

## QUESTION PAPER-2

### CHEMISTRY

Time Allowed : 3.00 Hours


Maximum Marks : 70

**General Instructions :**

- (a) There are 33 questions in this question paper with internal choice.
- (b) SECTION A consists of 16 multiple -choice questions carrying 1 mark each.
- (c) SECTION B consists of 5 short answer questions carrying 2 marks each. (1 question has internal choice)
- (d) SECTION C consists of 7 short answer questions carrying 3 marks each. (2 questions has internal choice)
- (e) SECTION D consists of 2 case - based questions carrying 4 marks each.
- (f) SECTION E consists of 3 long answer questions carrying 5 marks each. (2 questions has internal choice)
- (g) All questions are compulsory.
- (h) Use of log tables and calculators is not allowed.

**SECTION-A**

1. Which of the following is not a limitation of Raoult's law?
  - (a) The solution should be dilute
  - (b) The solute may be volatile or non-volatile
  - (c) The solute molecules do not undergo association or dissociation
  - (d) No molecular interactions exist between solute and solvent
2. The hard shell of an egg cell was dissolved out in HCl acid. The egg was then placed in a highly saturated solution of NaCl. What will happen in this case?
  - (a) The egg will shrink
  - (b) The egg will swell
  - (c) The egg will become harder
  - (d) There will be no change
3. On passing electricity through dilute  $\text{H}_2\text{SO}_4$  solution, the amount of substance liberated at cathode and anode respectively are in the ratio (by mass)
  - (a) 1 : 8
  - (b) 1 : 16
  - (c) 16 : 1
  - (d) 1 : 4
4. To produce 160 g of oxygen, the number of moles of water required to be electrolysed is:
  - (a) 2.5
  - (b) 5
  - (c) 20
  - (d) 10
5. The chemical twins for the element "Platinum" will be
  - (a) Au
  - (b) Ag
  - (c) Pd
  - (d) Hg
6. Which metal's ion is found in the gemstone "Emerald"
  - (a) Mn
  - (b) Cr
  - (c) Cu
  - (d) Co
7. Which of the following ligand is weaker than ligand  $\text{S}^{2-}$ 
  - (a)  $\text{SCN}^-$
  - (b)  $\text{OH}^-$
  - (c)  $\text{H}_2\text{O}$
  - (d)  $\text{NH}_3$
8. Which of the following ligand is not a polydentate ligand?
  - (a) en
  - (b) E.D.T.A.
  - (c) Ox
  - (d)  $\text{CH}_3\text{NH}_2$

9. Chemical name of vitamin B<sub>12</sub> is?  
 (a) Thiamine (b) Cyanocobalamine (c) Riboflavin (d) Pyridoxine
10. Which alpha ammino acid comes in the category of essential ammino acids  
 (a) Serine (b) Cysteine (c) Lysine (d) Aspartic acid
11. What will be the I.U.P.A.C. name for the compound
- $$\text{CH}_2 - \text{CH}_2 - \text{OH}$$

- (a) 2-Ethylphenol (b) 1-Hydroxyethyl benzene  
 (c) 2-Hydroxyethyl benzene (d) 2-Phenylethanol
12. Phenol when treated with Ni catalyst at higher temperature gives us :-  
 (a) Toluene (b) Cyclohexanol (c) Cyclohexane (d) Benzene
13. Which amine does not give Hinsberg reagent test  
 (a) Tertiary (b) Secondary  
 (c) Primary (d) Quaternary amine salt
14. In 30 minute, a first order reaction is 50% completed, the amount of time it took to complete 87.5% of the reaction will be :-  
 (a) 30 minute (b) 60 minute (c) 120 minute (d) 90 minute
15. Which aldehyde has smell like the bitter almond.  
 (a) Formaldehyde (b) Acetaldehyde (c) Butyraldehyde (d) Benzaldehyde
16. Which of the following acid formula is the formula for valeric acid?  
 (a) C<sub>3</sub>H<sub>7</sub>COOH (b) C<sub>4</sub>H<sub>9</sub>COOH (c) C<sub>5</sub>H<sub>11</sub>COOH (d) C<sub>6</sub>H<sub>13</sub>COOH

### SECTION-B

17. TiO<sub>2</sub> is white in colour while TiCl<sub>3</sub> is violet in colour, why?  
 18. Write any two applications of electrolysis?

**OR**

Resistance of 0.1M KCl solution in a conductance cell is 300 Ohm and conductivity is 0.013 Scm<sup>-1</sup>. Calculate value of cell constant.

19. What is chelate effect?  
 20. Iodoform gives the precipitate with silver nitrate on heating while chloroform does not. Give reason  
 21. What happen when  
 (i) diethyl ether is heated in the presence of Alumina  
 (ii) Write Friedie crafts alkylation reaction for phenol.

### SECTION-C

22. (i) Write I.U.P.A.C. name of the complex compound [Pt (NH<sub>3</sub>)<sub>4</sub>] [PtCl<sub>4</sub>]  
 (ii) Calculate magnetic momentum for the compound Na<sub>3</sub>[CoCl<sub>6</sub>].  
 (iii) The compound [Ni(dmg)<sub>2</sub>] has which type of structure?

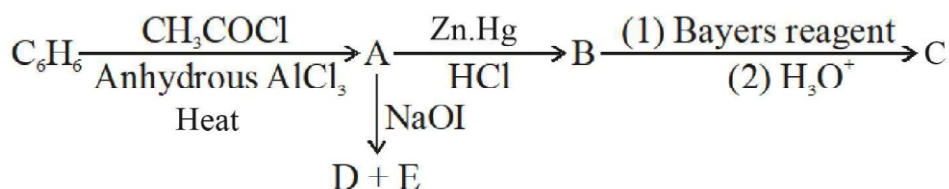
23. An alkyl halide, "X" having molecular formula  $C_6H_{13}Cl$  on treatment with potassium tert-butoxide gives two isomeric alkenes "Y" and "Z" alkenes on hydrogenation gives 2, 3-dimethylbutane. Identify compound "X", "Y" and "Z" by writing chemical reaction.
24. An organic compound (A) having molecular formula  $C_6H_6O$  gives a characteristic colour with aqueous  $FeCl_3$  solution. When (A) is treated with  $CO_2$  gas and NaOH at 400 K under high pressure gives (B) which on acidification gives "C". When "C" is reacted with acetyl chloride it gives compound "D". The (D) is used as a medicine to treat clogged arteries. Identify compound A, B, C and "D" by reaction.
25. Give one chemical test to distinguish between the following pairs with reaction -  
(1) Methylamine and dimethylamine  
(2) Aniline and benzylamine

OR

- (i) Amines have lower boiling point than alcohols of comparable molecular masses. Why?  
(ii) Ethylamine is soluble in water but aniline is not, why?
26. An organic compound "A" molecular formula  $C_3H_6O_2$  on reaction with ammonia followed by heating yield "B". Compound "B" on reaction with  $Br_2$  and alc. NaOH gives compound "C" ( $C_2H_7N$ ). Compound "C" forms a foul smelling compound D, on reaction with chloroform and NaOH. Identify A, B, C, and compound D and write reaction related to it also.
27. Give reason for the following -  
(i) Carboxylic acids do not give characteristic reactions of carbonyl group?  
(ii) Treatment of Benzaldehyde with HCN gives a mixture of two isomers which can not be separated even by fractional distillation.  
(iii) Sodium bisulphite is used for purification of ketones and aldehydes.

OR

- (1) Benzaldehyde to acetophenone  
(2) Malonic acid to acetic acid  
(3) Acetaldehyde But-2-enoic acid
28. Write only formula for the compound A, B, C, D and E in the following conversion-



#### SECTION-D

29. We should take balanced diet in our food to get sufficient amount of daily required nutrients. A balanced diet is decided according to the nature or type of work, age disease surrounding environment etc. A balanced diet keep us healthy, help us to grow properly, fight against pathogens, make us energetic. The deficiency of any nutrient in our body become cause of many diseases. Because of modern life style and increased use of fat and carbohydrates in junk food gradually making our body dull and weak.

The above paragraph shows us importance of balanced diet as our food. Now give answers for the following questions –

- Name the disease caused due to deficiency of vitamin “D” in the children.
- Name a disease caused due to deficiency of protein
- Name a non-sugar sacharide.
- What is function of enzyme “Maltase”.

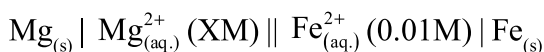
30. The general electronic configuration for lanthanide series elements is  $(n-2)f^{1-14}, ns^2$ . These elements are called “f” block elements as their last electron is filled in the “f” orbital. They are also known as rare earth metal because of their less availability in the earths crust. Their common oxidation state is +3. There is a regular decrease in the size of lanthanides ions with increase in atomic number due to lanthanide contraction.

The following questions are based on the properties of “f” block elements, Choose the most appropriate answer.

- Which lanthanide series element has electronic configuration  $[Xe], 4f^7, 5d^1, 6s^2$   
 (a) Ce (58)                      (b) Eu (63)                      (c) Gd (64)                      (d) Pm (61)
- Which lanthanide series element is radioactive :  
 (a) Ce                      (b) Eu                      (c) Gd                      (d) Pm
- Misch metal is/are?  
 (a) Metals belongs to Lanthanide series                      (b) Metals belongs to Actinide series.  
 (c) Radioactive “f” block metals.                      (d) Alloy of Lanthanide series elements.
- Write electronic configuration for the element  $Z = 65$ .

### SECTION-E

31. (i) At  $25^\circ\text{C}$ , the cell potential of a given electrochemical cell is 1.92V.



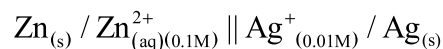
$$E^\circ_{\text{Mg}/\text{Mg}^{2+}} = 2.37V \quad E^\circ_{\text{Fe}/\text{Fe}^{2+}} = 0.45V$$

Calculate the value of “X” for the cell

- (ii) Conductivity of  $2 \times 10^{-3}\text{M}$  Methanoic acid is  $8 \times 10^{-5} \text{ S cm}^{-1}$ . Calculate its molar conductivity and degree of dissociation if  $\Lambda_M^0$  for methanoic acid is  $404 \text{ S cm}^2/\text{mol}$ . [2×2.5=5]

### OR

- (i) The electrical resistance of a column of  $0.05 \text{ M KOH}$  solution of length  $50 \text{ cm}$  and area of cross section  $0.625 \text{ cm}^2$  is  $5 \times 10^3 \text{ ohm}$ . Calculate its resistivity, conductivity and molar conductivity.  
 (ii) Calculate E.M.F. of the following cell – [3+2=5]



Given :–  $E^\circ_{\text{Zn}^{2+}/\text{Zn}_{(s)}} = -0.76V$

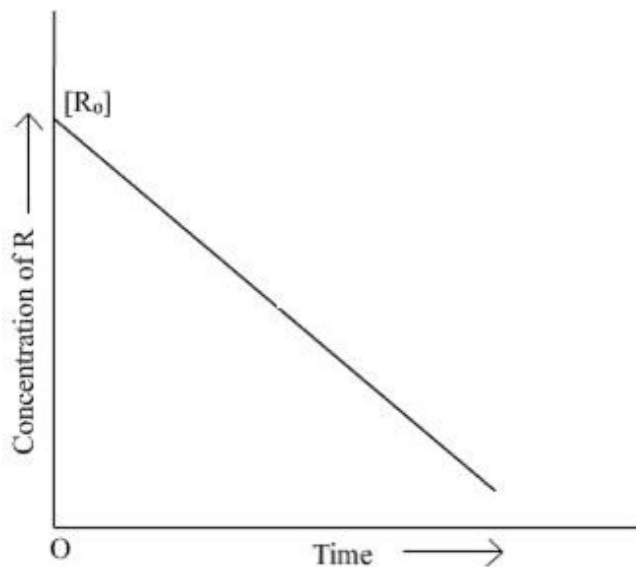
$E^\circ_{\text{Ag}^+/\text{Ag}_{(s)}} = +0.80V$

Given :–  $\log 10 = 1$

32. (i) Arjun plotted a graph between concentration of reactant R and time for the reaction  $R \rightarrow P$ , on the basis of graph

Answer the following questions –

[3+2=5]



- (a) Predict the order of reaction  
 (b) What does the slope of the line indicate?  
 (c) What is the unit of rate constant  
 (ii) A first order reaction takes 25 minutes for 25% decomposition. Calculate its half life time period.  
 Given :–  $\log 2 = 0.3010$   $\log 3 = 0.4771$

**OR**

- (i) The rate constant for a first order reaction is  $60 \text{ S}^{-1}$ . How much time will it take to reduce the initial concentration of reactant to its  $\frac{1}{16}$  value?  
 [3+1+1=5]

Given  $\log 2 = 0.3010$   $\log 10 = 1$

- (ii) Write two factors that affect rate of reaction.  
 (iii) Write a conditions for the collisions to be effective collisions.  
 [2+3=5]

33. (i) Prove that elevation in boiling point is directly proportional to the molality of the solution that contains non - volatile solute.

(ii) A 10% solution (by mass) of sucrose in water has a freezing point of 269.15 K. Calculate the freezing point of 10% glucose aqueous solution if the freezing point of pure water is 273.15 K.

Given – Glucose molecular formula:-  $\text{C}_6\text{H}_{12}\text{O}_6$

Sucrose molecular formula:-  $\text{C}_{12}\text{H}_{22}\text{O}_{11}$ .