$ for a metal is $0.5 \times 10^{15} s^{-1}$. What will be the kinetic energy of a photoelectron emitted when radiation of frequency $v = 1.5 \times 10^{15} s^{-1}$ strikes on a metal surface?

A. $h 10^{14} J$

B. $h \cdot 10^{16} J$

C. $h \cdot 10^{15} J$

D. h J

Answer: C

23. Select the incorrect statement about cathode rays.

A. Deflected by electric and magnetic field

B. Stream of electron

C. Move with same speed as that of light

D. Travel in straight lines

Answer: C

24. Let the mass of electron is two times, mass of proton is 1/4 and mass of neutron is 3/2 of original mass. Then, the atomic weight of C_6^{12} atom

A. Increases by 37.5%

B. Decreases by 87.5%

C. Decreases by 12.5%

D. Remains same

Answer: C

25. How are the radius of nucleus r and mass number (A) related to each other?

A. $r = R_o A^{\frac{1}{2}}$

B. $r = R_o A^{\frac{1}{3}}$

C. $r = R_o A^3$

D. $r = R_o A^2$

Answer: B

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26. A 200 W bulb emits monochromatic light of wavelenght 1400 A and only 10% of the energy is emitted as light. The number of photons emitted by the bulb per second will be

A. 1.4×10^{18}

B. 1.4×10^{20}

C. 1.4×10^{19}

D. 1.4×10^{21}

Answer: C

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27. The e/m ratio for electron was determined by........

A. James Chadwick

B. J.J. Thomson

C. Goldstein

D. Ernest Rutherford

Answer: B

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28. On absorbing light of wavelength 3800 A, bromine molecule undergoes dissociation and form atoms. The kinetic energy of one bromine atom assuming that one quantum of radiation is absorbed by each molecule would be (Bond energy of $Br_2 = 190\dfrac{kJ}{mol}$

A. $1.04 \times 10^{-19} J$

B. $2.08 \times 10^{-19} J$

C. $1.25 \times 10^{-5} J$

D. $6.25 \times 10^{-1} J$

Answer: A

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29. The correct sequency of frequency of the electromagnetic radiations in electronmagnetic spectrum is

A. Microwave

B. Microwave ltRadiowave lt Visible ltX-rays

C. UVlt Radiowave lt X-rays lt 'gamma-rays'

D. Radiowave ltIR ltVisible ltX-rays

Answer: D

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30. Which of the following phenomenon does not support the particle nature of electromagnetic radiation?

A. Photoelectric effect

B. Line spectrum of hydrogen

C. Interference

D. Blackbody radiation

Answer: C

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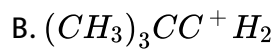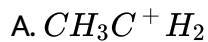**31.** Which among the following is not an aromatic species?

A. (1)

B. (2)

C. (3)

D. (4)
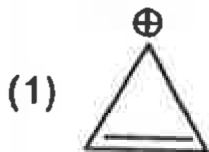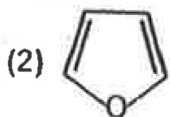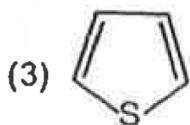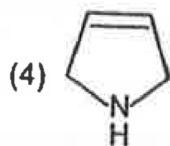
Answer: D

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32. The species which will not show hyperconjugation is

A. $CH_3C^+H_2$

B. $(CH_3)_3CC^+H_2$

C. $CH_3CH_2C^+H_2$

D. $CH_3C^+HCH_2$
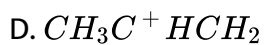
Answer: B

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33. Number of hyperconjugative structure for
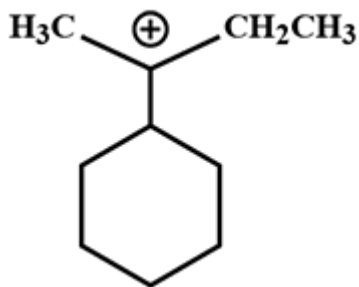
A. 3

B. 6

C. 9

D. 5

Answer: C

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34. The shape of CH_3^+ and CH_3^- is respectively

A. plner,planer

B. plner,pyramidal

C. pyramidal,pyramidal
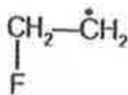
D. pyramidal,planer

Answer: B

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35. Non-aromatic compound is

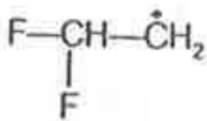**36.** Most stable radical among the following is

$$CH_3\overset{\bullet}{C}H_2$$

A.

B. $\underset{\underset{F}{|}}{\overset{\bullet}{C}H_2}-\overset{\bullet}{C}H_2$

C. $F-\underset{\underset{F}{|}}{CH}-\overset{\bullet}{C}H_2$

D. $F-\underset{\underset{F}{|}}{\overset{\overset{F}{|}}{C}}-\overset{\bullet}{C}H_2$
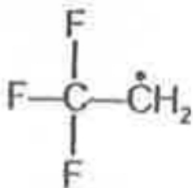
Answer: A

37. In the given species, carbanion is sp^3 hybridised?

38. Which of the following carbocation is most stable?

$CH_3\overset{\oplus}{C}H_2$

A.

(2) $\overset{\oplus}{C}H_3$

B.

C.

D.
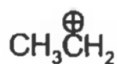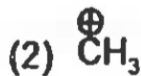
Answer: C

39. The correct stability order of the given carbanions is

$CH_3-\overset{\ominus}{CH}-CH_3$, $\overset{\ominus}{CH}-CH_3$

a   b

$O_2N-\overset{\ominus}{CH}-CH_3$

c
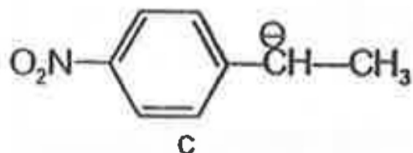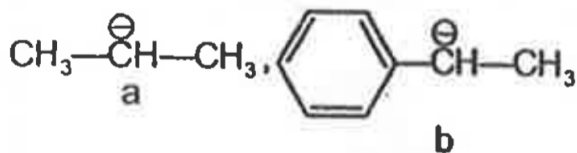
A. $a > b > c$

B. $b > c > a$

C. $c > b > a$

D. $c > a > b$

Answer: C

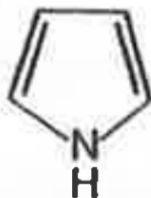▶ Watch Video Solution

40. Aromaticity order for the following aromatic compound will be

a   b   c

A. $a > b > c$

B. $c > b > a$

C. $b > c > a$

D. $c > a > b$

Answer: C

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41. An octahedral complex is prepared by mixing $CoCl_3$ and NH_3 in the

molar ratio 1 : 4, 0.1 m solution of this complex was found to freeze at

0.372°C. What is the formula of the complex? Given that molal depression constant (Kf) for water = 1.86°C/m.

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42. Identify the incorrect characteristic of carbenes,: CR_2
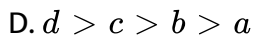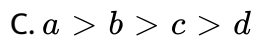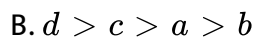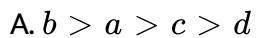
A. contain carbon atom with only six valence electrons

B. neutral species

C. very reactive

D. normally neocleophylic

Answer: D

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43. Which is the correct stability order for the given carbonium ions?

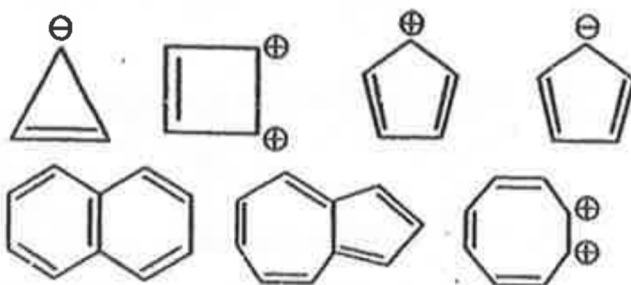A.Methyl B.ethyl C.iso-propyl D.tert-butyl

A. $b > a > c > d$

B. $d > c > a > b$

C. $a > b > c > d$

D. $d > c > b > a$

Answer: B

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44. Among the following species, how many are aromatic in nature?

A. 5

B. 4

C. 6

D. 3

Answer: A

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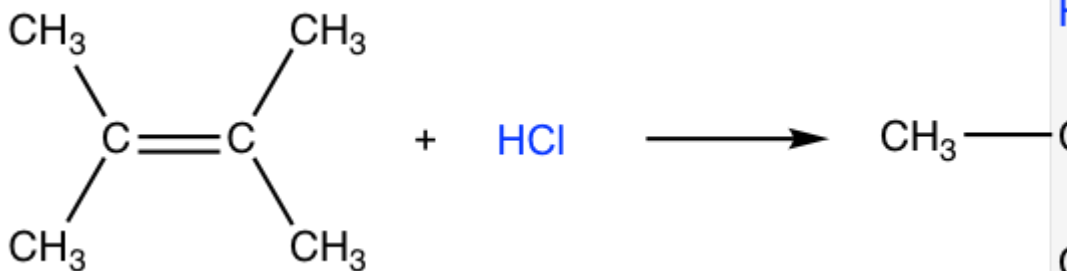**45.** Peroxide plays a vital role in producing

A. carbocation

B. carboanion

C. free radical

D. carbene

Answer: C

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46.

$$CH_3\text{—}C(CH_3)=C(CH_3)\text{—}CH_3 \quad + \quad HCl \quad \longrightarrow \quad CH_3\text{—}C$$

Products formed in the above reaction are result of

    A. substitution

    B. elimination

    C. addition

    D. elimination and addition

Answer: B

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47. An aldehyde reacts with KCN to form cyanohydrin. In this reaction

A. CN^- acts as nucleophile and does nucleophilic addition

B. CN^- acts as nucleophile and does electrophilic addition

C. CN^- acts as an electrophilic and does electrophilic addition

D. CN^- acts as nuclcophile and does nucleophile substitution

Answer: A

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48. Why do alkenes prefer to undergo electrophilec addition reaction while arenes prefer electrophilic substitution reactions ? Explain.

A. Increase of unsaturation number in product W.r.t. reactant

B. Decrease of unsaturation number in product w.r.t reactant

C. Formation of new bonds without breaking any bond

D. Both (2) and (3)

Answer: B

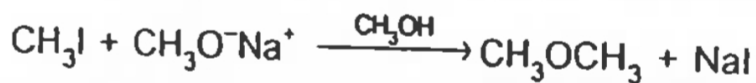**49.** What are homogeneous catalysts? state one example

50. Why are alkyl halides insoluble in water?

51. The following reaction falls under the category of

$$CH_3I + CH_3O^-Na^+ \xrightarrow{CH_3OH} CH_3OCH_3 + NaI$$

A. Nucleophilic addition reaction

B. Nucleophilic substitution reaction

C. Elimination reaction

D. Free radical reaction

Answer: B

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52. The intermediate formed in the electrophilic addition of HBr to propene is a
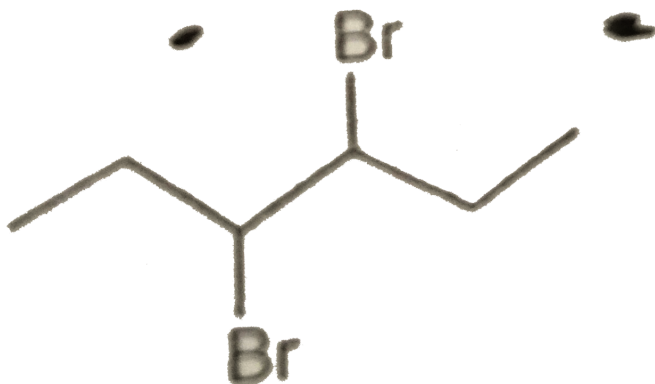
A. Carbocation

B. Carbanion

C. Carbene

D. Free radical

Answer: A

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53. How many elimination products are formed when the given dibromo compound is heated with 2 equivalent of sodium ethoxide in ethanol ?
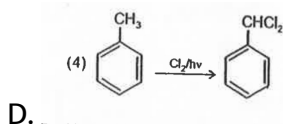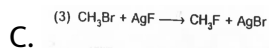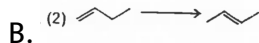

A. 1

B. 2

C. 3

D. 4

Answer: C

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54. Which one of the following reaction is an example of free radical substitution reaction?

A. (1) $C_2H_5OH \xrightarrow{H_2SO_4, \Delta} CH_2 = CH_2 + H_2O$

B. (2) $\sim\!\!\!\vee \longrightarrow \sim\!\!\!\wedge$

C. (3) $CH_3Br + AgF \longrightarrow CH_3F + AgBr$

D. (4) [benzene ring with CH_3] $\xrightarrow{Cl_2/h\nu}$ [benzene ring with $CHCl_2$]
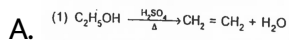
Answer: D

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55. Hydroxide ion in the following reaction behaves as a/an

$\sim\!\!\!\!\wedge\!\!\!\!|\overset{\frown}{Br} + OH^- \longrightarrow \sim\!\!\!\!\wedge\!\!\!\!\wedge OH + Br^-$
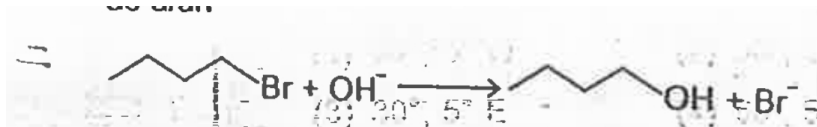
A. Catalyst

B. Electrophile

C. Nucleophile

D. Reducing agent

Answer: C

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56. Alkenes react rapidly with bromine in non-nucleophilic solvents to form vicinal dibromides.This reaction can be best described as

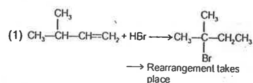A. Electrophilic addition

B. Nucleophilic addition

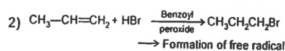C. Nucleophilic substitution

D. Electrophilic substitution

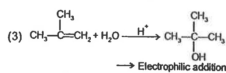**Answer: A**

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57. Identify the incorrect match among the following

A.
(1) $CH_3-CH-CH=CH_2 + HBr \longrightarrow CH_3-\overset{CH_3}{\underset{Br}{C}}-CH_2CH_3$
→ Rearrangement takes place

B.
2) $CH_3-CH=CH_2 + HBr \xrightarrow[\text{peroxide}]{\text{Benzoyl}} CH_3CH_2CH_2Br$
→ Formation of free radical

C.
(3) $CH_3-\overset{CH_3}{C}=CH_2 + H_2O \xrightarrow{H^+} CH_3-\overset{CH_3}{\underset{OH}{C}}-CH_3$
→ Electrophilic addition

D.
(4) $CH_3-CH=CH_2 \xrightarrow{H_2/Ni} CH_3CH_2CH_3$
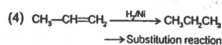→ Substitution reaction

Answer: D

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58. In the following elimination reaction, hybridisation of carbon atom to which halogen is attached changes from

$CH_3CH_2CH_2Br \xrightarrow{\text{alc. KOH}} CH_3CH = CH_2$

A. sp^2 to sp^3

B. sp^3 to sp^2

C. sp^2 to sp^2

D. sp^3 to sp^3

Answer: B

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59. Which element cannot be detected by Lassaigne's test?

A. Nitrogen

B. Sulphur

C. Oxygen

D. Phosphorus

Answer: C

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60. On treating sodium fusion extract with sodium nitroprusside, a violet colour was observed. This indicates the presence of which element in the organic compound?

A. Nitrogen

B. Sulphur

C. Chlorine

D. Bromine

Answer: B

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61. In a Carius tube, 0.25 g of an organic compound gave 0.699 g of barium sulphate. What is the percentage of sulphur in the compound? (Atomic weight of Ba = 137)

A. 42.5

B. 35.5

C. 45.2

D. 38.4

Answer: D

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62. During estimation of nitrogen present in an organic compound using Kjeldahl's method, the NH_3 evolved from 0.25 g of the compound was neutralised by 10 ml of 1.25N H_2SO_4 What is the percentage of nitrogen in the organic compound?

A. 0.56

B. 0.35

C. 0.7

D. 0.66

Answer: C

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63. Boiling point is highest for which compound?

A. Pentane

B. 2-Methylbutane

C. 2, 2-dimethylpropane

D. 2-Methylpropane

Answer: A

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64. Number of moles of oxygen required for the complete combustion of

butane are

A. 6

B. 7.5

C. 6.5

D. 7

Answer: C

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65. A mixture of two volatile liquids having little difference in their boiling

points can be purified by

A. Distillation

B. Crystalization

C. Column chromatography

D. Fractional distillation

Answer: D

66. In Duma's method for quantitative estimation of nitrogen, 0.5 g of an organic compound gave 100 ml of nitrogen collected at 27°C temperature and 680 mm of Hg pressure. What is the percentage composition of nitrogen in the sample? [Given aqueous tension at 27°C = 20mm Hg]

A. 0.2525

B. 0.1525

C. 0.2875

D. 0.1975

Answer: D

67. Total number of isomeric products(excluding stereoisomers) formed on monochlorination of 2-methylbutane are

A. 3

B. 4

C. 5

D. 2

Answer: B

68. Total number of conformational isomers obtained by C-C bond rotation of ethane are

A. 2

B. 4

C. 5

D. Infinite

Answer: D

69. The catalyst used for converting methane to methanol in presence of air at 100 atm and 523 K is

A. Mo_2O_3

B. Ni

C. Cu

D. Zn

Answer: C
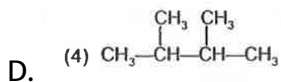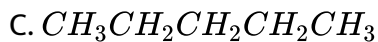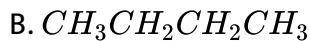
70. Which alkane cannot be be produced using only one type of alkyl halide in Wurtz reaction?

A. $CH_3 - CH_3$

B. $CH_3CH_2CH_2CH_3$

C. $CH_3CH_2CH_2CH_2CH_3$

D.   (4) CH₃—CH—CH—CH₃ with CH₃ and CH₃ substituents

Answer: C

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71. Which alkane will be formed as major product on electrolysis aqueous solution of sodium propanoate?

A. CH_4

B. CH_3CH_3

C. $CH_3CH_2CH_2CH_3$

D. $CH_3CH_2CH_3$
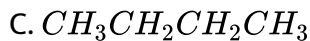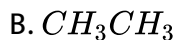
Answer: C

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72. The compound which gives propane on reduction with Zn and dilute hydrochloric acid is
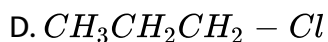
A. $CH_3CH_2CH_2OH$

B. $CH_3CH = CH_2$

C. CH - C -= CH

D. $CH_3CH_2CH_2 - Cl$
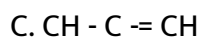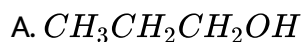
Answer: D

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73. Which among the following is the major product (p) of the given

$$\xrightarrow[\substack{773 \text{ K} \\ 10\text{-}20 \text{ atm}}]{V_2O_3} P(\text{Major})$$

reaction

A. (1)

B.

C. (3)

D.
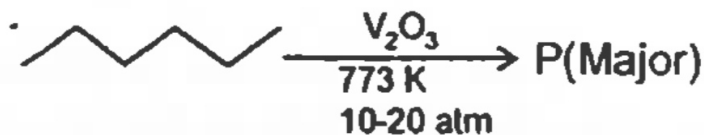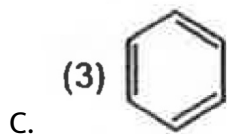
Answer: C

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74. Consider the two geometrical isomers of but-2-ene
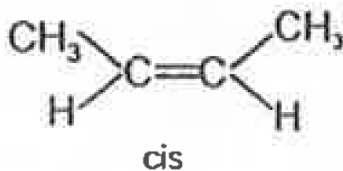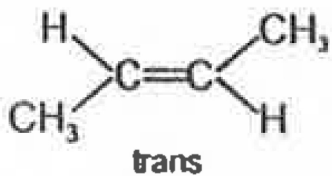
trans   cis

The isomer with higher melting point and the reason for the same is respetively

A. Cis, symmetric bonding

B. Trans, close and symmetric packing

C. Cis, close packing

D. Trans, non- symmetric arrangement of similar groups around C=C

Answer: B

75. Consider the given chemical equations $C_6H_6 + Cl_2 + FeCl_3 \rightarrow A + B$. A and B in the given reaction respectively are

76. An alkane, A on ozonolysis gives two products propanal and propanone. Which of the given statements is incorrect for A?

A. Compound A is pent-2-ene

B. Compound A on hydrogenation gives 2-methyl pentane

C. Compound A can undergo bromination reaction

D. Compound a forms 2-bromo, 2-methylpentane on treating with HBr

Answer: A

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77. Consider the given reaction
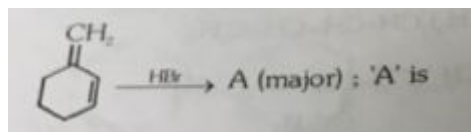
Compound A is

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78. Ethyl iodide undergoes SN2 reaction faster than ethyl bromide.

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79. Birch reduction is done in the presence of

A. Palladium supported over charcoal

B. $Na - liq.\ NH_3$

C. $H_2 - Nickel$

D. Alc. KOH

Answer: B

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80. A compound 'X', molecular formula $C_4H_8Br_2$ on treatment with zinc in an alcoholic solution, forms an alkene Y. Compounds X and Y respectively are

A. 1, 2-dibromobutane and but-2-ene

B. 1, 3-dibromobutane and but-1-ene

C. 1, 2-dibromobutane and but-1-ene

D. 1, 4-dibromobutane and but-2-ene

Answer: C

81. The IUPAC name of the given compound is
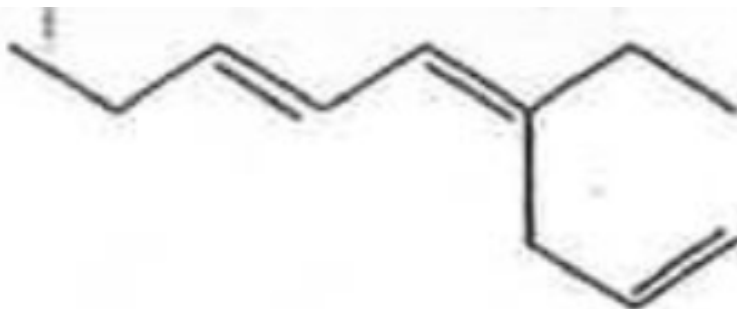
A. 4-ethyl-1, 4, 6-nonatriene

B. 6-ethyl-3, 6, 8-nonatriene

C. 4-ethyl-1, 4, 6-dectraine

D. 6-ethyl-3, 6, 8-dectriene

Answer: A

82. The total number of sigma bonds formed by $sp^2 - sp^2$ overlapping in 1, 3-butadiene is

A. 5

B. 2

C. 3

D. 4

Answer: C

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83. Which of the following represents an E isomer?

A.

B. (2)

C. (3)

D. (4)
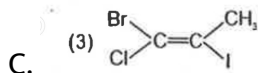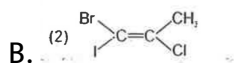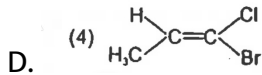
Answer: C

84. Consider the following reaction

$$X \xrightarrow[\text{(ii) Zn/H}_2\text{O}]{\text{(i) O}_3} OHC–CHO + OHC–\overset{\overset{\displaystyle CH_3}{\displaystyle |}}{CH}–CHO$$

The compound X is

(1)

A.

(2)

B.

(3)

C.

(4)

D.
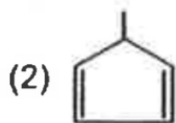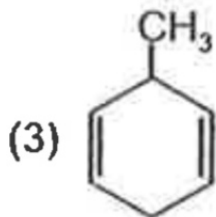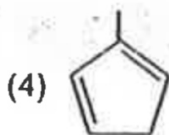
Answer: B

85. Consider the given reaction, $RCOOAg \xrightarrow[CCl_4]{Br_2/\Delta} R - Br$

Which one of the following acids will give maximum yield of R-Br in the above reaction ?

A. $CH_3 - CH(CH_3) - COOH$

B. $CH_3 - CH_2 - CH_2 - COOH$
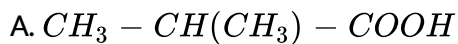
C. HCOOH

D. All of these

Answer: C

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86. Which of the given statements is incorrect?

A. Peroxide effect proceeds via free radical chain mechanism

B. Peroxide effect is not observed in case of HCl

C. Tertiary carbocation is less stable than secondary carbocation

D. Kharasch effect is applicable for unsymmetrical alkenes

Answer: C

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87. Hydration of which of the given compounds leads to the formation of 2-methylpropan-2-ol?

    A. 2-methylpropane

    B. 1-bromopropane

    C. 2-methylpropene

    D. Propene

Answer: C

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88. Consider the given reaction Compound 'X' is

$$CH_3 - CH = CH_2 + HBr \rightarrow X$$

    A. 1-bromopropane

    B. 2-bromopropane

    C. 1, 2-dibromopropane

D. 1,3-dibromopropane
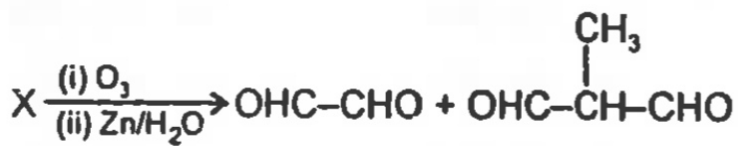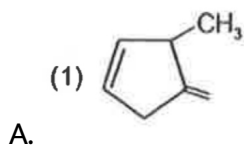
Answer: C

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89.   Consider   the   following   compounds

I. $HC\equiv C-CH_2-CH_2-CH_2-CH_3$

II. $H_3C-C\equiv C-CH_2-CH_2-CH_3$

III. $H_3C-C\equiv C-\underset{\underset{CH_3}{|}}{CH}-CH_3$
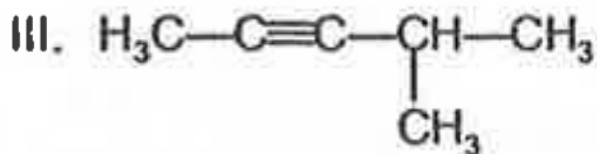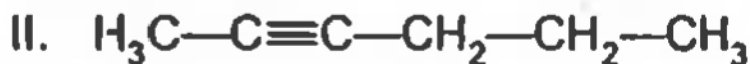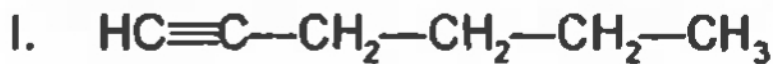
A. Compounds I,II and III are position isomers of each other

B. compounds I and II are position isomers while II and III are chain

   isomers

C. Compounds I and III are position isomers while I and II are chain

   isomers

D. Compounds I and II are chain isomers while II and III are position

   isomers

Answer: B

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90. The IUPAC name of dimethylacetylene is

   A. propyne

   B. ethyle acetylene

   C. But-1-yne

   D. But-2-yne

Answer: D

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91. Consider the following chemical reactions,Compound P,Q, and R respectively are

Consider the following chemical reactions

$$CaCO_3 \xrightarrow{\Delta} P + CO_2$$

$$P + 3C \longrightarrow Q + CO$$

$$Q + 2H_2O \longrightarrow Ca(OH)_2 + R$$

A. CaO, CaC_2 and C_2H_4

B. CaO, CaC_2 and C_2H_2

C. Ca, CaC_2 and C_2H_4

D. Ca, CaC_2 and C_2H_2
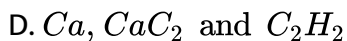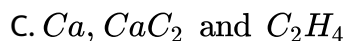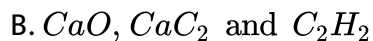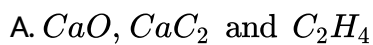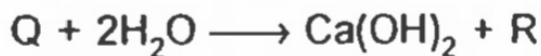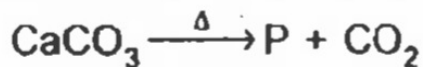
Answer: B

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92. Valence Bond Theory was developed in the year?

A. 1916

B. 1927

C. 1930

D. 1932

Answer: C

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93. All of the following are the example of benzenoid aromatic compounds, except

A. Tolune

B. Azulene

C. Naphthalene

D. Anhracene

Answer: B

94. choose the incorrect statement from the following

A. Benzene is planer molecule

B. All the carbon atoms in benzene are sp^2hybridised

C. Absence of pure double bond in benzene accounts for the reluctance of benzene to show addition reactions under normal conditions

D. Presence of delocalised π electrons in benzene makes it less stable than hypothetical cyclohexatriene

Answer: D

95. which among the following statement is incorrect regarding the product formed when two molecules of HBr add to ethyne?

    A. IUPAC name is 1,1-dibromoethane

    B. it is a geminal dihalide

    C. It is a position isomer of 1,2-dibromoethane

    D. It has a planer structure

Answer: D

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96. An example of a antiaromatic species is

A.

B.
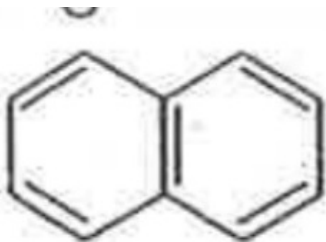
C.

D.

Answer: D

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97. Consider the following reaction , the compounds P and Q are respectively

$$\underset{\text{(COONa on benzene ring)}}{\text{C}_6\text{H}_5\text{COONa}} + \text{NaOH} \xrightarrow[\Delta]{\text{CaO}} P + Na_2CO_3$$

$$\underset{\text{(OH on benzene ring)}}{\text{C}_6\text{H}_5\text{OH}} + \text{Zn} \xrightarrow{\Delta} Q + ZnO$$
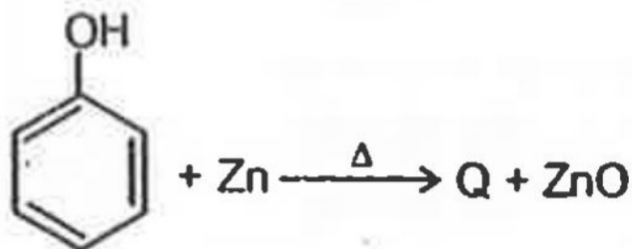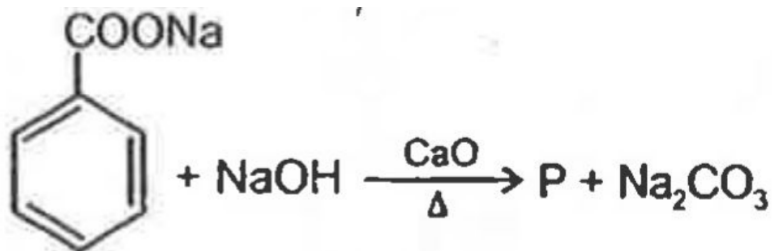
A. Benzene,Toluene

B. Toloune, Benzene

C. Toluene, Benzaldehyde

D. Benzene, Benzene

Answer: D

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98. Number of sp hybridised carbon atoms in But-2-yne is

A. 1

B. 2

C. 3

D. 4

Answer: B

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99. Give reasons : C–X bond length in halobenzene is smaller than C–X bond length in CH3–X.

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100. Total number of pi-electrons in benzene is

A. 2

B. 3

C. 4

D. 6

Answer: D

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101. Total number of hydrogen molecules required to form ethane from

ethyne is

A. One

B. Two

C. Three

D. Four

Answer: B

102. In anthrcene ,number of pi electrons is equal to x. the value of x is

A. 6

B. 10

C. 14

D. 12

Answer: C

103. The colour chage observed when excess ethyne is passed through the solution of bromine water is

A. Colourless to reddish brown

B. Colourless to green

C. reddish brown to colourless

D. Pink to colourless

Answer: C

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104. Major product is

$+ CH_3CH_2CH_2 - Cl \xrightarrow{\text{anhy. AlCl}_3} A(\text{Major})$

A.

B.

C.

D.

Answer: B

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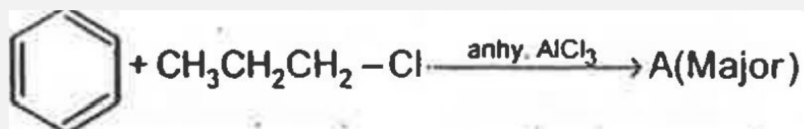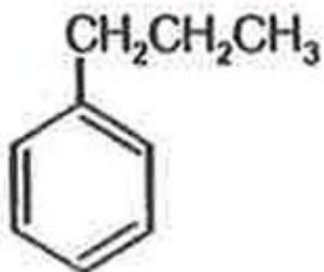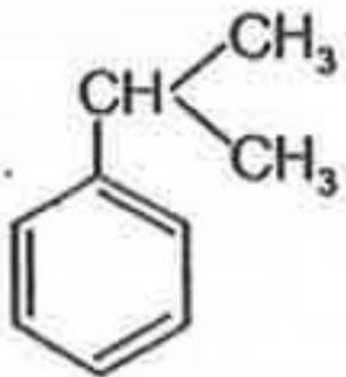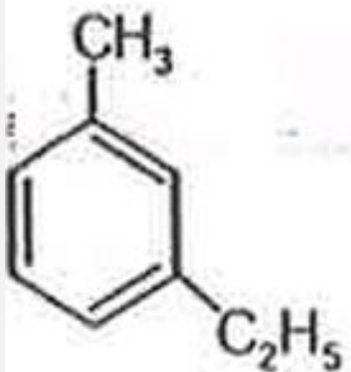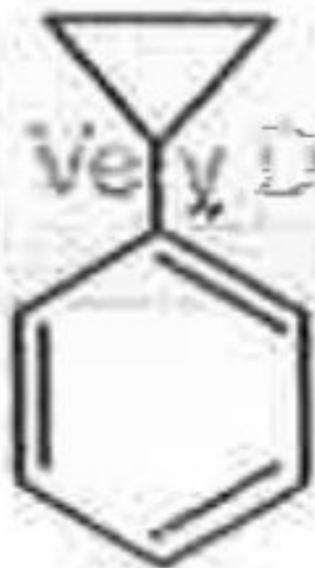
105. consider the given box the total number of gases which are responsible for acid rain is/are

SO_2. CO_2, CO, NO_2, NO

A. One

B. Two

C. Three

D. Four

Answer: C

106. For clear water ,its BOD should be less than

A. 50 ppm

B. 17 ppm

C. 10ppm

D. 5ppm

Answer: D

107. Consider the following reaction X and Y respectively are

$$CF_2Cl_2 \xrightarrow{\text{UV}} X + Y$$

$$X + O_3 \longrightarrow Cl\dot{O} + O_2$$

$$Cl\dot{O} + O_2 \longrightarrow X + 2O_2$$

X and Y respectively are

A. $\dot{F}$ and $\dot{C}Cl$

B. $\dot{C}l$ and $\dot{C}F_2Cl$

C. $\dot{C}F.Cl$ and $\dot{C}l$

D. $\dot{C}l$ and $\dot{C}FCl$
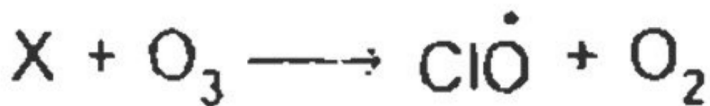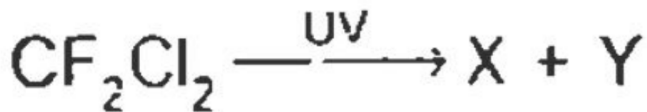
Answer: B

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108. All the following are the effects of depletion of ozone layer, except

A. It can cause skin cancer

B. It increases transpiration in plants and hence decreases soil moisture

C. It increases the acidity of soil

D. It damages the paints over the buildings causing them to fade faster

Answer: C

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109. IUPAC name of K3[Fe(C2O4)3] is?

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110. Which of the following is not an example of organochlorine which shows biomagnification?

   A. Endrin

   B. DDT

   C. $HClO_4$

   D. Dieldrin

Answer: C

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111.   Product   P   is

$$+ \ 3Cl_2 \xrightarrow[500\,K]{UV} P(Major)$$

A.

B.

C.

D.
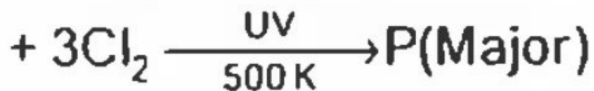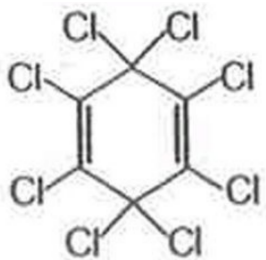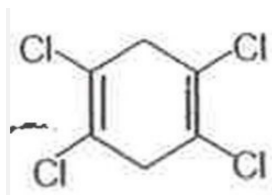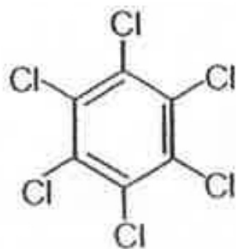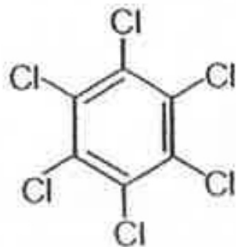
Answer: B

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112. Which of the following gases combines with haemoglobin to form a very stable compound and reduces the oxygen carrying capacity of blood?

A. CO_2

B. CO

C. SO_2

D. NO_2

Answer: B

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113. In an electrophilic aromatic substitution reaction, the nitro group is meta directing because of it?

A. decreases the electron density at ortho and para position

B. decreases the electron density at meta position

C. increases the electron density at meta position

D. increases the electron density at ortho and para position

Answer: B

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114. Hydrogenation of benzene is done by

A. $NaBH_4$

B. $\dfrac{H_2}{N}i$

C. HCl

D. $NaNH_2$

Answer: B

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115. In which of the following zones of atmosphere ozone layer is present ?

    A. Troposphere

    B. Stratosphere

    C. Mesosphere

    D. Exosphere

Answer: B

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116. Sometimes , the colour of photochemical smog becomes brown . The reason for this brown appearance is the excess of

    A. NO_2

    B. SO_2

    C. PAN

D. CH_4

Answer: A

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117. Major product (P) formed in the given reaction is

A.

B.

C.

D.
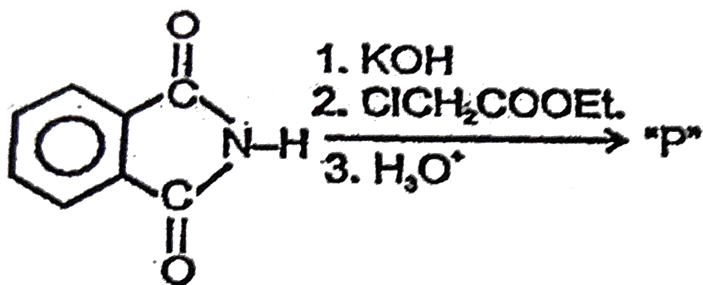
Answer: C

118. Sulphonation of benzene is done by which reagent?

A. Conc. HNO_3 + Conc. H_2SO_4

B. Fuming sulphuric acid

C. SO_2

D. Dilute sulphuric acid

Answer: B

119. Ethylidene chloride is a/an.....

A. Gem-dihalide

B. Allylic halide

C. Vinylic halide

D. Vic-dihalide

Answer: A

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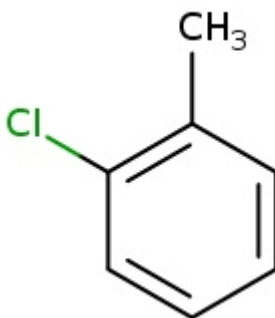
120. IUPAC nomenclature of PIC is

A. Benzylchloride

B. Chlorophenylmethane

C. 1-chloro-2-methylbenzene

D. Benzoylchloride

Answer: B

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121. Major product of the given reaction is

$$\xrightarrow[\text{(ii) HNO}_3, \text{H}_2\text{SO}_4]{\text{(i) } n\text{-}C_4H_9Cl, \text{ anhyd. AlCl}_3} X$$

A.

B.

C.

D.
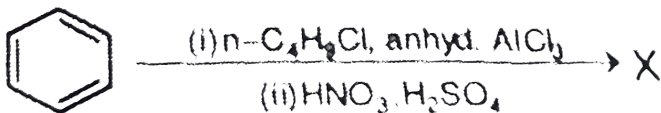
Answer: C

122. Which of the following will not lead to the formation of an alkyl halide?

A. $C_2H_5OH \xrightarrow{RedP + Br_2}$

B. $C_2H_5OH \xrightarrow{SoCl_2}$
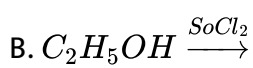
C. Both 1 and 2

D. None of these

Answer: D

---

123. PIC Compounds (A) and (B) are respectively

$$A \xleftarrow{Br_2} \text{(benzene with } CH=CH_2 \text{ group)} \xrightarrow{KMnO_4} B$$
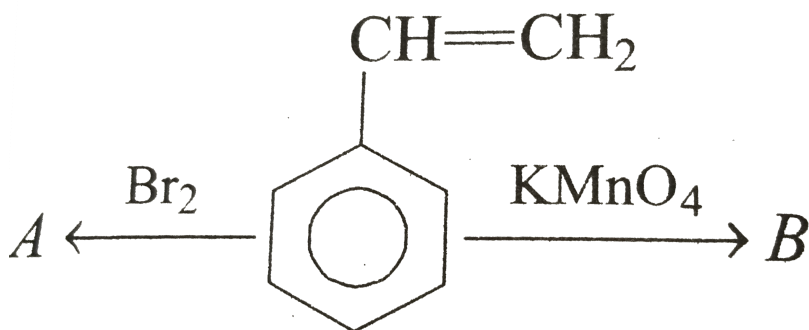
124. For the reaction $C_2H_5OH + HX \rightarrow C_2H_5X + H_2O$, the order of reactivity is

A. $HI > HBr > HCl$

B. $HCl > HBr > HI$

C. $HCl > HI > HBr$

D. $HBr > HI > HCl$

Answer: A

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125. The p-orbital is in the shape of a _____

A. Sphere

B. Dumbbell

C. Pear-shaped lobe

D. None of the mentioned

Answer: B

---

126. Arrange the following compounds in increasing order of their boiling points

(I)
$$\begin{array}{c} CH_3 \\ \diagdown \\ CH_3 \diagup \end{array} CH-CH_2Br$$

(II) $CH_3CH_2CH_2CH_2Br$

(III)
$$H_3C-\overset{\overset{\displaystyle CH_3}{|}}{\underset{\underset{\displaystyle Br}{|}}{C}}-CH_3$$
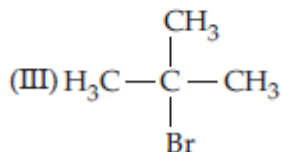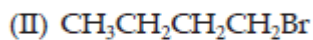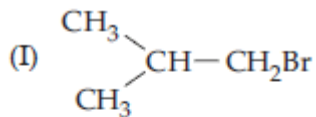
A. $II < I < III$

B. $I < II < III$

C. $III < I < II$

D. $III < II < I$

Answer: C

127. Which one of the following is liquid at room temperature?

A. CH_3Cl

B. C_2H_5Cl

C. CH_3Br

D. C_2H_5Br
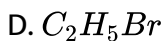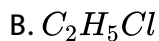
Answer: D

128. The correct order of boiling points of alkyl halides is

A. $CH_3F > CH_3Cl > CH_3Br > CH_3I$

B. $CH_3F > CH_3Br > CH_3Cl > CH_3I$

C. $CH_3I > CH_3Br > CH_3Cl > CH_3F$

D. $CH_3Cl > CH_3Br > CH_3F > CH_3I$
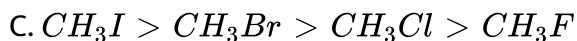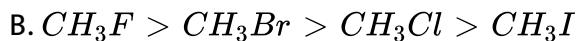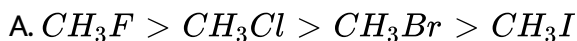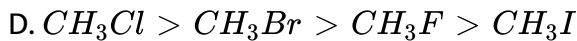
Answer: C

129. For PIC , the rate of reaction is given by the expression

$CH_3Br + OH \rightarrow CH_3OH + Br$
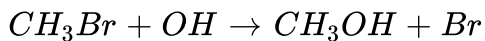
A. $Rate = k[CH_3Br]$

B. $Rate = k[OH^-]$

C. $Rate = k[CH_3Br][OH^-]$

D. $Rate = k[CH_3Br][OH^-]^{-1}$

Answer: C

130. Which of the following alkyl halide will undergo S_N1 reaction is

A. $(CH_3)_3C - F$

B. $(CH_3)_3C - Cl$

C. $(CH_3)_3C - Br$

D. $(CH_3)_3C - I$
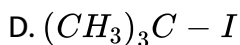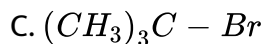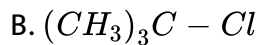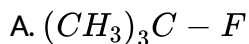
Answer: D

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131. The compound which is least reactive among the following in a nucleophilic substitution reaction is

A. $CH_2 = CHCl$

B. CH_3CH_2Cl

C. $CH_2 = CHCH_2Cl$

D. $(CH_3)_3C - Cl$
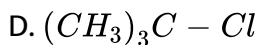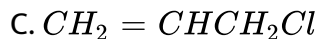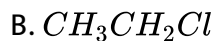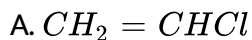
Answer: A

132. The correct order of reactivity of the following bromides towards S_N1 reaction is

Me~~~~~Br

(A)

Me (with double bond), Br, Me

(B)

Me~~~Me, Br
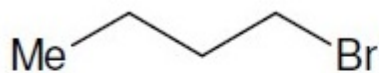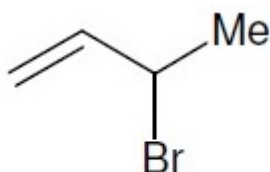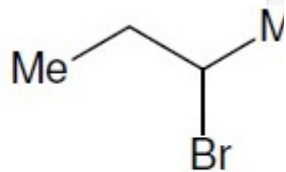
(C)

A. $I > II > III$

B. $III > II > I$

C. $II > III > I$

D. $II > I > III$

Answer: C

133. Which of the following statement(s) is/are incorrect regarding S_N1 reaction?

I) Rearrangement is possible.

II) Proceeds with complete inversion of configuration.

III) Rate depends on polarity of solvent.

IV) The strength of the nucleophile is important in rate determining step.

    A. II,IV only

    B. I, II, IV only

    C. III only

    D. I, II only

Answer: A

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134. Which of the following molecules contain a chiral centre?

A. 2-chloropropan-2-ol

B. 1-chlorobutane

C. 2-chloropropane

D. 2-chlorobutane

Answer: D

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135. Two enantiomers differ with respect to

A. Melting point

B. Refractive index

C. Direction of rotation of plane polarised light

D. Solubility in achiral solvents

Answer: C

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136. Among the given halides, which will give same product in both S_N1 and S_N2 reactions(excluding stereoisomers)?
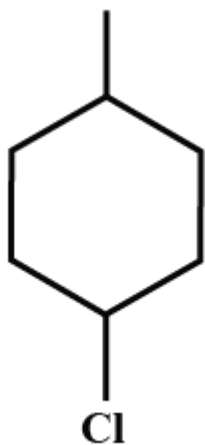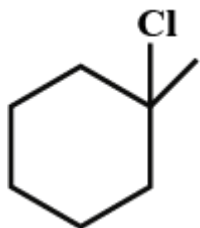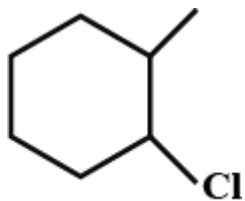
A. III only

B. III and IV only

C. I and II only

D. I, II and IV only

Answer: B

---

137. The correct statement regarding the transition state of a S_N2 reaction in alkyl halides

A. Lower in energy than the starting materials

B. Involves both the nucleophile and leaving group

C. Closely resembles a carbonium ion intermediate

D. The carbon where substitution takes place is sp^3 hybridised

Answer: B

138. 1-Bromopentane is more reactive towards

A. S_N2 and S_N1

B. S_N1 and S_N2

C. Both S_N1

D. Both S_N2

Answer: B

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139. Hybridisation of Acetylene is ____

A. sp

B. sp^2

C. sp^3

D. dsp^2

Answer: C

---

140. Nucleophilic substitution reaction of optically active halide, PIC is accompanied by

A. Inversion of configuration

B. Retention of configuration

C. Racemisation

D. Both (1) and (3)

Answer: C

---

141. Shape of PCl5 molecule is __

A. Tigonal Planar

B. Linear

C. Trigonal bipyramidal

D. Tetrahedral

Answer: B

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142. Number of chlorine atoms which form equatorial bonds in PCl5 molecule are _

A. 1

B. 2

C. 3

D. 4

Answer: B

143. The correcr order of ease of elimination of following groups in the E2

reaction is

A. $- F > - Cl > - Br > - I$

B. $- I > - Br > - F >_C l$

C. $- I > - Br > - Cl > - F$

D. $- F > - Cl > - I > - Br >$
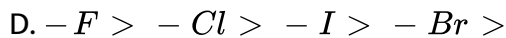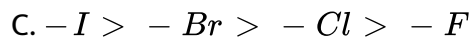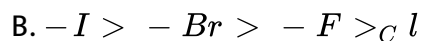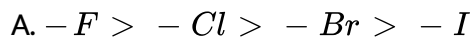
Answer: C

144. Arrange the following compounds in order of ease of

dehydrohalogenation by concentrated alcoholic KOH

A) $CH_3 \underset{\underset{CH_3}{|}}{C} HCH_2CH_2Br$

$$\text{B)}CH_3CH_2 \overset{\overset{\displaystyle Br}{|}}{\underset{\underset{\displaystyle CH_3}{|}}{C}} CH_3$$

$$\text{C) } CH_3 \underset{\underset{\displaystyle CH_3}{|}}{C} \overset{\overset{\displaystyle Br}{|}}{H}CHCH_3$$
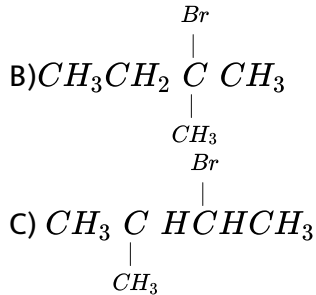
A. $C < B < A$

B. $A < B < C$

C. $B < C < A$

D. $B < A < C$

Answer: B

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145. The percentage p-character in sp3 hybridisation is _____

A. 25%

B. 50%

C. 75%

D. 66.6%

Answer: C

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146. Do we call metal carbonyls as organometallics?

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147. The hybridisation of BeF_3^- is _____

A. sp^3

B. sp^2

C. sp

D.

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148. The e.m.f and the standard e.m.f of a cell in the following reaction is 5 V and 5.06 V at room temperature, $Ni(s) + 2Ag^+(n) \rightarrow Ni^{2+}(0.02M) + 2Ag(s)$. What is the concentration of Ag+ ions?

A. 0.0125 M

B. 0.0314 M

C. 0.0625 M

D. 0.0174 M

Answer: D

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149. Product obtained when benzaldehyde and acetophenone undergo cross aldol condensation is

A. 1, 4 – Diphenylprop -2- en -1- one

B. 1,3 - Diphenylprop -2- en -1- one

C. 1,3- Diphenylprop -1- ene -2- one

D. 1, 4 – Diphenylprop -1- ene -2- one

Answer: B

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150. Calculate the electrode potential of the given electrode. Pt, Cl_2(2 bar)|

$2Cl^-(0.02M)$; E°$(Cl_2 \mid 2Cl^-)$ = 3.4 V

    A. 3.51 V

    B. 3.55 V

    C. 1.26 V

    D. 2.95 V

Answer: C

151. A zinc rod dipped in n molar solution of $ZnSO_4$ has an electrode potential of -0.56 V. The salt is 98 percent dissociated at room temperature. What is the molarity of the solution? $\left(E° \left(Z \dfrac{n^{+2}}{Z} n \right) = -0.5V \right)$

A. 8.44×10^{-3} M

B. 9.44×10^{-4} M

C. 8.44×10^{-4} M

D. 9.44×10^{-3} M

Answer: C

152. Cannizzaro reaction is an example of

A. Disproportionation reaction

B. Decomposition reaction

C. Condensation reaction

D. Displacement reaction

Answer: A

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153. What is the pH of HCl solution when the hydrogen gas electrode shows a potential of -0.22 V at standard temperature and pressure?

A. 2.17

B. 2.98

C. 3.73

D. 3.14

Answer: B

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154. Identify products A and B in the following reaction

A $\xleftarrow{\text{Cl}_2/\text{CH}_3\text{COOH}}$ CH$_3$CHO $\xrightarrow{\text{Cl}_2/\text{NaOH}}$ B

A.

B.

C.

D.
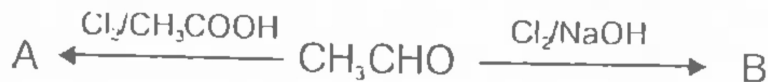
Answer: A

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155. Although the H-bonding in hydrogen fluoride is much stronger than that in water, yet water has a much higher boiling point than hydrogen fluoride. Why?

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156. IUPAC name of the following compound is

    A. 2-Methylcyclohex-5- enoic acid

    B. 6-Methylcyclohex-2- enoic acid

    C. 6-Methylcyclohex-2- enecarboxylic acid

    D. 2-Methylcyclohex-5- enecarboxylic acid

Answer: C

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157. What is the number of electrons transferred in an equation if the Nernst equation is $E(cell) = E°(cell) - 9.83 \times 10^{-3} \times \log_{10}$(Anode / Cathode)?

    A. 2

    B. 4

C. 6

D. 1

Answer: C

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158. Acidic hydrolysis of 2-methylbenzamide followed by heating with alkaline potassium permanganate and acidic work up produces

    A. Benzoic acid

    B. Glutaric acid

    C. Oxalic acid

    D. Phthalic acid

Answer: D

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159. Find the number of electrons transferred in the equation $Cu(g) + 2Ag^+(aq) \rightarrow Cu^{2+}(aq) + 2Ag(s)$.

A. 1

B. 2

C. 3

D. 4
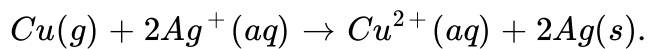
Answer: D

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160. What is the time taken to complete 75 percent of the reaction if the rate of the first-order reaction is 0.023 min-1?

A. 60.28 minutes

B. 69.28 minutes

C. 50.37 minutes

D. 65.97 minutes

Answer: B

---

161. The rate constant of a reaction is k=3.28 $\times 10^{-4} s^{-1}$. Find the order of the reaction.

A. Zero order

B. First order

C. Second order

D. Third order

Answer: D

162. Product obtained when cyclohexene is oxidised with acidic potassium dichromate will be

A. Succinic acid

B. Adipic acid

C. Benzoic acid

D. Terephthalic acid

Answer: B

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163. Incorrect statement with respect to physical properties of carboxylic acids is

A. Carboxylic acids have higher boiling point than alcohols of comparable molecular masses

B. Most carboxylic acids exist as dimer in the vapour phase

C. Solubility of carboxylic acids in water increases with increasing number of carbon atoms

D. Carboxylic acids are also soluble in less polar organic solvents like benzene, ether, chloroform etc.

Answer: C

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164. For a reaction A +B → C, the experimental rate law is found to be $R = k[A]^1[B]^{\frac{1}{2}}$. Find the rate of the reaction when [A] = 0.5 M, [B] = 0.1 M and k=0.03.

A. $4.74 \times 10^{-2} \left(Lmol^{-1}\right)^{\frac{1}{2}} s^{-1}$

B. $5.38 \times 10^{-2} \left(Lmol^{-1}\right)^{\frac{1}{2}} s^{-1}$

C. $5.748 \times 10^{-2} \left(Lmol^{-1}\right)^{\frac{1}{2}} s^{-1}$

D. $4.86 \times 10^{-2} \left(Lmol^{-1}\right)^{\frac{1}{2}} s^{-1}$

Answer: C

---

165. pK, value of trifluoroacetic acid, benzoic acid and acetic acid are respectively

    A. 4.76, 4:19 and 0:23

    B. 4-19, 4-76 and 0-23

    C. 0-23, 4-76 and 4-19

    D. 0:23, 4-19 and 4.76

Answer: D

---

166. For the reaction $A + H2O \rightarrow$ products, find the rate of the reaction when

[A] = 0.75 M, k= 0.02.

A. $0.077S^{-1}$

B. $0.085S^{-1}$

C. $0.015S^{-1}$

D. $0.045S^{-1}$

Answer: B

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167. What is the concentration of the reactant in a first order reaction when the rate of the reaction is 0.6 s-1 and the rate constant is 0.035?

A. 26.667 M

B. 17.143 M

C. 26.183 M

D. 17.667 M

Answer: B

168. How many times will the rate of the elementary reaction 3X + Y → X2Y change if the concentration of the substance X is doubled and that of Y is halved?

    A. r2= 4.5r1

    B. r2= 5r1

    C. r2= 4r1

    D. r2= 2r1

Answer: B

169. The rate constant of a reaction is $0.01 S^{-1}$, how much time does it take for $2.4 mol L^{-1}$ concentration of reactant reduced to $0.3\ mol L^{-1}$?

A. $108.3S^{-1}$

B. $207.9S^{-1}$

C. $248.2S^{-1}$

D. $164.3S^{-1}$

Answer: D

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170. What time does it take for reactants to reduce to 3/4 of initial concentration if the rate constant is 7.5 x $10^{-3}S^{-1}$?

A. 38.4s

B. 40.2s

C. 39.3s

D. 36.8s

Answer: B

171. One of the product formed in the electrolysis of sodium salt of succinic acid is

A. Ethane

B. Butene

C. Ethylene

D. Acetylene

Answer: C

172. Carboxylic acid in which Hell-Volhard-Zelinsky reaction cannot be carried out?

A.

B.

C.

D.

Answer: B

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173. Write the IUPAC name of the following compound :

$$CH_3CH_2CH_2N \underset{C_2H_5}{\overset{CH_3}{<}}$$

A. N-Methyl-N-ethylaniline

B. N-Ethyl-N-methylaniline

C. N-Ethyl-N-methylbenzenamine

D. N-Methyl-N-ethylbenzenamine

Answer: C

174. A zero-order reaction is 25% complete in 30seconds. What time does it take for 50% completion?

A. 40s

B. 70s

C. 50s

D. 60s

Answer: B

175. Amine produced by the Hoffmann degradation of benzamide is

A. Secondary amine

B. Aliphatic amine

C. Tertiary amine

D. Aromatic amine

Answer: D

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176. Identify the amine which cannot be prepared by Gabriel phthalimide synthesis

A.

B.

C.

D. ▶

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177. For a certain reaction the values of Arrhenius factor and Activation energy are 4 x 10^{13} collision/sec and 98.6KJ/mol at 303K. Calculate the rate constant if reaction is 1st order?($R = 8.341 mol^{-1}K^{-1}$)

A. 6.07 x 10^{-3}

B. 3.02 x 10^{-5}

C. 4.07 x 10^{-4}

D. 7.42 x 10^{-3}

Answer: D

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178. The correct order of boiling points of isomeric amines is

A. tertiary gtsecondary gtprimary

B. secondarygt primarygt tertiary

C. primary gtsecondarygt tertiary

D. secondary gttertiary gtprimary

Answer: C

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179. The correct order of value of pk_b the following amines is (i)$C_2H_5NH_2$

(ii)$(C_2H_5)_2NH$(iii)$(C_2H_5)_3N$

A. (i)gt(ii)gt(iii)

B. (iii)gt(ii)gt(i)

C. (ii)gt(i)gt(iii)

D. (i)gt(iii)gt(ii)

Answer: D

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180. The decomposition of N_2O_5 in CCl_4 solution was studied. $N_2O_5 \rightarrow 2NO_2 + \dfrac{1}{2}O_2$. The rate constant of the reaction is 6.2 x $10^{-4}\sec^{-1}$. Calculate the rate when the concentration of N_2O_5 is 1.25 molar.

    A. 6.45 x 10^{-4}

    B. 7.45 x 10^{-4}

    C. 6.75 x 10^{-4}

    D. 7.75 x 10^{-4}

Answer: A

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181. which amines form foul smelling compound on heating with chloroform and ethanol KOH?

    A.

B.

C.

D. Both(1)&(3)

Answer: D

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182. For the reaction X → Y + Z, the rate constant is 0.00058 s-1. What percentage of X will be decomposed in 50 minutes?

A. 90.02 %

B. 82.44 %

C. 88.82 %

D. 82.67 %

Answer: B

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183. Compound (s) is used for the distinction of primary, secondary and tertiary amines is/are

    A. alkaline chloroform

    B. benzenesulphonyl chloride

    C. p-toluenesulfonyl chloride

    D. both (2)& (3)

Answer: D

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184. A first-order reaction was 70 percent complete in 20 minutes. What is the rate constant of the reaction?

    A. 0.07 min-1

    B. 0.06 min-1

C. 0.08 min-1

D. 0.09 min-1

Answer: D

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185. The product which is obtained in least amount on the direct nitration

of aniline is

A.

B.

C.

D. both (2) and (3)

Answer: A

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186. The major product formed when aniline reacts with concentrated

H_2SO_4 followed by heating with H_2SO_4 at 453-473k is

A.

B.

C.

D.

Answer: A

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187. What is the time required for 75 percent completion of a first-order

reaction?

A. $3 \times t_{50}$

B. $4 \times t_{50}$

C. $2 \times t_{50}$

D. $5 \times t_{50}$

Answer: D

---

188. Which of the following statement is incorrect?

    A. benzenediazonium chloride is a colourless crystalline solid

    B. benzenediazonium chloride is readily soluble in water

    C. benzenediazonium fluoroborate is soluble in water

    D. benzene diazonium fluoroborate is stable at room temperature

Answer: C

189. The rate constant of a reaction is $6 \times 10^{-3} s^{-1}$ at 50º and $9 \times 10^{-3} s^{-1}$ at 100º C. Calculate the energy of activation of the reaction.

A. 6.123 kJ mol^{-1}

B. 8.124 kJ mol^{-1}

C. 12.357 kJ mol^{-1}

D. 18.256 kJ mol^{-1}

Answer: B

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190. The activation energy of a reaction is 50 kJ mol-1 and the value of rate constant at 300 K is $2.5 \times 10^{-5} sec^{-1}$. What is the value of the frequency factor, A?

A. 4228.53 S^{-1}

B. 3829.53 S^{-1}

C. 7596.45 S^{-1}

D. 6565.53 S^{-1}

Answer: A

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191. Coupling of benzene diazonium chloride and phenol to form p- hydroxy azobenzene (orange dye) is an example of

A. elimination reaction

B. electrophilic substitution reaction

C. nucleophilic substitution reaction

D. electrophilic addition reaction

Answer: B

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192. What is the value of rate constant k if the value of the activation energy Ea and the frequency factor A are 49 kJ / mol and $9 \times 10^{10} S^{-1}$ respectively? (T = 313 K)

A. $6 \times 10^2 S^{-1}$

B. $9 \times 10^2 S^{-1}$

C. $3 \times 10^2 S^{-1}$

D. $6 \times 10^{-2} S^{-1}$

Answer: C

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Exercise

1. Among the following halide ions (X^-) reaction, which is feasible is?

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2. The numberof all possible products excluding stereoisomers obtained on monochlorination of n-butane and iso-butane are respectively

A. 2 and 3

B. 3 and 2

C. 2 and 1

D. 2 and 2

Answer: D

3. The list product (B) formed in the following reaction is

$$CH_3 - CH_2 - Br + Mg \xrightarrow{dryethanol} A \xrightarrow{CH_3COOH} B$$
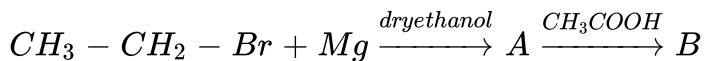
4. In dénydrohalogenation of tert-pentyl bromide using alc. KOH, major product obtained is

A. 2-Methylbut-1-ene

B. 2-Methylbut-2-ene

C. Pen! 1-ene

D. Pent-2 ene

Answer: B

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5. Which of the following is one of the major products formed in the reaction? $2CH_3 - CH_2 - Cl + 2Na \xrightarrow{dryethanol}$

A. $CH_3 - CH_3$

B. $CH_2 = CH_2$

C. $CH_3 - CH_2 - CH_2 - CH_3$

D. $CH_3 - CH_2 - CH_3$

Answer: D

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6. For dehyetohalogenation, the order of reactivity of alkyl halides considering E1 mechanism is

A. $1° > 2° > 3°$

B. $2° > 1° > 3°$

C. $2° > 3° > 1°$

D. $3° > 2° > 1°$
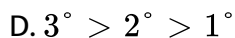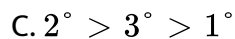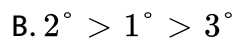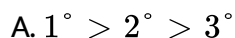
Answer: D

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7. Name two complexes which are used in medicines.

8. For a second-order reaction, what is the unit of the rate of the reaction

A. s^{-1}

B. $mol\,L^{-1}s^{-1}$

C. $mol^{-1}Ls^{-1}$

D. $mol^{-2}L^2s^{-1}$

Answer: C

9. Which of the following molecules would have a carbon-halogen bond least susceptible to nucleophilic aromatic substitution reaction?

A. 2-Fluoropropane

B. 2-Chloropropane

C. 2-Bromopropane

D. 2-Iodopropane

Answer: B

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10. Write 1st 5 order and define What is spectrochemical series?

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11. IUPAC Name of K2[PdCl4]

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12. In electrophilic substitution reactions of haloarenes, halogen atom is

A. Slightly activating and o, p-directing

B. Slightly deactivating and meta directing

C. Slightly activating and meta directing

D.

Answer: C

13. The s-orbital does not show preference to any direction because _____

A. It is the smallest orbital

B. It is present in every atom

C. It is spherically symmetric

D. It is the first orbital

Answer: B

14. What are crystal fields?

15. Chemical formula of Freon 12 is

A. CH_2F_2

B. CH_2CL_2

C. CLF_3

D. CL_2F_2
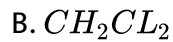
Answer: D

16. The total number of atoms in one unit cell of primitive unit cubic cell is _____ atom(s).

A. 1

B. 8

C. 4

D. 2

Answer: B

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17. What does the ratio 'space occupied/total space' denote?

A. Packing factor

B. Packing efficiency

C. Particle fraction

D. Packing unit

Answer: C

18. Aluminium crystallises in a face-centred cubic lattice. The edge length of the unit cell of aluminium is 4.05 x 10-10m. What is the density of aluminium? (Atomic mass of Al=27)

A. $2700 kgm^{-3}$

B. $3000 kgm^{-3}$

C. $2400 kgm^{-3}$

D. $2100 kgm^{-3}$

Answer: D

19. Gold (atomic mass 197 u) crystallises in a face-centred unit cell. What is its atomic radius if the edge length of the gold unit cell is $0.407x10^{-9}$m?

A. 0.115 nm

B. 0.144 nm

C. 0.235 nm

D. 0.156 nm

Answer: D

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20. Why is butan-1-ol optically inactive but butan-2-ol is optically active?

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21. What are the products obtained from the following reaction?

$CHCL_3 + O_2 - - \rightarrow (\ \hat{}\ light)$
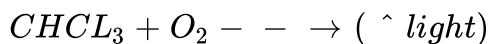
A. HCHO and HCl

B. HCOCl and HCl

C. $COCl_2$ and HCl

D. $COCl_2$ and HCOCl

Answer: C

22. The radius of an atom of an element is 55 pm. What is the edge length of the unit cell if it is body-centred cubic?

A. 144.6 pm

B. 163.4 pm

C. 127.0 pm

D. 123.5pm

Answer: D

23. If 1 litre of a gas A at 500 mm and 0.5 litre of gas B at 800 mm are taken in a 2–litre bulb, the resulting pressure is:

A. 200

B. 300

C. 450

D. 500

Answer: D

24. What are Grignard reagents? Give a chemical reaction for their preparation

25. Choose the secondary alcohol among the following

    A. Isobutyl alcohol

    B. Isopropyl alcohol

    C. Isopentyl alcohol

    D. Neopentyl alcohol

Answer: B

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26. The alcohol having least solubility in water is

    A. Ethanol

    B. 1-Propanol

    C. 1-Butanol

    D. 1-Pentanol

Answer: D

27. The correct structure of hydroquinone or quinol is

28. In acid catalysed hydration of alkenes, reaction intermediate formed is

    A. Free radical

    B. Carbocation

    C. Carbanion

    D. Carbene

Answer: B

29. A metal X has a BCC structure with nearest neighbor distance 365.9 pm. What is metal X if its density is 1.0016 g cm^{-3}?

    A. Aluminum

    B. Magnesium

    C. Sodium

    D. Potassium

Answer: B

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30. Lithium forms a BCC lattice with an edge length of 350 pm. The experimental density of lithium is 0.53 g cm-3. What is the percentage of missing lithium atoms? (Atomic mass of Lithium = 7 amu)

    A. 97.7%

    B. 95.4%

C. 4.6%

D. 2.3%

Answer: B

31. An element of density 8.0 g/cm3 forms an FCC lattice with unit cell edge of 300 pm. Calculate the number of atoms present in 0.5kg of the element.

A. $95x10^{23}$ atoms

B. $93.59x10^{23}$ atoms

C. $92.59x10^{23}$ atoms

D. $91.38x10^{23}$ atoms

Answer: B

32. Phenol is also known as

A. Phenolic acid

B. Hydroxy cinnamic acid

C. Carbolic acid

D. Hydroxy carbolic acid

Answer: C

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33. If the radius of a Chloride ion is 0.154 nm, then what is the maximum size of a cation that can fit in each of its octahedral voids?

A. 1.15×10^{-1} nm

B. 1.21×10^{-1} nm

C. 1.18×10^{-1} nm

D. 1.13×10^{-1} nm

Answer: D

---

34. The correct order of boiling point is:

A. n-butane lt ethoxyethane lt pentan-1-ol

B. n-butane ltpentan-1-olltethoxyethane

C. Ethoxyethane ltn-butane lt pentan-1-ol

D. Pentan-1-ol ltethoxyethane ltn-bulane

Answer: A

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35. When cumene is oxidised in the presence of air followed by treatment with dilute acid, the products obtained are

A. Benzoic acid and Methanol

B. Phenol and Acetone

C. Benzoic acid and Acetone

D. Phenol and Acetaldehyde

Answer: B

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36. Rubidium Chloride (RbCl) has NaCl like structure at normal pressures. If the radius of the Chloride ion is 1.54 Å, what is the unit cell edge length for RbCl? (Assuming anion-anion contact)

A. 4.25 A°

B. 4.78 A°

C. 4.35 A°

D. 5.14 A°

Answer: B

37. A metal crystallises as body centred cubic lattice with the edge length of unit cell equal to 0.304 nm. If the molar mass of the metal is 50.3 $gmol^{-1}$, its density (in g cm^{-3}) is :

A. 5.945

B. 2.9725

C. 8.915

D. 4.458

Answer: C

38. Calculate the density of diamond from the fact that it has a face-centered cubic structure with two atoms per lattice point and unit cell edge length of 3.569×10^{-8} cm.

A. 3.509 g cm^{-3}

B. 7.012 g cm^{-3}

C. 5.012 g cm^{-3}

D. 1.206 g cm^{-3}

Answer: D

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39. Which of the following statement is correct for alcohols?

A. They react only as a nucleophile

B. They react only as an electrophile

C. They react both as a nucleophile and an electrophile

D. They neither react as a nucleophile nor an electrophile

Answer: C

40. A metal crystallizes into two cubic phases BCC and FCC. The ratio of densities of FCC and BCC is equal to 1.5. Calculate the difference between the unit cell lengths of the FCC and BCC crystals if the edge length of the FCC crystal is equal to 4.0 Å.

A. 0.5 Å

B. 0.37 Å

C. 0.28 Å

D. 0.73 Å

Answer: D

41. An element with cell edge of 288 pm has a density of 7.2 g cm-3. What type of structure does the element have if it's atomic mass M=51.8 g mol-1?

    A. Body-Centred Cubic (BCC)

    B. Face-Centred Cubic (FCC)

    C. Simple Cubic

    D. Hexagonal Closed Packing (HCP)

Answer: C

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42. Sodium metal crystallises in bcc lattice with the cell adge, a equal to 42.29 A˚ . What is the radius (in A˚) of sodium atom?

    A. 1.86

    B. 1.90

    C. 18.3

D. 1.21

Answer: C

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43. Acetylation of salicylic acid produces

A. Adipic acid

B. Picric acid

C. Glutaric acid

D. Aspirin

Answer: D

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44. If metallic atoms of mass 197 and radius 166 pm are arranged in ABCABC fashion then what is the surface area of each unit cell?

A. 1.32×10^{6} pm2

B. 1.32×10^{-18} pm2

C. 2.20×10^{5} pm2

D. 2.12×10^{-19} pm2

Answer: B

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45. If copper, density = 9.0 g/cm3 and atomic mass 63.5, bears face-centered unit cells then what is the ratio of surface area to volume of each copper atom?

A. 0.0028

B. 0.0235

C. 0.0011

D. 0.0323

Answer: B

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46. Formation of Salicylic acid from phenol (Kolbe's reaction) is an example
of

    A. Electrophilic addition reaction

    B. Nucleophilic addition reaction

    C. Electrophilic substitution reaction

    D. Nucleophilic substitution reaction

Answer: C

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47. Reaction intermediate formed in the formation of salicylaldehyde from phenol (Reimer-Tiemann reaction) is

A. Carbocation

B. Free radical

C. Carbanion

D. Carbene

Answer: D

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48. If a metal forms a FCC lattice with unit edge length 500 pm. Calculate the density of the metal if its atomic mass is 110.

A. $2923 kgm^{-3}$

B. $5846 kgm^{-3}$

C. $8768 kgm^{-3}$

D. $1750 kgm^{-3}$

Answer: C

49. What is the radius of a metal atom if it crystallizes with body-centered lattice having a unit cell edge of 333 Pico meter?

A. 1538.06 pm

B. 769.03 pm

C. 288.38 pm

D. 144.19 pm

Answer: C

50. ΔHvap for water is 40.7 KJ mol^{-1} . The entropy of vaporization of water is:

    A. 407 J $mol^{-1}k^{-1}$

    B. 756 J $mol^{-1}k^{-1}$

    C. 109 J $mol^{-1}k^{-1}$

    D. 40.7 kJ/mol

Answer: B

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51. The enthalpy of vaporization for water is 186.5 KJ mol^{-1} ,the entropy of its vaporization will be:

    A. 4.07 J $mol^{-1}k^{-1}$

    B. 1.02 KJ $mol^{-1}k^{-1}$

    C. 0.7 J $mol^{-1}k^{-1}$

D. 0.5 KJ $mol^{-1}k^{-1}$

Answer: B

52. The enthalpy of vaporization of liquid is 40 kJ mol^{-1} and entropy of vaporization is 64 J $mol^{-1}k^{-1}$. The boiling point of the liquid is

A. 625 K

B. 254 K

C. 456 K

D. 725 K

Answer: C

53. At NTP, the solubility of natural gas in water is 0.8 mole of gas/kg of water. What is the Henry's law constant for natural gas?

A. 8 kN/m^2

B. 7.90 x 10^{-3}Pa

C. 71.36 bar

D. 105 mmHg

Answer: B

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54. Order of reactivity of hydrogen halides towards ethers is

A. $HCl > HBr > HI$

B. $HI > HBr > HCl$

C. $HBr > HI > HCl$

D. $HBr > HCl > HI$
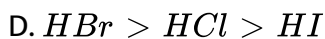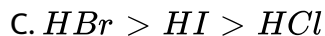
Answer: B

55. The following reaction takes place through

$$CH_3 - O - CH_2 - CH_3 + HI \text{ to } CH_3 - I + CH_3 - CH_2 - OH$$
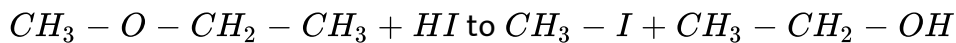
A. S_N1 mechanism

B. S_N2 mechanism

C. S_N1 in first step and E2 in second step

D. S_N2 in first step and E1 in second step

Answer: B

56. Which of the following is an appropriate set of reactants for the preparation of 1-methoxy-4-nitrobenzene and why?

(i)

Br

+ CH₃ONa

NO₂

(ii)

ONa

+ CH₃Br

NO₂
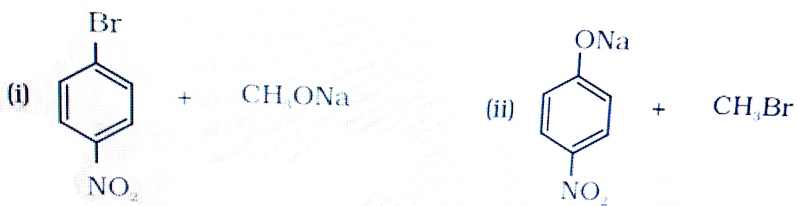
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57. The common name of Prop-2-enal is

A. Catechol

B. Acrolein

C. Vanillin

D. Valeraldelyde

Answer: B

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58. For denaturation of ethanol

A. Copper sulphate is added to give colour and pyridine for foul smell

B. Nickel sulphate is added to give colour and aniline for foul smell

C. Copper sulphate is added to give colour and aniline for foul smell

D. Nickel sulphate is added to give colour and pyridine for foul smell

Answer: A

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59. In aldehydes and ketones

A. Carbonyl carbon is nucleophilic and carbonyl oxygen is electrophilic

B. Carbonyl carbon, is slectrophilic and carbonyl oxygen is nucleophilic

C. Both are electrophilic

D. Both are nucleophilic

Answer: B

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60. What is the molar solubility product for $V_3(PO_4)_5$ in terms of K_{SP}?

A. $S = \left(\dfrac{K_{SP}}{84375} \right)^{\frac{1}{8}}$

B. $S = \left(\dfrac{K_{SP}}{155} \right)^{\frac{1}{8}}$

C. $S = \left(\dfrac{K_{SP}}{108} \right)^{\frac{1}{8}}$

D. $S = (K_{SP})^{\frac{1}{8}}$

Answer: C

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61. If ethanol and chloroform are present in a molar ratio of 2:3 then what is

the vapor pressure at 20° C if vapor pressures of pure liquids are 5.95 kPa

and 21.17 kPa, respectively?

A. 16.692 kPa

B. 15.082 kPa

C. 8.731 kPa

D. 12.038 kPa

Answer: C

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62. 5 moles of liquid X and 10 moles of liquid Y make a solution having a total vapour pressure 70 torr. The vapour pressures of pure X and pure Y are 64 torr and 76 torr respectively.Calculate the expected pressure.

A. 70 torr

B. 80 torr

C. 72 torr

D. 82 torr

Answer: A

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63. When 2.0 grams of copper (II) nitrate is added to 1000 ml of pure water, by how much is the vapor pressure of water decreased, given that at 20ºC the vapor pressure of pure water is 17.535 mm Hg?

A. 0.303

B. 0.0333

C. 0.0033

D. 3.14 x 10^{-4}

Answer: B

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64. At 70ºC the vapor pressure of pure water is 31 kPa. Which of the following is most likely the vapor pressure of a 2.0 molal aq. glucose solution at 70ºC?

A. 30.001 kPa

B. 29.915 kPa

C. 28.226 kPa

D. 32.392 kPa

Answer: B

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65. 117 g of NaCl is added to 222 g of water in a saucepan. At what does temperature does water boil at 101.325 kPa? Ebullioscopy constant for water = 0.52 K kg mol-1 and b.p. = 100°C

A. 98.3°C

B. 102.8°C

C. 104.7°C

D. 101.5°C

Answer: C

66. Boiling point of chloroform is 61ºC. After addition of 5.0 g of a non-volatile solute to 20 g chloroform boils at 64.63ºC. If kb = 3.63 K kg mol-1, what is the molecular weight of the solute?

    A. 320 g/mol

    B. 100 g/mol

    C. 400 g/mol

    D. 250 g/mol

Answer: C

67. Pure CS_2 melts at -112ºC. 228 grams of propylene glycol crystals is mixed with 500 grams of CS_2. If k_f of $CS_2 = -3.83 Kkgmol^{-1}$ what is the depression in freezing point?

A. 23°C

B. -135°C

C. -20°C

D. -100°C

Answer: D

68. Addition of water to ethyne in the presence of H_2SO_4 and HgSO_4`

gives

A. Acetone

B. Acetaldehyde

C. Formaldehyde

D. Glyoxal

Answer: B

69. The given reaction is an example of
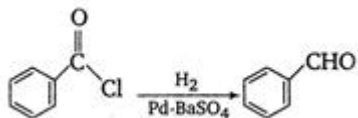
A. Stephen reaction

B. Rosenmund reduction

C. Etard reaction

D. Gattermann Koch reaction

Answer: B

70. The van't Hoff factor of $BaCl_2$ at 0.01 M concentration is 1.98. The percentage of dissociation of $BaCl_2$ at this concentration is:

A. 49

B. 69

C. 89

D. 79

Answer: A

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71. n-Butyl bromide has higher boiling point than t-butyl bromide.

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72. The depression of freezing point of a solution of acetic acid in benzene is – 0.2°C. If the molality of acetic acid is 0.1 m, then find the ratio of the normal mass to the abnormal mass. (Assume Kf of acetic acid = 4.0°C m-1)

A. 1.5

B. 0.5

C. 0.8

D. 0.2

Answer: A

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73. The incorrect statement for aldehydes and ketones is

A. Methanal, ethanal and propanone are miscible in water

B. All aldehydes and ketones are fairly soluble in organic solvents like

benzene, chloroform, etc.

C. Many naturally occurring aldehyde and ketones are used in the

blending of perfumes

D. All aldehydes and ketones are fragrant

Answer: D

74. The shape of the intermediate formed In nucleophilic addilion reaction of aldehydes and ketones is

    A. Trigonal planar

    B. Tetrahedral

    C. Trigonal bipyramidal

    D. Bent

Answer: B

75. Ketones are generally less reactive than Aldehydes in nucleophilic addition reactions because

A. Carbonyl carbon in ketones is sterically more protected and more

electrophilic

B. Carbonyl carbon in aldehydes is sterically more protected and more

electrophilic

C. Carbonyl carbon in aldehydes is sterically less protected and less

electrophilic

D. Carbonyl carbon in ketones is sterically more protected and less

electrophilic

Answer: D

76. Acetic acid associates as dimers in benzene. What is the Van't Hoff factor

(i) if the degree of association of acetic acid is 50%?

A. 0.25

B. 0.50

C. 0.75

D. 0.40

Answer: C

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77. The pH of a 2 M solution of a weak monobasic acid (HA) is 4. What is the value of the Van't Hoff factor?

A. 0.00005

B. 1.05

C. 1.005

D. 1.00005

Answer: C

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78. In the given reaction, product formed is

$$CH_3CHO + HCN \longrightarrow CH_3CH(OH)CN$$
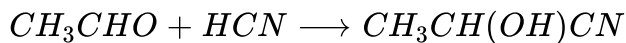
A. Laevorotatory

B. Racemic nixture

C. Meso compound

D. Dextrorotatory

Answer: B

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79. State true or false : red phosphorus less reactive than white phosphorus

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80. Which of the following conditions are satisfied when the cell reaction in the electrochemical cell is spontaneous?

A. $\Delta G° > 0$

B. $E°cell < 0$

C. $E°cell = 0$

D. $\Delta G° < 0$

Answer: B

81. What is the EMF of a galvanic cell if $E°cathode = 0.80$ volts and $E°anode = -0.76$ volts?

A. 1.56 volts

B. 0.04 volts

C. -1.56 volts

D. -0.04 volts

Answer: C

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82. Tollen's reagent is

    A. Aqueous copper sulphate

    B. Alkaline sodium potassium tartarate

    C. Ammoniacal silver nitrate

    D. Ammoniacal silver chloride

Answer: C

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83. What is the standard reduction potential of the cathode of a galvanic cell if the standard EMF of the cell and the standard reduction potential of the anode are 2.71 and -2.37 respectively?

A. 0.68 volts

B. -0.68 volts

C. -0.34 volts

D. 0.34 volts

Answer: C

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84. What is the EMF of a galvanic cell if the standard reduction potential of the reduction half-reaction is -0.38 volts and the standard reduction potential of the oxidation half-reaction is 0.52 volts?

A. -0.9 volts

B. -0.6 volts

C. 0.9 volts

D. 0.6 volts

Answer: B

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85. Who invented the galvanic cell?

A. Galvani and Volta

B. Henry Cavendish

C. Joseph Priestley

D. Antoine Lavoisier

Answer: A

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86. Calculate the e.m.f. of the half-cell given below. Pt, H2 | HCl at 1-atmosphere pressure and 0.1 M. Given, E°(OP) = 2 V.

    A. 4 V

    B. 5.6 V

    C. 3.4 V

    D. 5.4 V

Answer: B

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87. What is the EMF of a galvanic cell if the standard oxidation potential of the oxidation half-reaction is 0.64 volts and the standard reduction potential of the reduction half-reaction is 0.48 volts?

    A. 1.48 volts

    B. 1.12 volts

C. 1.36 volts

D. 0.96 volts

Answer: C

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88. The standard oxidation potential of Ni/Ni2+ electrode is 0.3 V. If this is combined with a hydrogen electrode in acid solution, at what pH of the solution with the measured e.m.f. be zero at 25°C? (Assume [Ni2+] = 1M)

A. 5.08

B. 4

C. 4.5

D. 5.25

Answer: D

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89. Equal amount of aqueous solution of $CuSO_4$ and alkaline sodium potassium tartarate is mixed and treated with aliphatic aldehyde, then

A. Red brown ppt of Cu_2O is formed

B. Red brown ppt of Cuo is formed

C. Blue ppt of CuO is formed

D. There will be no reaction

Answer: A

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90. Mixture of carboxylic acids oblained by the oxidation of hexan-3-one does not contain

A. Methanoic acid

B. Ethanoic acid

C. Propanoic acid

D. Butanoic acid

Answer: A

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91. Benzaldehyde can be oxidised to corresponding carboxylate anion with

A. Fehling's reagent

B. Tollen's reagent

C. Both Fehling's and Tollen's reagent

D. Neither Fehling's nor Tollen's reagent

Answer: B

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92. Calculate the equilibrium constant for the reaction $Fe + CuSO_4 \rightleftharpoons FeSO_4 + Cu$ at 25ºC. (Given Eº(OP/Fe) = 0.5 Vº, Eº(OP/Cu) = -0.4 V)

A. 3.46×10^{30}

B. 3.46×10^{26}

C. 3.22×10^{30}

D. 3.22×10^{26}

Answer: A

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93. PH3 forms bubbles when passed slowly in water but NH3 dissolves. $(T \ or \ F)$

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94. The equilibrium constant for a cell reaction, $Cu(g) + 2Ag^+(aq) \rightarrow Cu^{2+}(aq) + 2Ag(s)$ is 4×10^{16}. Find E° (cell) for the cell reaction.

A. 0.63 V

B. 0.49 V

C. 1.23 V

D. 3.24 V

Answer:

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95. What is the correct Nernst equation for $M^{2+}(aq) + 2e^+ \rightarrow M$(s) at 45°C?

A. $E^o\left(\dfrac{M^{2+}}{M}\right) + 0.315\log_{10}\left(\dfrac{1}{[M]^{+2}}\right)$

B. $E^o\left(\dfrac{M^{2+}}{M}\right) + 0.0425\log_{10}\left(\dfrac{1}{[M]^{+2}}\right)$

C. $E^o\left(\dfrac{M^{2+}}{M}\right) + 0.0315\log_{10}\left(\dfrac{1}{[M]^{+2}}\right)$

D. $E^o\left(\dfrac{M^{2+}}{M}\right) + 0.0326\log_{10}\left(\dfrac{1}{[M]^{+2}}\right)$

Answer: B

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