

61. Which of the following compounds can be detected by Molisch's test?

- (1) Primary alcohols (2) Nitro compounds
 (3) Sugars (4) Amines

Sol: [3] Molisch test used for identification of sugar.

62. The increasing order of the ionic radii of the given isoelectronic species is

- (1) K^+ , S^{2-} , Ca^{2+} , Cl^-
 (2) Cl^- , Ca^{2+} , K^+ , S^{2-}
 (3) S^{2-} , Cl^- , Ca^{2+} , K^+
 (4) Ca^{2+} , K^+ , Cl^- , S^{2-}

Sol: [4] In isoelectronic series as $\frac{Z}{e}$ increases size decreases.

	Ca^{2+}	K^+	Cl^-	S^{2-}
$\frac{Z}{e}$	$\frac{20}{18}$	$\frac{19}{18}$	$\frac{17}{18}$	$\frac{16}{18}$

Size Ca^{2+} , K^+ , Cl^- , S^{2-}

63. Which one of the following statements is correct?

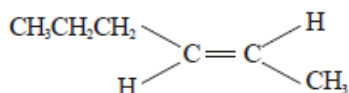
- (1) All amino acids except glutamic acid are optically active.
 (2) All amino acids except lysine are optically active.
 (3) All amino acids are optically active.
 (4) All amino acids except glycine are optically active.

Sol: [4] Structure of glycine is $H_2N - CH_2 - COOH$
 No chiral carbon,

64. 2 – Hexyne gives trans – 2 – Hexene on treatment with

- (1) $LiAlH_4$ (2) Pt / H_2
 (3) Li / NH_3 (4) $Pd / BaSO_4$

Sol: [3] $H_3C - H_2C - H_2C - C \equiv C - CH_3 \xrightarrow{Li/NH_3}$



65. The species which can best serve as an initiator for the cationic polymerization is

- (1) $BuLi$ (2) $LiAlH_4$
 (3) HNO_3 (4) $AlCl_3$

Sol: [4] for cationic polymerization, the species which helps in the formation of cation is Lewis acid i.e. $AlCl_3$.

66. The standard reduction potentials for Zn^{2+} / Zn , Ni^{2+} / Ni , and Fe^{2+} / Fe are -0.76 , -0.236 and -0.44 V respectively. The reaction $X + Y^{2+} \rightarrow X^{2+} + Y$ will be spontaneous when

- (1) $X = Zn$, $Y = Ni$
 (2) $X = Ni$, $Y = Fe$
 (3) $X = Ni$, $Y = Zn$
 (4) $X = Fe$, $Y = Zn$,

Sol: [1] $Zn + Ni^{2+} \longrightarrow Zn^{2+} + Ni$

67. Lithium forms body centred cubic structure. The length of the side of its unit cell is 351 pm. Atomic radius of the lithium will be

- (1) 152 pm (2) 75 pm
 (3) 300 pm (4) 240 pm

Sol: [1] for bcc

$$\sqrt{3}a = 4r$$

$$r = \frac{1.732 \times 351}{4} = 151.9 \approx 152 \text{ pm}$$

68. The electrons identified by quantum numbers n and l :

- (a) $n = 4$, $l = 1$ (b) $n = 4$, $l = 0$
 (c) $n = 3$, $l = 2$ (d) $n = 3$, $l = 1$

can be placed in order of increasing energy as

- (1) $(a) < (c) < (b) < (d)$
 (2) $(c) < (d) < (b) < (a)$
 (3) $(d) < (b) < (c) < (a)$
 (4) $(b) < (d) < (a) < (c)$

Sol: [3] According to Aufbau principle orbital whose $(n + l)$ is minimum should be filled first. If $(n + l)$ is same then for lower value of n , should be filled first.

69. According to Freundlich adsorption isotherm, which of the following is correct?

- (1) $\frac{x}{m} \propto p^0$ (2) $\frac{x}{m} \propto p^1$
 (3) $\frac{x}{m} \propto p^{1/n}$

(4) All the above are correct for different ranges of pressure.

Sol: [4] Freundlich adsorption isotherm apply for different range of pressures

$$\frac{x}{m} \propto p^{1/n}$$

70. The density of a solution prepared by dissolving 120 g of urea (mol. mass = 60 u) in 1000 g of water is 1.15 g/mL. The molarity of this solution is

- (1) 2.05 M (2) 0.50 M
(3) 1.78 M (4) 1.02 M

Sol: [1] Volume of solution = $\frac{1000}{1.15}$ mL

$$M = \frac{\text{no of moles}}{\text{Volume of solution in (L)}}$$

$$M = \frac{120 \times 1.15 \times 1000}{60 \times 1000} = 2.05 \text{ M}$$

71. The pH of a 0.1 molar solution of the acid HQ is 3. The value of the ionization constant, K_a of this acid is

- (1) 1×10^{-7} (2) 3×10^{-1}
(3) 1×10^{-3} (4) 1×10^{-5}

Sol: [4] $\text{HA} \longrightarrow \text{H}^+ + \text{A}^-$

$$\therefore [\text{H}^+] = \alpha C = 10^{-3}$$

$$\therefore C = 0.1 \text{ M}$$

$$\text{so } \alpha = \frac{10^{-3}}{0.1} = 10^{-2}$$

$$\text{now } K_a = \alpha^2 C = (10^{-2})^2 \times 0.1 = 10^{-5}$$

72. The **incorrect** expression among the following is

(1) $K = e^{-\Delta G^\circ / RT}$

(2) $\frac{\Delta G_{\text{system}}}{\Delta S_{\text{total}}} = -T$

(3) In isothermal process,

$$w_{\text{reversible}} = -nRT \ln \frac{V_f}{V_i}$$

(4) $\ln K = \frac{\Delta H^\circ - T\Delta S^\circ}{RT}$

Sol: [4] $\Delta G^\circ = -RT \ln K$

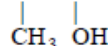
$$\frac{\Delta H^\circ - T\Delta S^\circ}{RT} = -\ln K$$

$$\text{hence } \ln K = \frac{T\Delta S^\circ - \Delta H^\circ}{RT}$$

73. Iodoform can be prepared from all except:

- (1) Isobutyl alcohol
(2) Ethyl methyl ketone
(3) Isopropyl alcohol
(4) 3 - Methyl - 2 - butanone

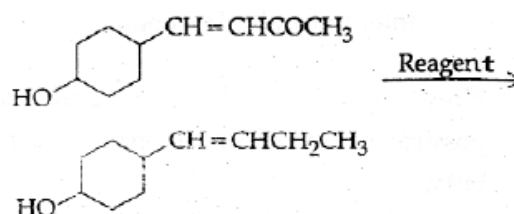
Sol: [1] $\text{CH}_3 - \text{CH} - \text{CH}_2$ (isobutyl alcohol) does not



contain $\text{CH}_3 - \text{CH}$ group.



74. In the given transformation, which of the following is the most appropriate reagent?



- (1) NaBH_4 (2) $\text{NH}_2\text{NH}_2, \text{OH}^-$
(3) $\text{Zn} - \text{Hg} / \text{HCl}$ (4) $\text{Na}, \text{Liq. NH}_3$

Sol: [2] $\text{NH}_2\text{NH}_2, \text{OH}^-$ converts $> \text{C} = \text{O}$ group into $-\text{CH}_2 -$ group without affecting $-\text{OH}$ group and $> \text{C} = \text{C} <$

75. Very pure hydrogen (99.9%) can be made by which of the following processes?

- (1) Reaction of salt like hydrides with water
(2) Reaction of methane with steam
(3) Mixing natural hydrocarbons of high molecular weight
(4) Electrolysis of water

Sol: [4] By electrolysis of water

76. Which among the following will be named as dibromidobis (ethylene diamine) chromium (III) bromide?

- (1) $[\text{Cr}(\text{en})\text{Br}_2]\text{Br}$ (2) $[\text{Cr}(\text{en})_3]\text{Br}_3$
(3) $[\text{Cr}(\text{en})_2\text{Br}_2]\text{Br}$ (4) $[\text{Cr}(\text{en})\text{Br}_4]$

Sol: [3] $[\text{Cr}(\text{en})_2\text{Br}_2]\text{Br}$

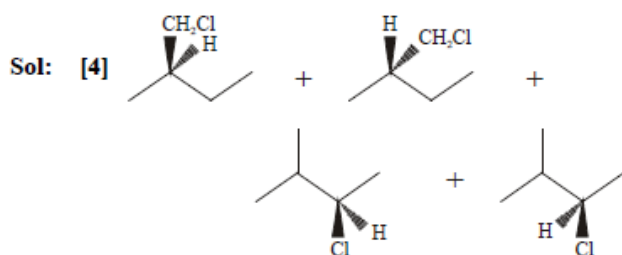
77. Ortho-Nitrophenol is less soluble in water than p- and m-Nitrophenols because

- (1) Melting point of o -Nitrophenol is lower than those of m - and p - isomers.
(2) o -Nitrophenol is more volatile in steam than those of m - and p - isomers.
(3) o -Nitrophenol shows Intramolecular H - bonding
(4) o -Nitrophenol shows Intermolecular H - bonding

Sol: [3] ortho-Nitrophenol is less soluble in water because it shows intramolecular hydrogen bonding.

78. How many chiral compound are possible on monochlorination of 2 - methyl butane?

- (1) 6 (2) 8
(3) 2 (4) 4



79. Iron exhibits +2 and +3 oxidation states. Which of the following statements about iron is incorrect?

- (1) Ferrous compound are more easily hydrolysed than the corresponding ferric compounds.
(2) Ferrous oxide is more basic in nature than the ferric oxide.
(3) Ferrous compounds are relatively more ionic than the corresponding ferric compounds.
(4) Ferrous compounds are less volatile than the corresponding ferric compounds.

Sol: [1] The incorrect statement is that ferrous compounds are more easily hydrolysed. In fact ferric compounds are more easily hydrolysed due to more covalent character because of greater charge to radius ratio

80. What is DDT among the following:

- (1) Non - biodegradable pollutant
(2) Greenhouse gas
(3) A fertilizer
(4) Biodegradable pollutant

Sol: [1] DDT is non-biodegradable pollutant

81. K_f for water is $1.86 \text{ K kg mol}^{-1}$. If your automobile radiator holds 1.0 kg of water, how many grams of ethylene glycol ($\text{C}_2\text{H}_6\text{O}_2$) must you add to get the freezing point of the solution lowered to $-2.8 \text{ }^\circ\text{C}$?

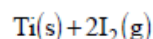
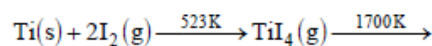
- (1) 27 g (2) 72 g
(3) 93 g (4) 39 g

Sol: [3] $\Delta T_f = K_f m$

$$2.8 = 1.86 \times \frac{w_0}{62 \times 1}$$

$$w_0 = \frac{62 \times 2.8}{1.86} = 93.33 \text{ g}$$

82. Which method of purification is represented by the following equation:



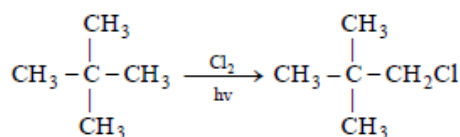
- (1) Van Arkel (2) Zone refining
(3) Cupellation (4) Poling

Sol: [1] It is Van Arkel process of purification

83. Which branched chain isomer of the hydrocarbon with molecular mass 72u gives only one isomer of mono substituted alkyl halide?

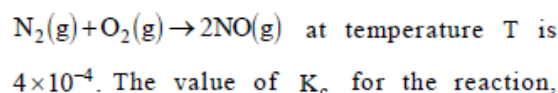
- (1) Neohexane
(2) Tertiary butyl chloride
(3) Neopentane
(4) Isohexane

Sol: [3] Neopentane



molecular mass 72

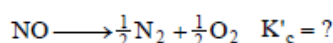
84. The equilibrium constant (K_c) for the reaction



The value of K_c for the reaction, $\text{NO}(\text{g}) \rightarrow \frac{1}{2}\text{N}_2(\text{g}) + \frac{1}{2}\text{O}_2(\text{g})$ at the same temperature is

- (1) 50.0 (2) 0.02
(3) 2.5×10^2 (4) 4×10^{-4}

Sol: [1] $\text{N}_2 + \text{O}_2 \rightarrow 2\text{NO} \quad K_c = 4 \times 10^{-4}$



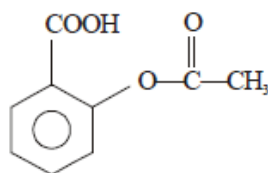
$$K'_c = \frac{1}{\sqrt{K_c}} = \frac{1}{\sqrt{4 \times 10^{-4}}} = \frac{100}{2} = 50$$

85. For a first order reaction, $(\text{A}) \rightarrow \text{products}$, the concentration of A changes from 0.1 M to 0.025 M in 40 minutes. The rate of reaction when the concentration of A is 0.01 M, is

- (1) $1.73 \times 10^{-4} \text{ M/min}$
(2) $1.73 \times 10^{-5} \text{ M/min}$
(3) $3.47 \times 10^{-4} \text{ M/min}$
(4) $3.47 \times 10^{-5} \text{ M/min}$

Sol: [3] $[A]_0 = 0.1$
 $[A] = 0.025$
 for first order it is equal to 2 half lives hence
 $2T_{1/2} = 40 \text{ min}$
 $T_{1/2} = \frac{40}{2} = 20 \text{ min}$
 $K = \frac{0.693}{20}$
 Now $t = \frac{2.303 \times 20}{0.693} \log \frac{0.1}{0.01}$
 $t = 3.47 \times 10^{-4} \text{ M/min}$

86. Aspirin is known as
 (1) Methyl salicylic acid
 (2) Acetyl salicylic acid
 (3) Phenyl salicylate
 (4) Acetyl salicylate



- Sol:** [2]
87. The molecule having smallest bond angle is
 (1) PCl_3 (2) NCl_3
 (3) AsCl_3 (4) SbCl_3

Sol: [4] Due to less electronegativity of Sb lone pair-bond pair repulsion dominates, consequently bond angle decreases.

88. The compressibility factor for a real gas at high pressure is
 (1) $1 - \frac{pb}{RT}$ (2) $1 + \frac{RT}{pb}$
 (3) 1 (4) $1 + \frac{pb}{RT}$

Sol: [4] $\left(P + \frac{an^2}{V^2}(V - nb) \right) = nRT$
 at high pressure
 $PV - Pb = RT$
 $PV = RT + Pb$
 $\frac{PV}{RT} = \frac{RT}{RT} + \frac{Pb}{RT}$
 $Z = 1 + \frac{Pb}{RT}$

89. Which of the following on thermal-decomposition yields a basic as well as an acidic oxide?
 (1) NH_4NO_3 (2) NaNO_3
 (3) KClO_3 (4) CaCO_3

Sol: [4] $\text{CaCO}_3 \xrightarrow{\Delta} \text{CaO} + \text{CO}_2$

90. In which of the following pairs the two species are **not** isostructural?
 (1) AlF_6^{3-} and SF_6
 (2) CO_3^{2-} and NO_3^-
 (3) PCl_4^+ and SiCl_4
 (4) PF_5 and BrF_5

Sol: [4] $\text{PF}_5 = sp^3d$ hybridization (Trigonal bi pyramidal)
 $\text{BrF}_5 = sp^3d^2$ hybridization (square pyramidal)