

## CHEMISTRY - CET 2021 - VERSION CODE – B2 SOLUTIONS

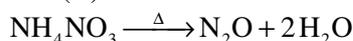
1. Zeta potential is  
 (A) Potential required to bring about coagulation of a colloidal sol.  
 (B) Potential required to give the particle a speed of  $1 \text{ cm S}^{-1}$   
 (C) Potential difference between fixed charged layer and the diffused layer having opposite charges  
 (D) Potential energy of the colloidal particles.

**Ans (C)**

The potential difference between fixed charged layer and the diffused layer having opposite charges is known as zeta potential

2. Which of the following compound on heating given  $\text{N}_2\text{O}$ ?  
 (A)  $\text{Pb}(\text{NO}_3)_2$                       (B)  $\text{NH}_4\text{NO}_3$                       (C)  $\text{NH}_4\text{NO}_2$                       (D)  $\text{NaNO}_3$

**Ans (B)**



3. Which of the following property is true for the given sequence  $\text{NH}_3 > \text{PH}_3 > \text{AsH}_3 > \text{SbH}_3 > \text{BiH}_3$ ?  
 (A) Reducing property                      (B) Thermal stability  
 (C) Bond angle                      (D) Acidic character

**Ans GRACE**

(B), (C)

Thermal stability and bond angle decreases down the group due to increase in bond length.

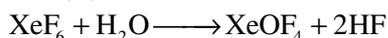
4. The correct order of boiling point in the following compounds is  
 (A)  $\text{HF} > \text{H}_2\text{O} > \text{NH}_3$                       (B)  $\text{H}_2\text{O} > \text{HF} > \text{NH}_3$                       (C)  $\text{NH}_3 > \text{H}_2\text{O} > \text{HF}$                       (D)  $\text{NH}_3 > \text{HF} > \text{H}_2\text{O}$

**Ans (B)**

Boiling point is directly proportional to molecular mass and strength of hydrogen bond.

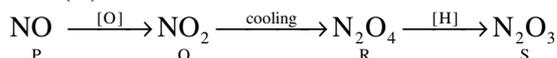
5.  $\text{XeF}_6$  on partial hydrolysis gives a compound X, which has square pyramidal geometry 'X' IS  
 (A)  $\text{XeO}_3$                       (B)  $\text{XeO}_4$                       (C)  $\text{XeOF}_4$                       (D)  $\text{XeO}_2\text{F}_2$

**Ans (C)**



6. A colourless, neutral, paramagnetic oxide of Nitrogen 'P' on oxidation gives reddish brown gas Q. Q on cooling gives colourless gas R. R on reaction with P gives blue solid S. Identify P, Q, R, S, respectively  
 (A)  $\text{N}_2\text{O}$   $\text{NO}$   $\text{NO}_2$   $\text{N}_2\text{O}_5$                       (B)  $\text{N}_2\text{O}$   $\text{NO}_2$   $\text{N}_2\text{O}_4$   $\text{N}_2\text{O}_3$   
 (C)  $\text{NO}$   $\text{NO}_2$   $\text{N}_2\text{O}_4$   $\text{N}_2\text{O}_3$                       (D)  $\text{NO}$   $\text{NO}$   $\text{N}_2\text{O}_4$   $\text{N}_2\text{O}_5$

**Ans (C)**

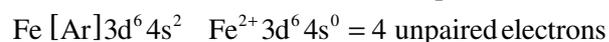
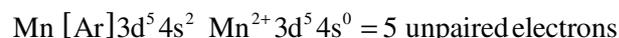
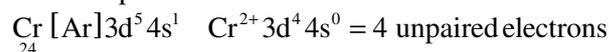


7. Which of the following does not represent property stated against it?  
 (A)  $\text{CO}^{+2} < \text{Fe}^{+2} < \text{Mn}^{+2}$  – Ionic size  
 (B)  $\text{Ti} < \text{V} < \text{Mn}$  – Number of oxidation states  
 (C)  $\text{Cr}^{+2} < \text{Mn}^{+2} < \text{Fe}^{+2}$  – Paramagnetic behaviour  
 (D)  $\text{Sc} > \text{Cr} > \text{Fe}$  – Density

**Ans GRACE**

(C) and (D)

Correct option are both C and D

Since both  $\text{Cr}^{2+}$  and  $\text{Fe}^{2+}$  contain 4 unpaired electrons, the correct option is C.

Option D is also correct because density order given is not correct.

8. Which one of the following is correct for all elements from Sc to Cu?

(A) The lowest oxidation state shown by them is +2

(B) 4s orbital is completely filled in the ground state

(C) 3d orbital is not completely filled in the ground state

(D) The ions in +2 oxidation states are paramagnetic.

**Ans (D)**

Paramagnetism is due to the presence of one or more unpaired electrons.

9. When the absolute temperature of ideal gas is doubled and pressure is halved, the volume of gas

(A) will be half of original volume

(B) will be 4 times the original volume

(C) will be 2 times the original volume

(D) will be 1/4 times the original volume

**Ans (B)**

From the combined gas equation,

$$\frac{p_1 V_1}{T_1} = \frac{p_2 V_2}{T_2}$$

$$\frac{p_1 V_1}{T_1} = \frac{1}{2} \frac{p_1 V_2}{2T_1}$$

$$V_1 = \frac{1}{4} V_2$$

$$V_2 = 4V_1$$

10. Which of the following pairs has both the ions coloured in aqueous solution? [Atomic numbers of Sc = 21, Ti = 22, Ni = 28, Cu = 29, Mn = 25]

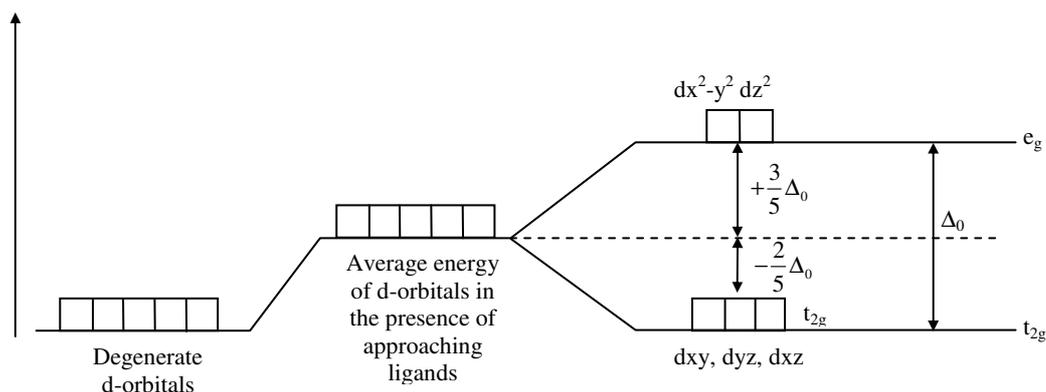
(A)  $\text{Sc}^{3+}$ ,  $\text{Mn}^{2+}$ (B)  $\text{Ni}^{2+}$ ,  $\text{Ti}^{4+}$ (C)  $\text{Ti}^{3+}$ ,  $\text{Cu}^+$ (D)  $\text{Mn}^{2+}$ ,  $\text{Ti}^{3+}$ **Ans (D)**Sc = 21,  $\text{Sc}^{3+} = [\text{Ar}] 3d^0 4s^0 =$  no unpaired electronsTi = 22,  $\text{Ti}^{3+} = [\text{Ar}] 3d^1 4s^0 =$  1 unpaired electron $\text{Ti}^{4+} = [\text{Ar}] 3d^0 4s^0$  no unpaired electronsNi = 28,  $\text{Ni}^{2+} = [\text{Ar}] 3d^8 4s^2 =$  2 unpaired electronsCu = 29,  $\text{Cu}^+ = [\text{Ar}] 3d^{10} 4s^0 =$  no unpaired electronsMn = 25,  $\text{Mn}^{2+} = [\text{Ar}] 3d^5 4s^2 =$  5 unpaired electrons

11. For the crystal field splitting in octahedral complexes,

(A) the energy of the  $e_g$  orbitals will decrease by  $(3/5)\Delta_0$  and that of the  $t_{2g}$  will increase by  $(2/5)\Delta_0$ (B) the energy of the  $e_g$  orbitals will increase by  $(3/5)\Delta_0$  and that of the  $t_{2g}$  will decrease by  $(2/5)\Delta_0$ (C) the energy of the  $e_g$  orbitals will increase by  $(3/5)\Delta_0$  and that of the  $t_{2g}$  will increase by  $(2/5)\Delta_0$ (D) the energy of the  $e_g$  orbitals will decrease by  $(3/5)\Delta_0$  and that of the  $t_{2g}$  will decrease by  $(2/5)\Delta_0$ 

Strategic Academic Alliance with

Ans (B)



12. Peroxide effect is observed with the addition of HBr but not with the addition of HI to unsymmetrical alkene because

- (A) H-I bond is strong that H-Br and is not cleaved by the free radical  
 (B) H-I bond is weaker than H-Br bond so that iodine free radicals combine to form iodine molecules  
 (C) Bond strength of HI and HBr are same but free radicals are formed in HBr  
 (D) All of these.

Ans (B)

Due to free radical mechanism (secondary free radical)

13. The IUPAC name of  $[\text{Co}(\text{NH}_3)_5(\text{CO}_3)] \text{Cl}$  is

- (A) Pentaamminecarbonatocobalt (III) Chloride  
 (B) Carbonatopentamminecobalt (III) Chloride  
 (C) Pentaamminecarbonatocobaltate (III) Chloride  
 (D) Pentaammine cobalt (III) Carbonate Chloride

Ans (A)

Pentaamminecarbonatocobalt(III) chloride

14. Homoleptic complexes among the following are

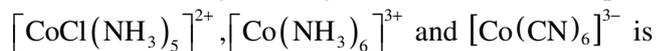
- (A)  $\text{K}_3[\text{Al}(\text{C}_2\text{O}_4)_3]$ , (B)  $[\text{CoCl}_2(\text{en})_2]^+$  (C)  $\text{K}_2[\text{Zn}(\text{OH})_4]$

- (A) A only (B) (A) and (B) only  
 (C) (A) and (C) only (D) (C) only

Ans (C)

Complex compounds having only one type of ligands are homoleptic complexes

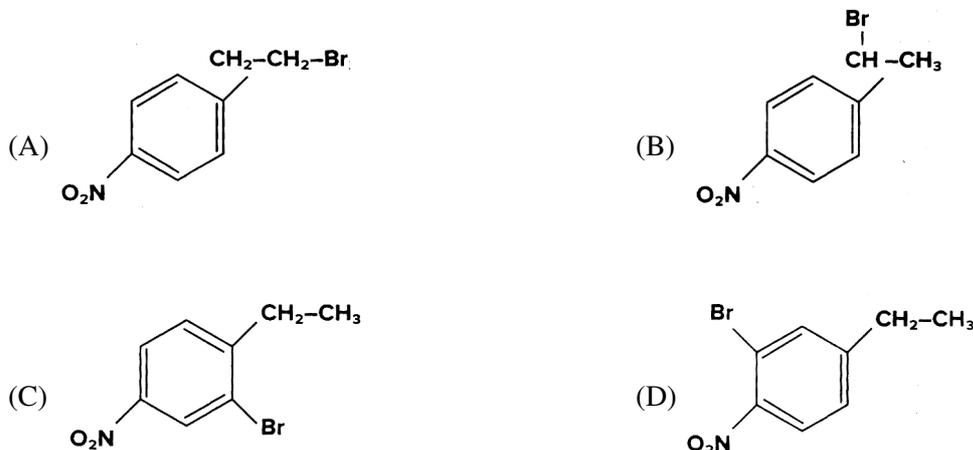
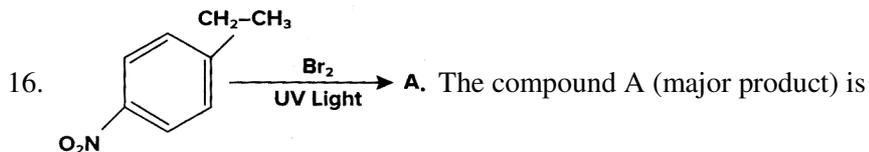
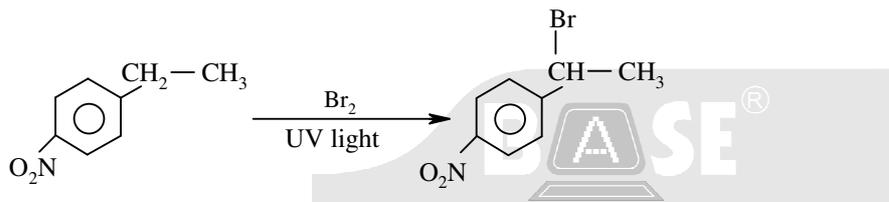
15. The correct order for wavelengths of light absorbed in the complex ions



- (A)  $[\text{CoCl}(\text{NH}_3)_5]^{2+} > [\text{Co}(\text{NH}_3)_6]^{3+} > [\text{Co}(\text{CN})_6]^{3-}$   
 (B)  $[\text{Co}(\text{NH}_3)_6]^{3+} > [\text{Co}(\text{CN})_6]^{3-} > [\text{CoCl}(\text{NH}_3)_5]^{2+}$   
 (C)  $[\text{Co}(\text{CN})_6]^{3-} > [\text{CoCl}(\text{NH}_3)_5]^{2+} > [\text{Co}(\text{NH}_3)_6]^{3+}$   
 (D)  $[\text{Co}(\text{NH}_3)_6]^{3+} > [\text{CoCl}(\text{NH}_3)_5]^{2+} > [\text{Co}(\text{CN})_6]^{3-}$

**Ans (A)**

Wavelength of light absorbed is inversely proportional to strength of the ligand.

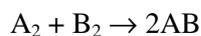
**Ans (B)**

In presence of uv light, substitution takes place in side chain by free radical halogenation. Halogenation takes place to the carbon which has less number of hydrogen.

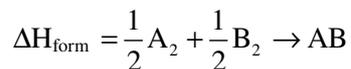
17. Bond enthalpies of  $A_2$ ,  $B_2$  and  $AB$  are in the ratio 2 : 1 : 2. If bond enthalpy of formation of  $AB$  is  $-100 \text{ KJ mol}^{-1}$ . The bond enthalpy of  $B_2$  is  
 (A)  $100 \text{ KJ mol}^{-1}$  (B)  $50 \text{ KJ mol}^{-1}$  (C)  $200 \text{ KJ mol}^{-1}$  (D)  $150 \text{ KJ mol}^{-1}$

**Ans (C)**

Let bond enthalpy of  $A_2$  be  $x$ ,  $B_2$  be  $\frac{x}{2}$ ,  $AB$  be  $x$



$$x + \frac{x}{2} \quad 2x$$

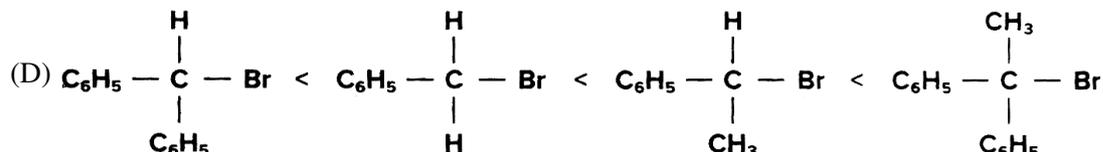
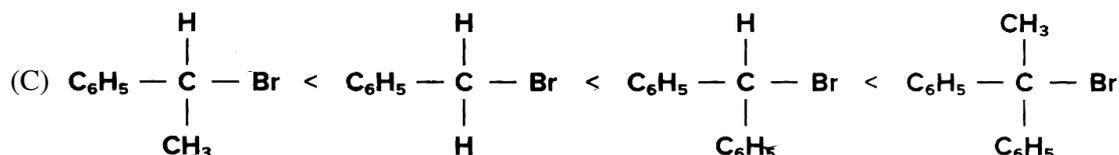
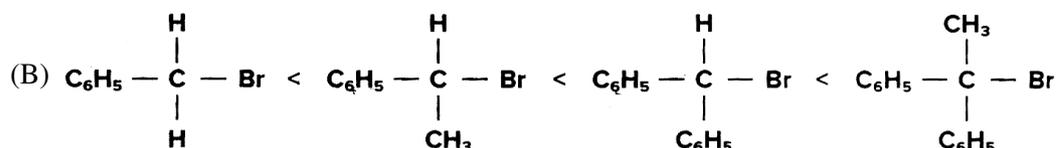
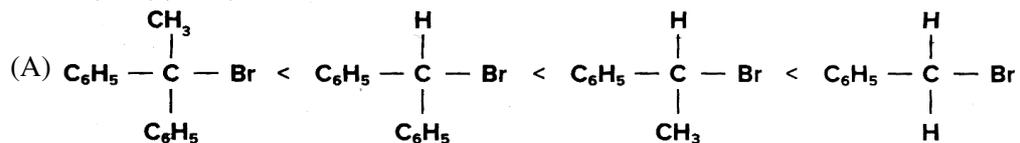


$$-100 = \left( \frac{x}{2} + \frac{x}{4} \right) - x$$

$$x = 400$$

$$B_2 = \frac{x}{2} = 200 \text{ kJ}$$

18. The order of reactivity of the compounds  $C_6H_5CH_2Br$ ,  $C_6H_5CH(C_6H_5)Br$ ,  $C_6H_5CH(CH_3)Br$  and  $C_6H_5C(CH_3)(C_6H_5)Br$  in  $S_N2$  reaction is



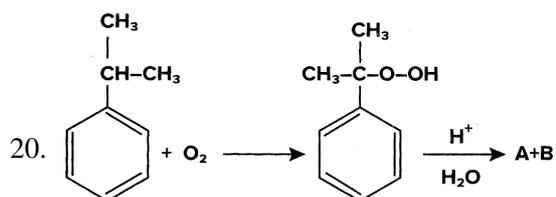
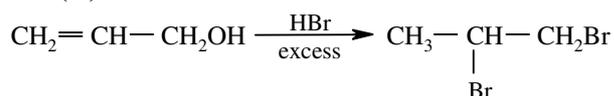
Ans (A)

Lesser the steric hindrance, easier and higher the rate of reaction towards  $S_N2$

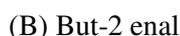
19. The major product of the following reaction is  $CH_2=CH-CH_2-OH \xrightarrow[\text{Excess}]{HBr}$  product



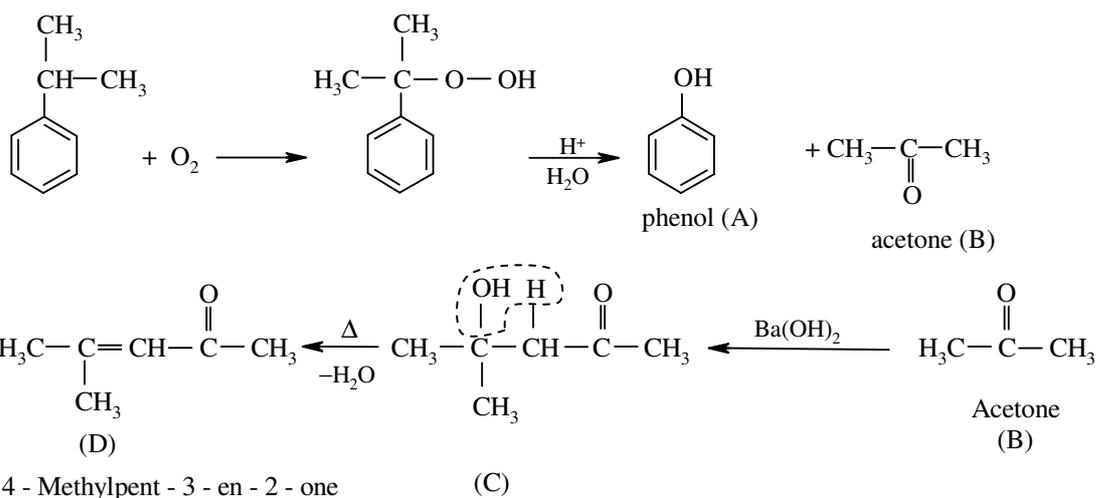
Ans (A)



The product 'A' gives white precipitate when treated with bromine water. The product 'B' is treated with Barium hydroxide to give the product C. The compound C is heated strongly to form product D. The product D is



Ans (A)



21. For the reaction  $A(g) + B(g) \rightleftharpoons C(g) + D(g)$ ;  $\Delta H = -QKJ$

The equilibrium constant cannot be disturbed by

- (A) Addition of A (B) Addition of D  
 (C) Increasing of pressure (D) Increasing of temperature

**Ans GRACE**

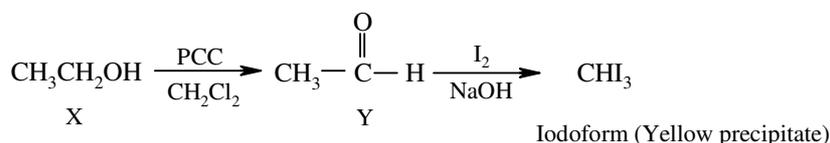
Equilibrium constant is directly proportional to temperature

So, Options (A), (B), (C) are correct.

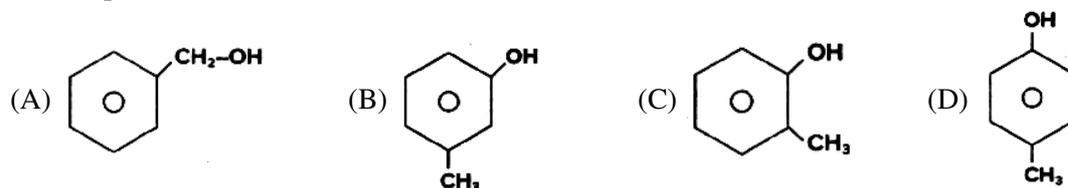
22. An organic compound 'X' on treatment with PCC in dichloromethane gives the compound Y. Compound 'Y' reacts with I<sub>2</sub> and alkali to form yellow precipitate of triiodomethane. The compound X is

- (A) CH<sub>3</sub>CHO (B) CH<sub>3</sub>COCH<sub>3</sub> (C) CH<sub>3</sub>CH<sub>2</sub>OH (D) CH<sub>3</sub>COOH

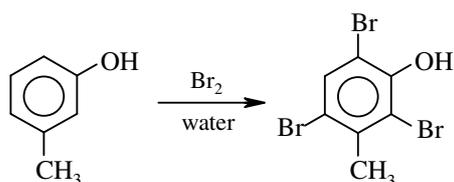
**Ans (C)**



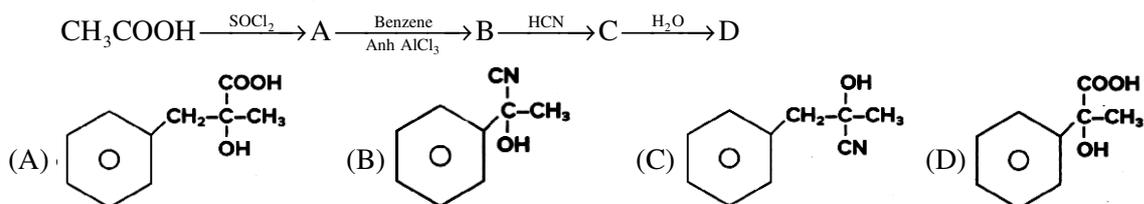
23. A compound 'A' (C<sub>7</sub>H<sub>8</sub>O) is insoluble in NaHCO<sub>3</sub> solution but dissolve in NaOH and gives a characteristic colour with neutral FeCl<sub>3</sub> solution. When treated with Bromine water compound 'A' forms the compound B with the formula C<sub>7</sub>H<sub>5</sub>OBr<sub>3</sub>. 'A' is



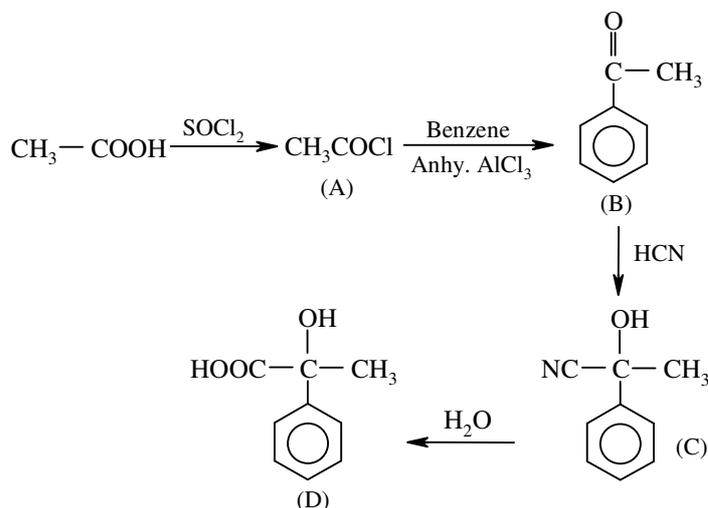
**Ans (B)**



24. In set of reactions, identify D



Ans (D)

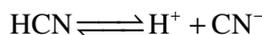


25.  $K_a$  values for acids  $\text{H}_2\text{SO}_3$ ,  $\text{HNO}_2$ ,  $\text{CH}_3\text{COOH}$  and  $\text{HCN}$  are respectively  $1.3 \times 10^{-2}$ ,  $4 \times 10^{-4}$ ,  $1.8 \times 10^{-5}$  and  $4 \times 10^{-10}$ , which of the above acids produces stronger conjugate base in aqueous solution?

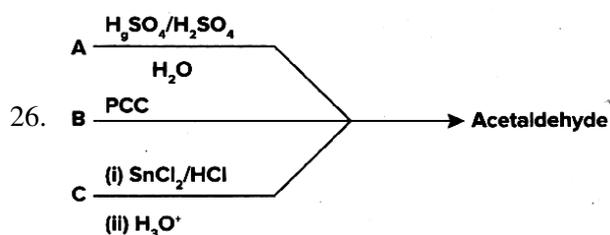
- (A)  $\text{H}_2\text{SO}_3$       (B)  $\text{HNO}_2$       (C)  $\text{CH}_3\text{COOH}$       (D)  $\text{HCN}$

Ans (D)

$$K_a(\text{HCN}) = 4 \times 10^{-10}$$



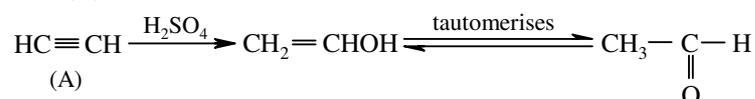
Weaker the acid, stronger the conjugate base.



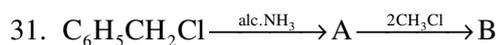
A, B and C respectively are

- (A) ethanol, ethane nitrile and ethyne      (B) ethane nitrile, ethanol and ethyne  
(C) ethyne, ethanol and ethane nitrile      (D) ethyne, ethane nitrile and ethanol

Ans (C)



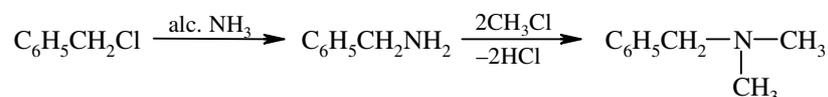




The product B is

- (A) N, N-Dimethyl phenyl methanamine                      (B) N, N-Dimethyl benzenamine  
 (C) N-Benzyl-N-methyl methanamine                      (D) phenyl-N, N-dimethyl methanamine

**Ans (A)**



Phenyl-N,N-dimethylmethanamine

32. The method by which aniline cannot be prepared is

- (A) Nitration of benzene followed by reduction with Sn and con HCl  
 (B) Degradation of benzamide with bromine in alkaline solution  
 (C) Reduction of nitrobenzene with  $\text{H}_2/\text{Pd}$  is ethanol  
 (D) Potassium salt of phthalimide treated with chlorobenzene followed by the hydrolysis with aqueous NaOH solution

**Ans (D)**

Gabriel phthalimide synthesis not preferred for preparing aniline because amine formation involves nucleophilic substitution of alkyl halides by the anion formed by phthalimide. But aryl halides do not undergo nucleophilic substitution.

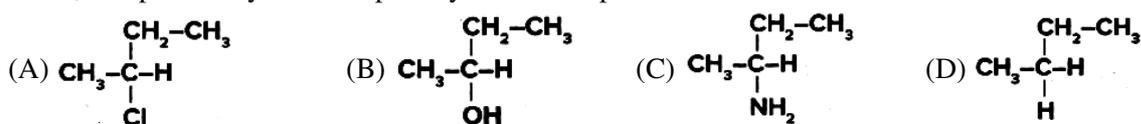
33. Permanent hardness cannot be removed by

- (A) Using washing soda                      (B) Calgon's method  
 (C) Clark's method                      (D) Ion exchange method

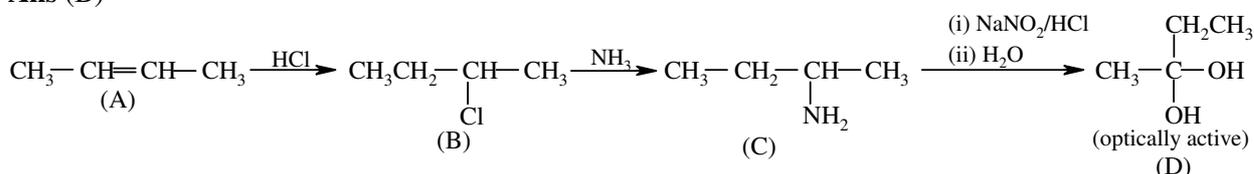
**Ans (C)**

Clark's method is for the removal of temporary hardness.

34. A hydrocarbon A ( $\text{C}_4\text{H}_8$ ) on reaction with HCl gives a compound B ( $\text{C}_4\text{H}_9\text{Cl}$ ) which on reaction with 1 mol of  $\text{NH}_3$  gives compound C ( $\text{C}_4\text{H}_{10}\text{N}$ ). On reacting with  $\text{NaNO}_2$  and HCl followed by treatment with water, compound C yields an optically active compound D. The D is



**Ans (B)**



35. RNA and DNA are chiral molecules, their chirality is due to the presence of

- (A) D-Sugar component                      (B) L-Sugar component  
 (C) Chiral bases                      (D) Chiral phosphate ester unit

**Ans (A)**

Deoxyribose and ribose sugars are D-chiral sugars in DNA and RNA.

36. The property of the alkaline earth metals that increases with their atomic number is  
 (A) Ionisation enthalpy (B) Electronegativity  
 (C) Solubility of their hydroxide in water (D) Solubility of their sulphate in water

**Ans (C)**

The solubility of alkaline earth metal hydroxides increases with increase in atomic number.

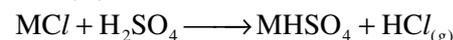
37. Primary structure in a nucleic acid chain contains bases as G A T G C \_\_\_\_\_. The chain which is complementary to this chain is  
 (A) G G T G A \_\_\_\_\_ (B) T G A A G \_\_\_\_\_ (C) C T A C G \_\_\_\_\_ (D) T T T A G \_\_\_\_\_

**Ans (C)**

G ≡ C  
 A = T  
 T = A  
 G ≡ C  
 C ≡ G

38. In the detection of II group acid radical, the salt containing chloride is treated with concentrated sulphuric acid, the colourless gas is liberated. The name of the gas is  
 (A) Hydrogen chloride gas (B) Chlorine gas  
 (C) Sulphur dioxide gas (D) Hydrogen gas

**Ans (A)**



39. The number of six membered and five membered rings in Buckminster Fullerene respectively is  
 (A) 20, 12 (B) 12, 20 (C) 14, 18 (D) 14, 11

**Ans (A)**

12 : 5 Membered ring

20 : 6 Membered ring

40. In Chrysoberyl, a compound containing Beryllium, Aluminium and oxygen, oxide ions form cubic close packed structure. Aluminium ions occupy  $1/4^{\text{th}}$  of tetrahedral voids and Beryllium ions occupy  $1/4^{\text{th}}$  of octahedral voids. The formula of the compound is  
 (A)  $BeAlO_4$  (B)  $BeAl_2O_4$  (C)  $Be_2AlO_2$  (D)  $BeAlO_2$

**Ans (B)**

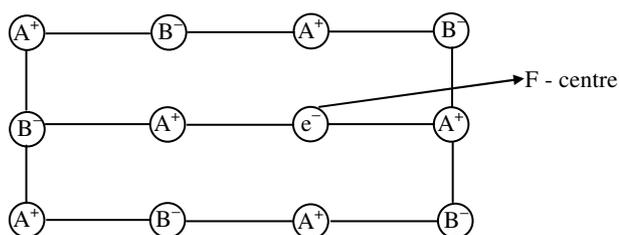
CCP = N = 4

Octahedral void = N =  $1 \times 4 = 4 \times \frac{1}{4} = 1$ : Be

Tetrahedral void = 2N =  $2 \times 4 = 2 \times \frac{1}{4} = 2$ : Al

41. The correct statement regarding defects in solids is  
 (A) Frenkel defect is a vacancy defect  
 (B) Schottky defect is a dislocation defect  
 (C) Trapping of an electron in the lattices leads to the formation of F-centre  
 (D) Schottky defect has no effect on density.

Ans (C)



42. A metal crystallises in BCC lattice with unit cell edge length of 300 pm and density  $6.15 \text{ g cm}^{-3}$ . The molar mass of the metal is

- (A)  $50 \text{ g mol}^{-1}$                       (B)  $60 \text{ g mol}^{-1}$                       (C)  $40 \text{ g mol}^{-1}$                       (D)  $70 \text{ g mol}^{-1}$

Ans (A)

$$d = \frac{ZM}{a^3 N_A}$$

$$6.15 = \frac{2 \times M}{(3 \times 10^{-8})^3 \times 6.02 \times 10^{23}}$$

$$M = \frac{6.15 \times 27 \times 10^{-24} \times 6.02 \times 10^{23}}{2}$$

$$M = 50 \text{ g/mol}$$

43. Henry's law constant for the solubility of  $\text{N}_2$  gas in water at 298 K is  $1.0 \times 10^5 \text{ atm}$ . The mole fraction of  $\text{N}_2$  in air is 0.8. The number of moles of  $\text{N}_2$  from air dissolved in 10 moles of water at 298 K and 5 atm pressure is

- (A)  $4.0 \times 10^{-4}$                       (B)  $4.0 \times 10^{-5}$                       (C)  $5.0 \times 10^{-4}$                       (D)  $4.0 \times 10^{-6}$

Ans (A)

$$\left. \begin{aligned} p_{\text{N}_2} &= x_{\text{N}_2} \times P_T \\ &= 0.8 \times 5 \\ &= 4.0 \text{ atm} \end{aligned} \right\} \text{Dalton's law of partial pressures}$$

$$\text{Henry's law, } p_{\text{N}_2} = x_{\text{N}_2} \times K_H$$

$$4 = \frac{n_{\text{N}_2}}{10} \times 10^5$$

$$\therefore n_{\text{N}_2} = 4 \times 10^{-4}$$

44. A pure compound contains 2.4 g of C,  $1.2 \times 10^{23}$  atoms of H, 0.2 moles of oxygen atoms. Its empirical formula is

- (A)  $\text{C}_2\text{HO}$                       (B)  $\text{C}_2\text{H}_2\text{O}_2$                       (C)  $\text{CH}_2\text{O}$                       (D)  $\text{CHO}$

Ans (D)

$$\text{Number of moles of C} = \frac{2.4}{12} = 0.2$$

$$\text{Number of moles of H} = \frac{1.2 \times 10^{23}}{6.0 \times 10^{23}} = 0.2$$

$$\text{Number of moles of O} = 0.2 \text{ mol}$$

Empirical formula is  $\text{CHO}$ .

45. Choose the correct statement

- (A)  $K_H$  value is same for a gas in any solvent  
 (B) Higher the  $K_H$  value more the solubility of gas  
 (C)  $K_H$  value increases on increasing the temperature of the solution  
 (D) Easily liquefiable gases usually has lesser  $K_H$  values

**Ans** (C) and (D)

$K_H \propto \text{temperature}$

46. The  $K_H$  value (K bar) of Argon (I), Carbon dioxide (II) formaldehyde (III) and methane (IV) are respectively 40.3, 1.67,  $1.83 \times 10^{-5}$  and 0.413 at 298 K. The increasing order of solubility of gas in liquid is

- (A) I < II < IV < III      (B) III < IV < II < I      (C) I < III < II < IV      (D) I < IV < II < III

**Ans** (A)

$K_H$  is inversely proportional to solubility of gas in liquid.

47. The vapour pressure of pure liquids A and B are 450 and 700 mm of Hg at 350 K respectively. If the total vapour pressure of the mixture is 600 mm of Hg, the composition of the mixture in the solution is

- (A)  $x_A = 0.4, x_B = 0.6$       (B)  $x_A = 0.6, x_B = 0.4$       (C)  $x_A = 0.3, x_B = 0.7$       (D)  $x_A = 0.7, x_B = 0.3$

**Ans** (A)

$$P_{\text{tot}} = P_A^0 x_A + P_B^0 x_B$$

$$600 = 450x_A + 700(1 - x_A)$$

$$600 = 450x_A + 700 - 700x_A$$

$$-100 = -250x_A$$

$$x_A = \frac{100}{250} = \frac{2}{5}$$

$$= 0.4$$

$$x_B = 1 - x_A = 1 - 0.4$$

$$= 0.6$$

48. Consider the following electrodes



$E_{\text{Zn}/\text{Zn}^{2+}}^0 = -0.76 \text{ V}$  Electrode potentials of the above electrodes in volts are in the order

- (A)  $P > S > R > Q$       (B)  $S > R > Q > P$       (C)  $Q > R > S > P$       (D)  $P > Q > R > S$

**Ans** (C)

Electrode potential is directly proportional to concentration of  $\text{Zn}^{2+}$  ions.

49. The number of angular and radial nodes in 3p orbital respectively are

- (A) 3, 1      (B) 1, 1      (C) 2, 1      (D) 2, 3

**Ans** (B)

Number of angular nodes =  $l$

Number of radial nodes =  $n - l - 1$

$\therefore$  For 3p orbital, angular nodes = 1

For 3p orbital, radial nodes =  $3 - 1 - 1 = 1$

$$\begin{bmatrix} s & p & d & f \\ l=0 & 1 & 2 & 3 \end{bmatrix}$$

50. The resistance of 0.01 m KCl solution at 298 K is 1500  $\Omega$ . If the conductivity of 0.01 m KCl solution at 298 K is  $0.146 \times 10^{-3} \text{ S cm}^{-1}$ . The cell constant of the conductivity cell in  $\text{cm}^{-1}$  is

- (A) 0.219 (B) 0.291 (C) 0.301 (D) 0.194

**Ans (A)**

$$\kappa = \frac{1}{R} \left( \frac{l}{a} \right)$$

$$\therefore \frac{l}{a} = \kappa \cdot R$$

$$= 0.146 \times 10^{-3} \times 1500$$

$$= 219 \times 10^{-3} = 0.219 \text{ cm}^{-1}$$

51.  $\text{H}_{2(\text{g})} + 2\text{AgCl}_{(\text{s})} \rightleftharpoons 2\text{Ag}_{(\text{s})} + 2\text{HCl}_{(\text{aq})}$

$E_{\text{cell}}^0$  at 25° C for the cell is 0.22 V. The equilibrium constant at 25 °C is

- (A)  $2.8 \times 10^7$  (B)  $5.2 \times 10^8$  (C)  $2.8 \times 10^5$  (D)  $5.2 \times 10^4$

**Ans (A)**

$$E_{\text{cell}}^0 = \frac{0.059}{n} \log K_C$$

$$0.22 = \frac{0.059}{2} \log K_C$$

$$\log K_C = \frac{0.22 \times 2}{0.059} = 7.457$$

$$K_C = 2.8 \times 10^7$$

52. For a reaction  $\text{A} + 2\text{B} \rightarrow \text{Products}$ , when concentration of B alone is increased half life remains the same. If concentration of A alone is doubled, rate remains the same. The unit of rate constant for the reaction is

- (A)  $\text{S}^{-1}$  (B)  $\text{L mol}^{-1} \text{S}^{-1}$  (C)  $\text{mol L}^{-1} \text{S}^{-1}$  (D)  $\text{atm}^{-1}$

**Ans (A)**

Order w.r.t. B = 1 as  $t_{1/2}$  remains same when concentration is increased.

Order w.r.t. A = 0 as rate does not change when concentration is doubled.

$$\therefore \text{rate} = k[\text{A}]^0[\text{B}]^1$$

$\therefore$  It is a first order reaction.

Hence, unit is  $\text{S}^{-1}$

53. The third ionisation enthalpy is highest in

- (A) Alkali metals (B) Alkaline earth metals  
(C) Chalcogens (D) Pnictogens

**Ans (B)**

Alkaline earth metals have  $ns^2$  configuration.

After the removal of 2<sup>nd</sup> electron, they get stable noble gas configuration.

54. If the rate constant for a first order reaction is k, the time (t) required for the completion of 99% of the reaction is given by

- (A)  $t = \frac{4.606}{k}$  (B)  $t = \frac{2.303}{k}$  (C)  $t = \frac{0.693}{k}$  (D)  $t = \frac{6.909}{k}$

**Ans (A)**

$$t = \frac{2.303}{k} \log \frac{100}{1} = \frac{2.303}{k} \times 2$$

$$t = \frac{4.606}{k}$$

55. The rate of a gaseous reaction is given by the expression  $k[A][B]^2$ . If the volume of vessel is reduced to one half of the initial volume, the reaction rate as compared to original rate is

- (A)  $\frac{1}{16}$                       (B)  $\frac{1}{8}$                       (C) 8                      (D) 16

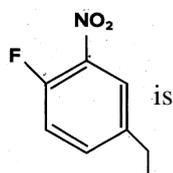
**Ans (C)**

$$r = K[A][B]^2$$

When volume is reduced to half, pressure increases by two times.

$$r = k[2A]^1 [2B]^2 = 2 \times 4 = 8 \text{ times}$$

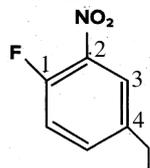
56. The correct IUPAC name of



- (A) 4-Ethyl-1-Fluoro-2-nitrobenzene                      (B) 1-Ethyl-4-Fluoro-3-nitrobenzene  
(C) 3-Ethyl-6-Fluoronitrobenzene                      (D) 5-Ethyl-2-Fluoronitrobenzene

**Ans (A)**

Based on lowest sum of locants,



4-Ethyl-1-fluoro-2-nitrobenzene

57. Higher order ( $> 3$ ) reactions are rare due to

- (A) Shifting of equilibrium towards reactants due to elastic collisions  
(B) Loss of active species on collision  
(C) Low probability of simultaneous collision of all reacting species  
(D) Increase in entropy as more molecules are involved

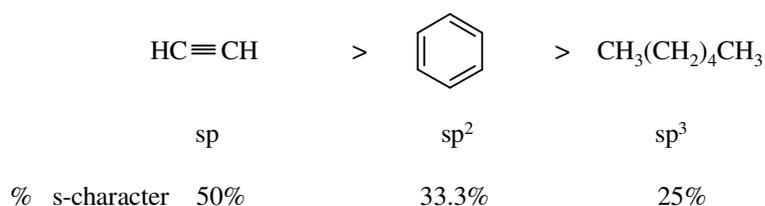
**Ans (C)**

Collisions between more than three reactant molecules is rare.

58. Arrange benzene, n-hexane and ethyne in decreasing order of their acidic behaviour

- (A) Benzene  $>$  n-hexane  $>$  ethyne  
(B) n-hexane  $>$  Benzene  $>$  ethyne  
(C) ethyne  $>$  n-hexane  $>$  Benzene  
(D) ethyne  $>$  Benzene  $>$  n-hexane

**Ans (D)**



Higher the percentage s-character, higher the acidic character.

59. A colloidal solution is subjected to an electric field than colloidal particles more towards anode. The amount of electrolytes of  $\text{BaCl}_2$ ,  $\text{AlCl}_3$  and  $\text{NaCl}$  required to coagulate the given colloid is in the order

(A)  $\text{NaCl} > \text{BaCl}_2 > \text{AlCl}_3$

(B)  $\text{BaCl}_2 > \text{AlCl}_3 > \text{NaCl}$

(C)  $\text{AlCl}_3 = \text{NaCl} = \text{BaCl}_2$

(D)  $\text{AlCl}_3 > \text{BaCl}_2 > \text{NaCl}$

**Ans (A)**

Based on Hardy-Schulze rule, higher the valence of flocculating ion, higher the flocculating power.

$$\text{Flocculating power} \propto \frac{1}{\text{Flocculating value}}$$

Order of the amount of electrolyte required is  $\text{NaCl} > \text{BaCl}_2 > \text{AlCl}_3$

60. Which of the following is an incorrect statement?

(A) Hydrogen bonding is stronger than dispersion forces

(B) Sigma bonds are stronger than  $\pi$ -bonds

(C) Ionic bonding is non-directional

(D)  $\sigma$ -electrons are referred to as mobile electrons

**Ans (D)**

$\pi$ -electrons are referred to as mobile electrons (with respect to graphite).

\* \* \*