

## Section - I

**Note : 1) Answer all the questions. 2) Choose the most suitable answer from the given four alternatives and write the option code and the corresponding answer.**

- Which of the metal is extracted is by Hall - Heroult process? 15 X 1 = 15  
 a) Al                                      b) Ni                                      c) Cu                                      d) Zn
- Match items in colum - I with the items of column - II and assign the correct code.  

Column - I	Column - II	A	B	C	D	
A Borazole	1 B(OH) <sub>3</sub>	a)	2	1	4	3
B Boric acid	2 B <sub>3</sub> N <sub>3</sub> H <sub>6</sub>	b)	1	2	4	3
C Quartz	3 Na <sub>2</sub> [B <sub>4</sub> O <sub>5</sub> (OH) <sub>4</sub> ]8H <sub>2</sub> O	c)	1	2	4	3
D Borax	4 SiO <sub>2</sub>	d)	None of these			
- Assertion :** Bond dissociation energy of fluorine is greater than chlorine gas  
**Reason :** Chlorine has more electronic repulsion than fluorine  
 a) Both assertion and reason are true and reason is the correct explanation of assertion  
 b) Both assertion and reason are true but reason is not the correct explanation of assertion  
 c) Assertion is true but reason is false  
 d) Both assertion and reason are false
- The catalytic behaviour of transition metal and their compounds is ascribed mainly due to  
 a) their magnetic behaviour                      b) their unfilled orbitals  
 c) their ability to adopt variable oxidation states                      d) their chemical reactivity
- Crystal field stabilisation energy for high spin d<sup>5</sup> octahedral complex is  
 a) -0.6Δ<sub>o</sub>                                      b) 0                                      c) 2(P-Δ<sub>o</sub>)                                      d) 2(P + Δ<sub>o</sub>)
- Potassium has a bcc structure with nearest neighbour distance 4.52Å<sup>o</sup>. Its atomic weight is 39. Its density will be  
 a) 915 Kgm<sup>-3</sup>                                      b) 2142 Kgm<sup>-3</sup>                                      c) 452 Kgm<sup>-3</sup>                                      d) 390 Kgm<sup>-3</sup>
- For a first order reaction, the rate constant is 6.909min<sup>-1</sup>. The time taken for 75% conversion in minutes is  
 a)  $\left(\frac{3}{2}\right) \log 2$                                       b)  $\left(\frac{2}{3}\right) \log 2$                                       c)  $\left(\frac{3}{2}\right) \log\left(\frac{3}{4}\right)$                                       d)  $\left(\frac{2}{3}\right) \log\left(\frac{4}{3}\right)$
- Pick out the strongest conjugate base among the following  
 a) Cl<sup>-</sup>                                      b) NO<sub>2</sub><sup>-</sup>                                      c) SO<sub>4</sub><sup>2-</sup>                                      d) CH<sub>3</sub>COO<sup>-</sup>
- Among the following, which has same equivalent and molar conductance?  
 a) H<sub>2</sub>SO<sub>4</sub>                                      b) CaCl<sub>2</sub>                                      c) NaCl                                      d) Na<sub>2</sub>SO<sub>4</sub>
- Which among the following does not affect adsorption?  
 a) surface area of the adsorbent                      b) temperature                      c) pressure                      d) catalyst
- Ethylene diamine is converted to ethylene glycol using  
 a) Na<sub>2</sub>CO<sub>3</sub> solution                      b) NaHCO<sub>3</sub>                      c) Baeyer's reagent                      d) nitrous acid
- In which of the following reaction new carbon-carbon bond is not formed?  
 a) Aldol condensation                      b) Friedel craft reaction  
 c) Kolbe's reaction                      d) Wolf Krishner reduction

13. Which of the following amines does not undergo acetylation?  
 a) t - butylamine    b) ethylamine    c) diethylamine    d) triethylamine
14. Which one of the following is not produced by body?  
 a) DNA    b) Enzymes    c) Hormones    d) Vitamins
15. Penicillin is an example of    a) Analgesic    b) Antibiotic    c) Anesthetic    d) Antacid

### Section - II

Answer any six questions and question number 20 is compulsory.    6 × 2 = 12

16. Give the limitations of Ellingham diagram.
17. What are interhalogen compounds? Give example.
18. Arrange the following in order increasing molar conductivity.  
 i)  $Mg[Cr(NH_3)Cl_3]$     ii)  $[Cr(NH_3)_3Cl_3]$     iii)  $[CoF_6]^{3-}$     iv)  $[Cr(NH_3)_3Cl_3]$
19. Define unit cell.
20. Calculate the  $p^H$  0.1M ammonium acetate. Given that  $K_a = K_b = 1.8 \times 10^{-5}$
21. What happens when a colloidal sol of  $Fe(OH)_3$  and  $As_2S_3$  are mixed.
22. How will you prepare benzoic acid using Grignard's reagent?
23. Write the zwitter ion structure of alanine.
24. Write are food preservatives?

### Section - III

Answer any six questions and question number 33 is compulsory.    6 × 3 = 18

25. Describe a method for refining nickel.
26. What is catenation? Describe briefly the catanation property of carbon?
27. What is lanthanide contraction? What are the effect of lanthanide contraction?
28. Derive integrated rate law for a zero order reaction  $A \rightarrow$  product.
29. Write the expression for the solubility product of  $Hg_2Cl_2$ .
30. Derive Nernst equation.
31. How are the following conversions effected?  
 i) benzyl chloride to benzyl alcohol    ii) benzyl alcohol to benzoic acid
32. Explain the mechanism of aldol condensation.
33. Identify A, B and C :  $CH_4 \xrightarrow{HNO_3} A \xrightarrow{LiAlH_4} B \xrightarrow{2CH_3CH_2Br} C$

### Section - IV

Answer all the questions.    5 × 5 = 25

34. a) i) Out of coke and  $CO$ , which is better reducing agent for the reduction of  $ZnO$ ? Why? (2)    ii) Describe the structure of diborane. (3) (OR)  
 b) i) Calculate the number of unpaired electrons in  $Ti^{3+}$ ,  $Mn^{2+}$  and calculate the spin only magnetic moment. (2)  
 ii) List any three compounds of xenon and mention the type of hybridisation and structure of the compounds. (3)
35. a) Explain using Valence Bond theory  $[Ni(CN)_4]^{2-}$  is diamagnetic,  $[NiCl_4]^{2-}$  is paramagnetic. (5) (OR) b) i) Calculate the number of atoms in a fcc unit cell. (2)  
 ii) Differentiate rate and rate constant of the reaction. (3)
36. a) i) State Kohlraush's law. ii) Derive an expression for Ostwald's dilution law. (3) (OR)    b) i) Give two uses of emulsions. (2)  
 ii) Describe adsorption theory of catalysis. (3).
37. a) i) Give the structure and IUPAC name of metamers of 2- methoxy propane. (2)  
 ii) What is the action of HCN on a) propanone and b) ethanal. (3) (OR)  
 b) i) How will you prepare cinnamic acid from benzaldehyde? (2)  
 ii) How will you distinguish between  $1^\circ$ ,  $2^\circ$  and  $3^\circ$  aliphatic amines. (3)
38. a) i)  $CH_3CH_2NC \xrightarrow{HCl} A \xrightarrow{H_2O} B$  find A and B. (2)  
 ii) Write a short note on Peptide bond. (3) (OR)  
 b) i) What are the functions of lipids in living organism. (2)  
 ii) How are the following prepared? a) Neoprene    b) Buna - S (3)