

# KCET 2024 Chemistry Question Paper

1. Which of the following set of polymers are used as fibre?  
(i) Teflon  
(ii) Starch  
(iii) Terylene  
(iv) Orlon  
(A) (i) and (ii)  
(B) (ii) and (iii)  
(C) (iii) and (iv)  
(D) (i) and (iv)

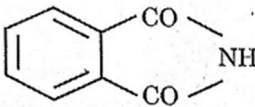
**Ans. C**

**Sol.** Terylene and orlon are fibres

2. The biodegradable polymer obtained by polymerisation, of Glycine and Aminocaproic acid is  
(A) Nylon 6  
(B) PHBV  
(C) Nylon 2 – Nylon 6  
(D) Nylon 6, 10

**Ans. C**

**Sol.** Nylon 2 – Nylon 6 is a biodegradable polymer

3. The compound  is  
(A) Sucralose  
(B) Aspartame  
(C) Saccharin  
(D) Alitame

**Ans. C**

**Sol.** Saccharin structure

4. Which one of the following is a cationic detergent?  
(A) Cetyltrimethylammonium bromide  
(B) Sodium dodecylbenzene sulphonate  
(C) Dodecylbenzene sulphonic acid  
(D) Dodecylbenzene

**Ans. A**

**Sol.** Cetyltrimethylammonium bromide is a cationic detergent

5. The type of linkage present between nucleotides is  
(A) Phosphoester linkage  
(B) Phosphodiester linkage  
(C) Amide linkage  
(D) Glycosidic linkage

**Ans. B**

**Sol.** Nucleotides are joined by Phosphodiester linkage

6.  $\alpha$ -D-(+)-glucose and  $\beta$ -D-(+)-glucose are  
(A) Enantiomers  
(B) Conformers  
(C) Epimers  
(D) Anomers

**Ans. D**

**Sol.**  $\alpha$ -D-(+)-glucose and  $\beta$ -D-(+)-glucose are anomeric at first carbon so called anomers

7. Propanone and Propanal are  
(A) Position isomers  
(B) Functional isomers  
(C) Chain isomers  
(D) Geometrical isomers

**Ans. B**

**Sol.** Propanone and Propanal are functional isomers

8. Sodium ethanoate on heating with soda lime gives 'X'. Electrolysis of aqueous solution of sodium ethanoate gives 'Y'. 'X' and 'Y' respectively are  
(A) Methane and Ethane  
(B) Methane and Methane  
(C) Ethane and Methane  
(D) Ethane and Ethane

**Ans. A**

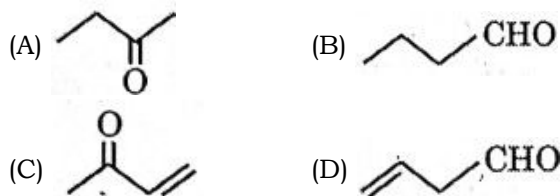
**Sol.** 
$$\text{CH}_3\text{COONa} + \text{NaOH} \xrightarrow[\Delta]{\text{CaO}} \underset{\text{X}}{\text{CH}_4} + \text{Na}_2\text{CO}_3$$

$$2\text{CH}_3\text{COONa} + 2\text{H}_2\text{O} \xrightarrow{\Delta} \underset{\text{Y}}{\text{C}_2\text{H}_6} + 2\text{NaOH} + 2\text{CO}_2 + \text{H}_2$$

X = CH<sub>4</sub>

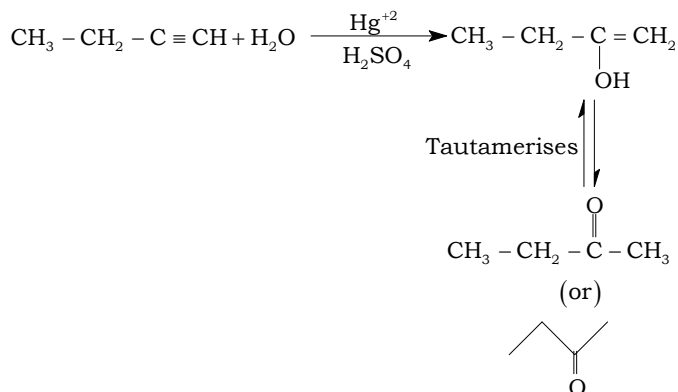
Y = C<sub>2</sub>H<sub>6</sub>

9. But-1-yne on reaction with dil.  $\text{H}_2\text{SO}_4$  in presence of  $\text{Hg}^{2+}$  ions at 333K gives



**Ans. A**

**Sol.**



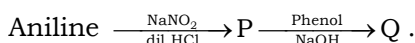
10. Biologically active adrenaline and ephedrine used to increase blood pressure contain

- (A) Primary amino group  
 (B) Secondary amino group  
 (C) Tertiary amino group  
 (D) Quaternary ammonium salt

**Ans. B**

**Sol.** Adrenaline and ephedrine contains secondary amino group

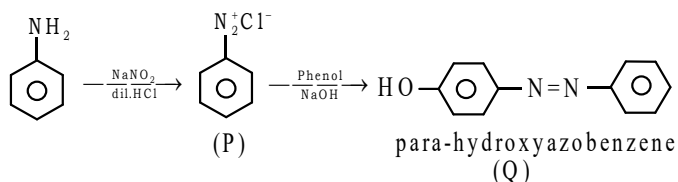
11. In the reaction



- (A)  $\text{C}_6\text{H}_5\text{N}_2\text{Cl}$   
 (B) ortho-hydroxyazobenzene  
 (C) para-hydroxyazobenzene  
 (D) meta-hydroxyazobenzene

**Ans. C**

**Sol.**



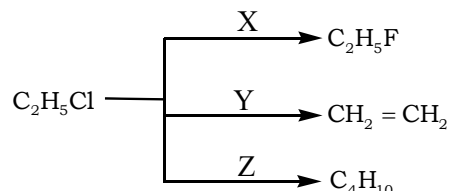
12. The female sex hormone which is responsible for the development of secondary female characteristics and participates in the control of menstrual cycle is

- (A) Testosterone (B) Estradiol  
 (C) Insulin (D) Thyroxine

**Ans. B**

**Sol.** Conceptual

13. In the following scheme of reaction.

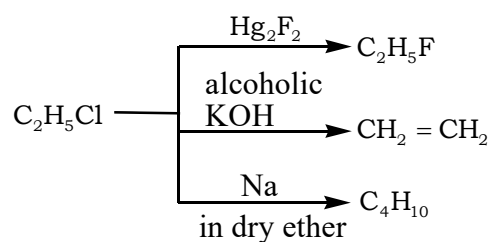


X, Y and Z respectively are:

- (A) AgF, alcoholic KOH and benzene  
 (B) HF, aqueous KOH and Na in dry ether  
 (C)  $\text{Hg}_2\text{F}_2$ , alcoholic KOH and Na in dry ether  
 (D)  $\text{CoF}_2$ , aqueous KOH and benzene

**Ans. C**

**Sol.**



14. 8.8 g of monohydric alcohol added to ethyl magnesium iodide in ether liberates  $2240 \text{ cm}^3$  of ethane at STP. This monohydric alcohol when oxidised using pyridinium-chloromate, forms a carbonyl compound that answers silver mirror test (Tollen's test). The monohydric alcohol is

- (A) butan-2-ol  
 (B) 2, 2-dimethyl propan-1-ol  
 (C) pentan-2-ol  
 (D) 2, 2-dimethyl ethan-1-ol

**Ans. B**

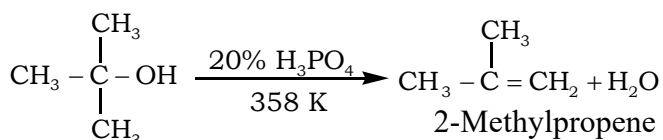
**Sol.** 8.8 g of monohydric alcohol  $\leftarrow 2240 \text{ cm}^3$   
 $88 \text{ g} \leftarrow 22400 \text{ cm}^3$

The carbonyl compound that can oxidise tollens reagent i.e., **Aldehyde** and which is oxidising product of Primary alcohol.

15. When a tertiary alcohol 'A' ( $C_4H_{10}O$ ) reacts with 20%  $H_3PO_4$  at 358 K, it gives a compound 'B' ( $C_4H_8$ ) as a major product. The IUPAC name of the compound 'B' is
- But-1-ene
  - But-2-ene
  - Cyclobutane
  - 2-Methylpropene

**Ans. D**

**Sol.**



16. PCC is
- $K_2Cr_2O_7$  + Pyridine
  - $CrO_3$  +  $CHCl_3$
  - $CrO_3$  +  $H_2SO_4$
  - A complex of chromium trioxide with pyridine +  $HCl$

**Ans. D**

**Sol.** PCC is pyridinium chlorochromate



17. On treating 100 mL of 0.1 M aqueous solution of the complex  $CrCl_3 \cdot 6H_2O$  with excess of  $AgNO_3$ , 2.86 g of  $AgCl$  was obtained. The complex is
- $[Cr(H_2O)_3Cl_3] \cdot 3H_2O$
  - $[Cr(H_2O)_4Cl_2]Cl \cdot 2H_2O$
  - $[Cr(H_2O)_5Cl]Cl_2 \cdot H_2O$
  - $[Cr(H_2O)_6Cl_3]$

**Ans. C**

**Sol.** 0.01 moles of an aqueous solution of  $CrCl_3 \cdot 6H_2O$

given 2.86 g  $AgCl$  means,

1 mole of aqueous solution = 2 moles of  $AgCl$

$$143.5 \times 2 = 286 \text{ g of } AgCl$$

So,  $[Cr(H_2O)_5Cl]Cl_2 \cdot H_2O$

18. The complex compounds  $[Co(NH_3)_5SO_4]Br$  and  $[Co(NH_3)_5Br]SO_4$  are
- Coordination isomers
  - Geometrical isomers
  - Optical isomers
  - Ionisation isomers

**Ans. D**

**Sol.**  $[Co(NH_3)_5SO_4]Br$  and  $[Co(NH_3)_5Br]SO_4$  are Ionisation isomers.

19. When of the following statements are true about  $[CoF_6]^{3-}$  ion?
- The complex has octahedral geometry.
  - Coordination number of Co is 3 and oxidation state is +6.
  - The complex is  $sp^3d^2$  hybridised
  - It is a high spin complex
- I, II and IV
  - I, III and IV
  - II and IV
  - II, III and IV

**Ans. B**

**Sol.** I, III and IV statements are true.

20. A haloalkane undergoes  $S_N2$  or  $S_N1$  reaction depending on
- Solvent used in the reaction
  - Low temperature
  - The type of halogen atom
  - Stability of the haloalkane

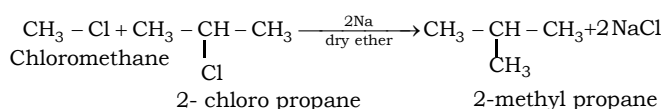
**Ans. A**

**Sol.**  $S_N2$  or  $S_N1$  reaction depends on solvent used in the reaction.

21. 2-Methyl propane can be prepared by Wurtz reaction. The haloalkanes taken along with metallic sodium and dry ether are :
- chloromethane and 2-chloropropane
  - chloroethane and chloromethane
  - chloroethane and 1-chloropropane
  - chloromethane and 1-chloropropane

**Ans. A**

**Sol.**



22. In the analysis of III group basic radicals of salts, the purpose of adding  $\text{NH}_4\text{Cl}_{(s)}$  to  $\text{NH}_4\text{OH}$  is :

- (A) to increase the concentration of  $\text{OH}^-$  ions.
- (B) to precipitate the radicals of group IV and V.
- (C) to suppress the dissociation of  $\text{NH}_4\text{OH}$ .
- (D) to introduce  $\text{Cl}^-$  ions.

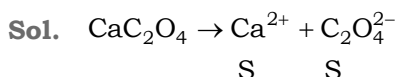
**Ans. C**

**Sol.** To suppress the dissociation of  $\text{NH}_4\text{OH}$  due to the common ion effect

23. Solubility product of  $\text{CaC}_2\text{O}_4$  at a given temperature in pure water is  $4 \times 10^{-9} (\text{mol L}^{-1})^2$   
Solubility of  $\text{CaC}_2\text{O}_4$  at the same temperature is

- (A)  $6.3 \times 10^{-5} \text{ mol L}^{-1}$
- (B)  $2 \times 10^{-5} \text{ mol L}^{-1}$
- (C)  $2 \times 10^{-4} \text{ mol L}^{-1}$
- (D)  $6.3 \times 10^{-4} \text{ mol L}^{-1}$

**Ans. A**



$$K_{sp} = (\text{S})(\text{S})$$

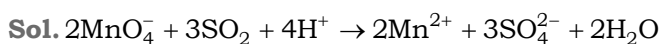
$$4 \times 10^{-9} = \text{S}^2$$

$$\text{S} = \sqrt{4 \times 10^{-9}} = 6.3 \times 10^{-5} \text{ mol / L}$$

24. In the reaction between moist  $\text{SO}_2$  and acidified permanganate solution :

- (A)  $\text{SO}_2$  is oxidised to  $\text{SO}_4^{2-}$   
 $\text{MnO}_4^-$  is reduced to  $\text{Mn}^{2+}$
- (B)  $\text{SO}_2$  is reduced to S  
 $\text{MnO}_4^-$  is oxidised to  $\text{MnO}_4$
- (C)  $\text{SO}_2$  is oxidised to  $\text{SO}_3^{2-}$   
 $\text{MnO}_4^-$  is reduced to  $\text{MnO}_2$
- (D)  $\text{SO}_2$  is reduced to  $\text{H}_2\text{S}$   
 $\text{MnO}_4^-$  is oxidised to  $\text{MnO}_4$

**Ans. A**



25. Which one of the following properties is generally **not** applicable to ionic hydrides?  
(A) Non-volatile  
(B) Non-conducting in solid state  
(C) Crystalline  
(D) Volatile

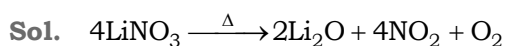
**Ans. D**

**Sol.** Ionic hydrides exhibit high Mpt i.e, Non - volatile

26. Which one of the following nitrate will decompose to give  $\text{NO}_2$  on heating?

- (A)  $\text{NaNO}_3$
- (B)  $\text{KNO}_3$
- (C)  $\text{RbNO}_3$
- (D)  $\text{LiNO}_3$

**Ans. D**



27. Which of the following halides **cannot** be hydrolysed?

- (A)  $\text{CCl}_4$
- (B)  $\text{SiCl}_4$
- (C)  $\text{GeCl}_4$
- (D)  $\text{SnCl}_4$

**Ans. A**

**Sol.** Due to the absence of d – orbitals.

28. 0.48g of an organic compound on complete combustion produced 0.22 g of  $\text{CO}_2$ . The percentage of C in the given organic compound is :

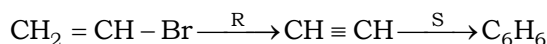
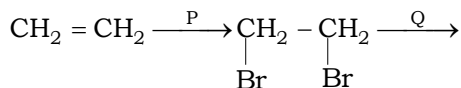
- (A) 25
- (B) 50
- (C) 12.5
- (D) 87.5

**Ans. C**

**Sol.**  $\% \text{C} = \frac{12}{44} \times \frac{\text{wt. of } \text{CO}_2}{\text{wt. of O.C}} \times 100$

$$\% \text{C} = \frac{12}{44} \times \frac{0.22}{0.48} \times 100 = \frac{600}{48} = 12.5\%$$

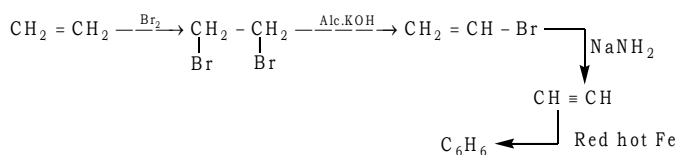
29. In the given sequence of reactions, identify 'P', 'Q' and 'S' respectively.



- (A)  $\text{Br}_2$ , Alc, KOH, NaOH,  $\text{Al}_2\text{O}_3$   
 (B) HBr, Alc, KOH,  $\text{CaC}_2$ ,  $\text{KMnO}_4$   
 (C) HBr, Alc, KOH,  $\text{NaNH}_2$ , Red hot iron tube  
 (D)  $\text{Br}_2$ , Alc, KOH,  $\text{NaNH}_2$ , Red hot iron tube

**Ans. D**

**Sol**



30. The first chlorinated organic insecticide proparod is :  
 (A) Gammaxene  
 (B) Chloroform  
 (C)  $\text{COCl}_2$   
 (D) DDT

**Ans. D**

**Sol.** Dichloro Diphenyl Trichloro ethane (D.D.T)

31. Which of the following crystals has the unit cell such that  $a = b \neq c$  and  $\alpha = \beta = 90^\circ$ ,  $\gamma = 120^\circ$  ?  
 (A) Zinc blende  
 (B) Graphite  
 (C) Cinnabar  
 (D) Potassium dichromate

**Ans. B**

**Sol.** Conceptual

32. MnO exhibits:  
 (A) Ferrimagnetism  
 (B) Antiferromagnetism  
 (C) Ferromagnetism  
 (D) Paramagnetism

**Ans. B**

**Sol.** Conceptual

33. The number of atoms in 4.5g of a face-centred cubic crystal with edge length 300pm is: (Given density =  $10 \text{ g cm}^{-3}$  and  $N_A = 6.022 \times 10^{23}$ )  
 (A)  $6.6 \times 10^{20}$   
 (B)  $6.6 \times 10^{23}$   
 (C)  $6.6 \times 10^{19}$   
 (D)  $6.6 \times 10^{22}$

**Ans. D**

**Sol.**  $d = \frac{Z \times M}{N_A \times a^3}$

$$\Rightarrow M = \frac{10 \times 6.022 \times 10^{23} \times (300 \times 10^{-10})^3}{4}$$

$$M = 40.5 \text{ gm}$$

$$\text{Therefore } 40.5 \text{ gm} \rightarrow 6.022 \times 10^{23} \text{ atoms}$$

$$4.5 \text{ gm} \rightarrow x$$

$$x = 6.6 \times 10^{22} \text{ atoms}$$

34. Vapour pressure of a solution containing 18 g of glucose and 178.2 g of water at  $100^\circ\text{C}$  is: (Vapour pressure of pure water at  $100^\circ\text{C} = 760$  torr)  
 (A) 76.0 torr  
 (B) 752.0 torr  
 (C) 7.6 torr  
 (D) 3207.6 torr

**Ans. B**

**Sol.**  $n_{\text{H}_2\text{O}} = \frac{178.2}{18} = 9.9$ ;  $n_{\text{C}_6\text{H}_{12}\text{O}_6} = \frac{18}{180} = 0.1$

$$\chi_{\text{C}_6\text{H}_{12}\text{O}_6} = \frac{0.1}{10} = 0.01$$

$$\frac{P_0 - P_s}{P_0} = \chi_{\text{C}_6\text{H}_{12}\text{O}_6}$$

$$\frac{760 - P_s}{760} = 0.01$$

$$760 - P_s = 7.6$$

$$P_s = 752.4 \text{ torr}$$

35. A mixture of phenol and aniline shows negative deviation from Raoult's law. This is due to the formation of:  
 (A) Polar covalent bond  
 (B) Non-polar covalent bond  
 (C) Intermolecular Hydrogen bond  
 (D) Intramolecular Hydrogen bond

**Ans. C**

**Sol.** Due to intermolecular hydrogen bond

ZOLLEGE

36. Which one of the following pairs will show positive deviation from Raoult's Law?

- (A) Water - HCl
- (B) Benzene-Methanol
- (C) Water - HNO<sub>3</sub>
- (D) Acetone - Chloroform

**Ans. B**

**Sol.** Conceptual

37. How many Coulombs are required to oxidise 0.1 mole of H<sub>2</sub>O to oxygen?

- (A)  $1.93 \times 10^5 \text{ C}$
- (B)  $1.93 \times 10^4 \text{ C}$
- (C)  $3.86 \times 10^4 \text{ C}$
- (D)  $9.65 \times 10^3 \text{ C}$

**Ans. B**

**Sol.**  $\text{H}_2\text{O} \rightarrow \text{H}_2 + \frac{1}{2}\text{O}_2$

1 mole H<sub>2</sub>O → 2 Faradays = 2 × 96500C

0.1 mole H<sub>2</sub>O → x C

$$x = \frac{2 \times 96500 \times 0.1}{1} = 19300\text{C} = 1.93 \times 10^4 \text{ C}$$

38. A current of 3A is passed through a molten calcium salt for 1hr 47 min 13sec. The mass of calcium deposited is:

(Molar mass of Ca = 40 g mol<sup>-1</sup>)

- (A) 6.0 g
- (B) 2.0 g
- (C) 8.0 g
- (D) 4.0 g

**Ans. D**

**Sol.**  $w = \frac{E_{it}}{96500}$

$$= \frac{20 \times 3 \times 6432}{96500}$$

$$= 3.99 \approx 4$$

39. The value of 'A' in the equation

$\lambda_m = \lambda_m^0 - A\sqrt{C}$  is same for the pair

- (A) NaCl and CaCl<sub>2</sub>
- (B) CaCl<sub>2</sub> and MgSO<sub>4</sub>
- (C) NaCl and KBr
- (D) MgCl<sub>2</sub> and NaCl

**Ans. C**

**Sol.** Conceptual

40. For the reaction,  $A \rightleftharpoons B$ ,  $E_a = 50 \text{ kJ mol}^{-1}$  and  $\Delta H = -20 \text{ kJ mol}^{-1}$ . When a catalyst is added,  $E_a$  decreases by  $10 \text{ kJ mol}^{-1}$ . What is the  $E_a$  for the backward reaction in the presence of catalyst?

- (A)  $60 \text{ kJ mol}^{-1}$
- (B)  $40 \text{ kJ mol}^{-1}$
- (C)  $70 \text{ kJ mol}^{-1}$
- (D)  $20 \text{ kJ mol}^{-1}$

**Ans. A**

**Sol.**  $\Delta H = (E_a)_f - (E_a)_b$

$$-20 = 40 - (E_a)_b$$

$$(E_a)_b = 60$$

41. For the reaction  $\text{PCl}_5 \rightarrow \text{PCl}_3 + \text{Cl}_2$ , rate and rate constant are  $1.02 \times 10^{-4} \text{ mol L}^{-1} \text{ s}^{-1}$  and  $3.4 \times 10^{-5} \text{ s}^{-1}$  respectively at a given instant. The molar concentration of PCl<sub>5</sub> at that instant is:

- (A)  $8.0 \text{ mol L}^{-1}$
- (B)  $3.0 \text{ mol L}^{-1}$
- (C)  $0.2 \text{ mol L}^{-1}$
- (D)  $2.0 \text{ mol L}^{-1}$

**Ans. B**

**Sol.** Rate =  $k[\text{PCl}_5]$

$$\frac{1.02 \times 10^{-4}}{3.4 \times 10^{-5}} = [\text{PCl}_5]$$

$$\therefore [\text{PCl}_5] = 3.0 \text{ mol / lit}$$

42. Which one of the following does not represent Arrhenius equation?

- (A)  $\log k = \log A - \frac{E_a}{2.303RT}$
- (B)  $k = Ae^{-E_a/RT}$
- (C)  $\ln k = -\frac{E_a}{RT} + \ln A$
- (D)  $k = Ae^{E_a/RT}$

**Ans. D**

**Sol.** Conceptual

43. Identify the **incorrect** statement:  
 (A) Values of colligative properties of colloidal solution are of small order compared to values of true solution  
 (B) Tyndall effect is observed only when diameter of the dispersed particles is not much smaller than wavelength of incident light  
 (C) Colour of colloidal solution depends on the wavelength of light scattered by the dispersed particles  
 (D) Brownian movement is due to balanced bombardment of molecules of dispersion medium on colloidal particles

**Ans. D**

**Sol.** Brownian movement is due to **unbalanced** bombardment of molecules of dispersion medium on colloidal particles

44. For the coagulations of positively charged hydrated ferric - oxide sol, the flocculating power of the ions is in the order:  
 (A)  $\text{PO}_4^{3-} > \text{SO}_4^{2-} > \text{Cl}^- > [\text{Fe}(\text{CN})_6]^{4-}$   
 (B)  $\text{Cl}^- > \text{SO}_4^{2-} > \text{PO}_4^{3-} > [\text{Fe}(\text{CN})_6]^{4-}$   
 (C)  $\text{SO}_4^{2-} = \text{Cl}^- = \text{PO}_4^{3-} = [\text{Fe}(\text{CN})_6]^{4-}$   
 (D)  $[\text{Fe}(\text{CN})_6]^{4-} > \text{PO}_4^{3-} > \text{SO}_4^{2-} > \text{Cl}^-$

**Ans. D**

**Sol.** flocculating power  $\propto$  charge on the ion

45. Gold sol is not a :  
 (A) Macromolecular colloid  
 (B) Lyophobic colloid  
 (C) Multimolecular colloid  
 (D) Negatively charged colloid

**Ans. A**

**Sol.** Conceptual

46. The **incorrect** statement about Hall -Heroult process is :  
 (A) Carbon anode is oxidised to CO and  $\text{CO}_2$   
 (B)  $\text{Na}_3\text{AlF}_6$  helps to decrease the melting point of the electrolyte  
 (C)  $\text{CaF}_2$  helps to increase the conductivity of the electrolyte  
 (D) Oxidation state of oxygen changes in the overall cell reaction

**Ans. D**

**Sol.** Conceptual

47. Select the correct statement :  
 (A) Roasting involves heating the ore in the absence of air  
 (B) Calcination involves heating the ore above its melting point  
 (C) Smelting involves heating the ore with suitable reducing agent and flux below its melting point  
 (D) Calcination of calcium carbonate is endothermic

**Ans. D**

**Sol.** Conceptual

48.  $\text{NO}_2$  gas is :  
 (A) Colourless, neutral  
 (B) Colourless, acidic  
 (C) Brown, acidic  
 (D) Brown neutral

**Ans. C**

**Sol.** Conceptual

49. Identify the incorrect statement from the following:  
 (A) Oxides of nitrogen in the atmosphere can cause depletion of the ozone layer  
 (B) Ozone absorbs the intense ultraviolet radiation of Sun  
 (C) Depletion of ozone layer is because of its chemical reactions with chlorofluoro alkanes  
 (D) Ozone absorbs infrared radiation

**Ans. D**

**Sol.** Ozone absorbs U.V radiation

50. The correct decreasing order of boiling point of hydrogen halides is:  
 (A)  $\text{HF} > \text{HCl} > \text{HBr} > \text{HI}$   
 (B)  $\text{HI} > \text{HBr} > \text{HCl} > \text{HF}$   
 (C)  $\text{HF} > \text{HI} > \text{HBr} > \text{HCl}$   
 (D)  $\text{HI} > \text{HF} > \text{HBr} > \text{HCl}$

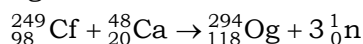
**Ans. C**

**Sol.** Conceptual

51. The synthetically produced radioactive noble gas by the collision of  $^{249}_{98}\text{Cf}$  with  $^{48}_{20}\text{Ca}$  is :  
 (A) Radon  
 (B) Radium  
 (C) Oganesson  
 (D) Xenon

**Ans. C**

**Sol.** Oganesson  $Z=118$



ZOLLEGE



52. The transition element ( $\approx 5\%$ ) present with lanthanoid metal in Misch metal is :  
 (A) Mg (B) Fe (C) Zn (D) Co

**Ans. B**

**Sol.** 95% lanthanoid metal and  $\approx 5\%$  iron

53. Match the following :

|                       |                              |
|-----------------------|------------------------------|
| I. $\text{Zn}^{2+}$   | i. $d^8$ configuration       |
| II. $\text{Cu}^{2+}$  | ii. Colourless               |
| III. $\text{Ni}^{2+}$ | iii. $\mu = 1.73 \text{ BM}$ |

Codes :

|     | I  | II  | III |
|-----|----|-----|-----|
| (A) | i  | ii  | iii |
| (B) | ii | iii | i   |
| (C) | ii | i   | iii |
| (D) | i  | iii | ii  |

**Ans. B**

**Sol.**  $\text{Zn}^{+2}$  – no unpaired electrons

$\text{Cu}^{+2}$  –  $\mu = 1.73 \text{ BM}$

$\text{Ni}^{+2}$  –  $d^8$  configuration

54. Which of the following statements related to lanthanoids is **incorrect** ?

- (A) Lanthanoids are silvery white soft metals.  
 (B) Samarium shows +2 oxidation state.  
 (C)  $\text{Ce}^{+4}$  solutions are widely used as oxidising agents in titrimetric analysis.  
 (D) Colour of Lanthanoid ion in solution is due to d-d transition .

**Ans. D**

**Sol.** Colour of Lanthanoid ion in solution is due to f-f transition

55. A metalloid is :

- (A) Bi  
 (B) Sb  
 (C) P  
 (D) Se

**Ans. B and D**

**Sol.** Sb and Se are metalloids.

(According to NCERT of 15<sup>th</sup> and 16<sup>th</sup> group)

56. A pair of isoelectronic species having bond order of one is :

- (A)  $\text{N}_2$ , CO  
 (B)  $\text{N}_2$ ,  $\text{NO}^+$   
 (C)  $\text{O}_2^{2-}$ ,  $\text{F}_2$   
 (D) CO,  $\text{NO}^+$

**Ans. C**

**Sol.**  $\text{O}_2^{2-}$ ,  $\text{F}_2$  = 18 electrons each

57. Identify the **wrong** relation for real gases :

(A)  $Z = \frac{V_{\text{ideal}}}{V_{\text{real}}}$

(B)  $p_{\text{ideal}} = p_{\text{real}} + \frac{an^2}{V^2}$

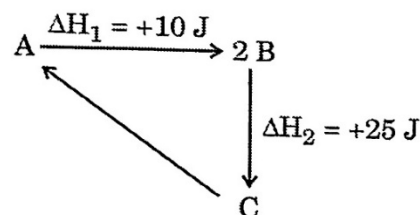
(C)  $V_{\text{real}} = V_{\text{ideal}} - nb$

(D)  $\left(p + \frac{a}{V^2}\right)(V - b) = RT$

**Ans. A**

**Sol.** Compressibility factor ( $Z$ ) =  $\frac{V_{\text{real}}}{V_{\text{ideal}}}$

58. From the diagram



$\Delta_r H$  for the reaction  $\text{C} \rightarrow \text{A}$  is :

- (A) +35 J (B) -15 J  
 (C) -35 J (D) +15 J

**Ans. C**

**Sol.**  $\text{A} \xrightarrow{\Delta H_1} 2\text{B} \xrightarrow{\Delta H_2} \text{C}$   
 $\Rightarrow \text{A} \rightarrow \text{C} \quad \Delta H = \Delta H_1 + \Delta H_2 = 35\text{J}$   
 Then  $\text{C} \rightarrow \text{A} \quad \Delta H = -35\text{J}$

59. For which one of the following mixtures is composition uniform throughout ?

- (A) Sand and water  
 (B) Grains and pulses with stone  
 (C) Mixture of oil and water  
 (D) Dilute aqueous solution of sugar

**Ans. D**

**Sol.** Dilute aqueous solution of sugar is a homogeneous solution.

60. The energy associated with first orbit of  $\text{He}^+$  is:

- (A) 0 J  
 (B)  $-8.72 \times 10^{-18} \text{ J}$   
 (C)  $-4.58 \times 10^{-18} \text{ J}$   
 (D)  $-0.545 \times 10^{-18} \text{ J}$

**Ans. B**

**Sol.**  $E_n = -2.18 \times 10^{-18} \times \frac{Z^2}{n^2}$

$$Z = 2, n = 1$$

$$E = -2.18 \times 10^{-18} \times \frac{4}{1} = -8.72 \times 10^{-18} \text{ J}$$