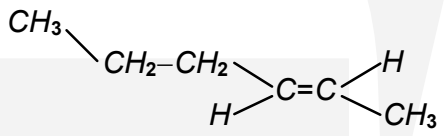
AIEEE- 2012 Chemistry

PART B - CHEMISTRY

31. 2- Hexyne gives trans -2- Hexene on treatment with :
(1) Li / NH_3 (2) $Pd / BaSO_4$ (3) $LiAlH_4$ (4) Pt / H_2

31. **(1)** $CH_3-CH_2-CH_2-C\equiv C-CH_3 \xrightarrow{Li / NH_3}$ 

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

32. **(2)** $CaCO_3 \xrightarrow{\Delta} \underset{\text{(Basic)}}{CaO} + \underset{\text{(acidic)}}{CO_2}$

33. Which one of the following statements is correct ?
(1) All amino acids are optically active
(2) All amino acids except glycine are optically active
(3) All amino acids except glutamic acid are optically active
(4) All amino acids except lysine are optically active

33. **(2)** Structure of glycine is $\begin{matrix} CH_2-COOH \\ | \\ NH_2 \end{matrix}$

34. 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) 1.78 M (2) 1.02 M (3) 2.05 M (4) 0.50

34. **(3)** Mass of solution = 1000 + 120 = 1120 g
Volume of solution = (1120 / 1.15) g / cc

$\therefore \quad M = \dfrac{120\times 1.15\times 1000}{60\times 1120} = 2.05(M)$

35. The incorrect expression among the following is :

(1) In isothermal process,

$$W_{\text{reversible}} = -nRT\,1n\frac{V_f}{V_i}$$

(2) $1nK = \dfrac{\Delta H^\circ - T\Delta S^\circ}{RT}$

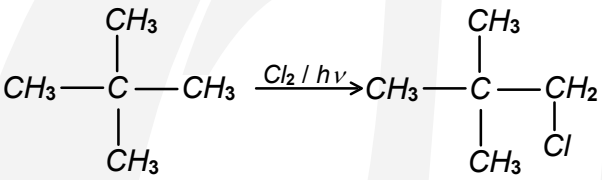
(3) $K = e^{-\Delta G^\circ / RT}$

(4) $\dfrac{\Delta G_{\text{system}}}{\Delta S_{\text{total}}} = -T$

35. **(2)** $\Delta G^\circ = -RT \ln K$

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

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

36. **(1)**  (only one isomer)

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

(1) $\dfrac{x}{m} \propto p^1$

(2) $\dfrac{x}{m} \propto p^{1/n}$

(3) $\dfrac{x}{m} \propto p^0$

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

37. **(4)** At low pressure $\dfrac{x}{m} \propto p^1$

At moderate pressure $\dfrac{x}{m} \propto p^{1/n}$

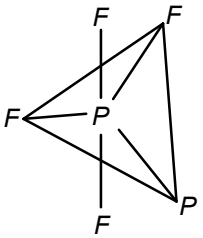
At high pressure $\dfrac{x}{m} \propto p^0$ (i.e. independent of pressure)

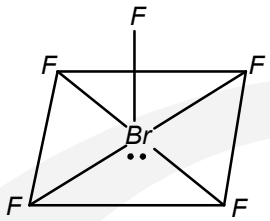
38. In which of the following pairs the two species are not isostructural ?

(1) PCl_4^+ and $SiCl_4$ (2) PF_5 and BrF_5

(3) AlF_6^{3-} and SF_6 (4) CO_3^{2-} and NO_3^-

38. **(2)**

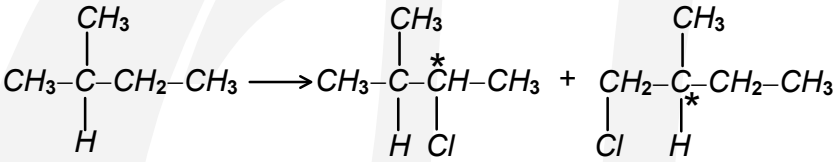




39. How many chiral compounds are possible on monochlorination of 2-methyl butane ?

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

39. **(2)**



and their enantiomers

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

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

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

40. **(2)** Greater the positive charge, smaller is the size of the ion. Greater the negative charge larger is the size of the ion for isoelectronic species.

41. The compressibility factor for a real gas at high pressure is :

(1) 1 (2) $1 + pb / RT$ (3) $1 - pb / RT$ (4) $1 + RT / pb$

41. **(2)** $\left(P + \frac{a}{V^2}\right)(v - b) = RT$

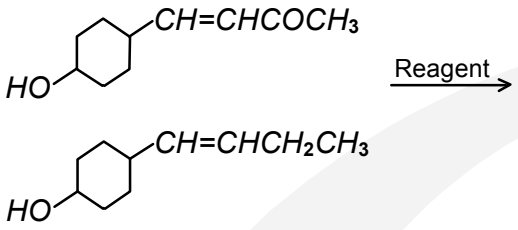
$P(V - b) = RT$ $\frac{a}{V^2}$ can be neglected

$$\therefore \quad \frac{PV}{RT} = 1 + \frac{Pb}{RT}$$

42. Which among the following will be named as dibromidobis (ethylene diamine) chromium (III) bromide ?
(1) $[Cr(en)_2Br_2]Br$ (2) $[Cr(en)Br_4]^-$ (3) $[Cr(en)Br_2]Br$ (4) $[Cr(en)_3]Br_3$

42. **(1)** As per the IUPAC convention.

43. In the given transformation, the following is the most appropriate reagent ?



(1) $Zn - Hg / HCl$ (2) Na, Liq. NH_3 (3) $NaBH_4$ (4) $NH_2NH_2, \overset{\ominus}{O}H$

43. **(4)** It should be basic reagent.

44. 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) 300 pm (2) 240 pm (3) 152 pm (4) 75 pm

44. **(3)** $4r = \sqrt{3} \times a$

$$r = \frac{\sqrt{3} \times 351}{4} = 152\text{pm}$$

45. K_f for water is 1.86 K kg mol^{-1}. If your automobile radiator holds 1.0 kg of water, how many grams of ethylene glycol ($C_2H_6O_2$) must you add to get the freezing point of the solution lowered to – 2.8° C ?
(1) 93 g (2) 39 g (3) 27 g (4) 72 g

45. (**1**) $2.8 = \frac{1.86 \times w}{62}$

46. The molecule having smallest bond angle is :
(1) $AsCl_3$ (2) $SbCl_3$ (3) PCl_3 (4) NCl_3

46. **(2)** Lower is the electronegativity of the central atom smaller is the bond angle.

47. What is DDT among the following :
(1) A fertilizer (2) Biodegradable pollutant
(3) Non-biodegradable pollutant (4) Greenhouse gas

47. **(3)** DDT (dichloro diphenyl trichloro ethane) is banned because it is a non-biodegradable pollutant.

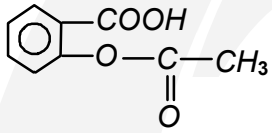
48. The *pH* of a 0.1 molar solution of the acid *HQ* is 3. The value of the ionization constant, *Ka* of this acid is :
(1) 1×10^{-3} (2) 1×10^{-5} (3) 1×10^{-7} (4) 3×10^{-1}

48. **(2)** $C\alpha = 10^{-3}$ $\therefore \alpha = 10^{-2}$
$k = C\alpha^2 = 0.1 \times (10^{-2})^2 = 1 \times 10^{-5}$

49. Very pure hydrogen (99.9%) can be made by which of the following processes ?
(1) Mixing natural hydrocarbons of high molecular weight
(2) Electrolysis of water
(3) Reaction of salt like hydrides with water
(4) Reaction of methane with steam

49. **(2)** Very pure hydrogen (99.9%) can be made by electrolysis of water.

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

50. **(4)** 

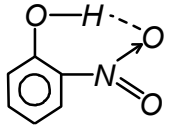
51. Which of the following compounds can be detected by Molisch's test ?
(1) Sugars (2) Amines
(3) Primary alcohols (4) Nitro compounds

51. **(1)** Molisch's test is used for the detection of carbohydrates. In which a small amount of α - napthol is added to the compound and then conc. sulphuric acid is dropped carefully, if the compound is carbohydrate, then a violet ring is obtained at the junction of the two liquids.

52. The standard reduction potentials for Zn^{2+} / *Zn*, Ni^{2+} / *Ni*, and Fe^{2+} / *Fe* are –0.76, – 0.23 and –0.44 V respectively. The reaction $X + Y^{2+} \rightarrow X^{2+} + Y$ will be spontaneous when **:**
(1) *X* = *Ni*, *Y* = *Zn* (2) *X* = *Fe*, *Y* = *Zn* (3) *X* = *Zn*, *Y* = *Ni* (4) *X* = *Ni*, *Y* = *Fe*

52. **(3)** E_{cell} should be positive. Zinc will have higher tendency to get oxidised and *Ni* have higher tendency to get reduced.

53. Ortho-Nitrophenol is less soluble in water than *p*–and *m*–Nitrophenols because :
(1) *o*–Nitrophenol shows Intramolecular *H*–bonding.
(2) *o*–Nitrophenol shows Intermolecular *H*–bonding.
(3) Melting point of *o*–Nitrophenol is lower than those of *m*–and *p*–isomers.
(4) *o*–Nitrophenol is more volatile in steam than those of *m*– and *p*–isomers.

53. **(1)** 

54. Iodoform can be prepared from all except :
(1) Isopropyl alcohol (2) 3–Methyl–2–butanone
(3) Isobutyl alcohol (4) Ethyl methyl ketone

54. **(3)** $CH_3-\underset{\displaystyle CH_3}{\underset{|}{CH}}-CH_2OH$

It is primary alcohol. Ethyl alcohol among 1° alcohols gives chloroform reaction.

55. The species which can best serve as an initiator for the cationic polymerization is :
(1) HNO_3 (2) $AlCl_3$ (3) $BuLi$ (4) $LiAlH_4$

55. **(2)** The initiator for a cationic polymerization should be a Lewis acid like $AlCl_3$ or BF_3

56. The equilibrium constant (K_c) for the reaction $N_2(g) + O_2(g) - 2NO(g)$ at temperature T is 4×10^{-4}. The value of K_c for the reaction, $NO(g) \rightarrow 1/2N_2(g) + 1/2O_2(g)$ at the same temperature is:
(1) 2.5×10^{2} (2) 4×10^{-4} (3) 50.0 (4) 0.02

56. **(3)** $\sqrt{\frac{1}{k}} = \frac{1}{\sqrt{4\times10^{-4}}} = 50$

57. For a first order reaction, (A) $\rightarrow$ 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) 3.47×10^{-4} M/min (2) 3.47×10^{-5} M/min
(3) 1.73×10^{-4} M/min (4) 1.73×10^{-5} M/min

57. **(1)** $k = \frac{2.3}{40} 2\ln 2 = \frac{0.693}{20}$

$R = \frac{0.693}{20}[.01] = 3.47 \times 10^{-4}$

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

$Ti(s) + 2I_2(g) \xrightarrow{523\,K} TiI_4(g) \xrightarrow{1700\,K} Ti(s) + 2I_2(g)$

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

58. **(3)** It is Van Arkel process.

59. Iron exhibits +2 and +3 oxidation states. Which of the following statements about iron is incorrect?
(1) Ferrous compounds are relatively more ionic than the corresponding ferric compounds
(2) Ferrous compounds are less volatile than the corresponding ferric compounds
(3) Ferrous compounds are more easily hydrolysed than the corresponding ferric compounds
(4) Ferrous oxide is more basic in nature than the ferric oxide.

59. **(3)** Lower the oxidation state, more is the ionic character and more is the basic character.

60. 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) (d) < (b) < (c) < (a) (2) (b) < (d) < (a) < (c)

(3) (a) < (c) < (b) < (d) (4) (c) < (d) < (b) < (a)

60. **(1)** Based on Aufbau's principle.