

## SECOND MID TERM TEST - 2023

**12 - STD**

**CHEMISTRY**

**Time : 1.30 Hrs.**

**Maximum Marks: 35**

**Part - I**

**Note: Answer all the questions.**

**10 x 1 = 10**

1. How many geometrical isomers are possible for  $[\text{Pt}(\text{Py})(\text{NH}_3)(\text{Br})(\text{Cl})]$ ?  
 (A) 3                      (B) 4                      (C) 0                      (D) 15
2. What kind of isomerism exists between  $[\text{Pt}(\text{en})_2\text{Cl}_2]\text{Br}_2$  and  $[\text{Pt}(\text{en})_2\text{Br}_2]\text{Cl}_2$ ?  
 (A) Linkage isomer                      (B) Ionisation isomer  
 (C) Coordination isomer                      (D) Solvate isomer
3. How many faradays of electricity are required for the following reaction to occur?  $\text{MnO}_4^- \rightarrow \text{Mn}^{2+}$   
 (A) 5F                      (B) 3F                      (C) 1F                      (D) 7F
4. Collodion is a 4% solution of which one of the following compounds in alcohol-ether mixture?  
 (A) Nitroglycerine                      (B) Cellulose acetate  
 (C) Glycoldinitrate                      (D) Nitrocellulose
5. Which one of the following is not a strong field ligand?  
 (A) CO                      (B) CN<sup>-</sup>                      (C) F<sup>-</sup>                      (D) en
6. Secondary nitro alkanes react with nitrous acid to form  
 (A) Red solution                      (B) Blue solution  
 (C) Green solution                      (D) Yellow solution
7. When aniline reacts with acetic anhydride the product formed is  
 (A) o-amino acetophenone                      (B) m-amino acetophenone  
 (C) p-amino acetophenone                      (D) acetanilide
8. Which of the following reagent can be used to convert benzene diazonium chloride to phenyl hydrazine?  
 (A)  $\text{SnCl}_2/\text{HCl}$                       (B) Zn dust/ $\text{CH}_3\text{COOH}$   
 (C)  $\text{Na}_2\text{SO}_3$                       (D) All the above
9. Assertion: Pure iron when heated in dry air is converted with a layer of rust  
 Reason: Rust has the composition of  $\text{Fe}_3\text{O}_4$   
 (A) If both assertion and reason are true and reason is the correct explanation of assertion  
 (B) If both assertion and reason are true and reason is not the correct explanation of assertion  
 (C) Assertion is true but reason is false  
 (D) Both assertion and reason are false
10. Which of the following is used in cellular phones?  
 (A) Mercury button cell                      (B) Fuel cell  
 (C) Lithium-ion battery                      (D) Lead storage battery

## Part - II

Note: Answer any three questions. Question No.15 is compulsory.

3 x 2 = 6

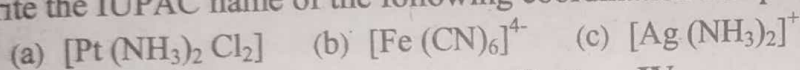
11. What are the limitations of VB theory?
12. Why is AC current used instead of DC in measuring the electrolytic conductance?
13. Write a note on Tyndall effect.
14. Write a note on Gomberg reaction.
15. How is aryl halide prepared by using  $\text{Cu}_2\text{Cl}_2/\text{HCl}$ ?

## Part - III

Note: Answer any three questions. Question No.20 is compulsory.

3 x 3 = 9

16. In an octahedral crystal field, draw figure to show splitting of d orbitals.
17. What are the factors that affect electrolytic conductance?
18. How to prepare colloids by using electro dispersion method?
19. Write a note on Mustard oil reaction.
20. Write the IUPAC name of the following coordination compounds.



## Part - IV

Note: Answer all the questions.

2 x 5 = 10

21. (a) Write the postulates of Werner's theory?  
(or)  
(b) (i) State Faraday's Laws of electrolysis. (3)  
(ii) Write a note on sacrificial protection. (2)
22. (a) Differentiate physisorption and chemisorptions.  
(or)  
(b) Compound  $\text{C}_2\text{H}_7\text{N}$  (A) react with trichloromethane in the presence of base to give the compound (B) which has an unpleasant smell. Compound (B) upon heating at  $250^\circ\text{C}$  give the compound (C). Find the compound A, B and C. Write the equations.

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## Tirupathur District – Second Mid Term – Nov - 2023

12<sup>th</sup> Std – Chemistry Answer Key

## Part – I

10 x 1 = 10

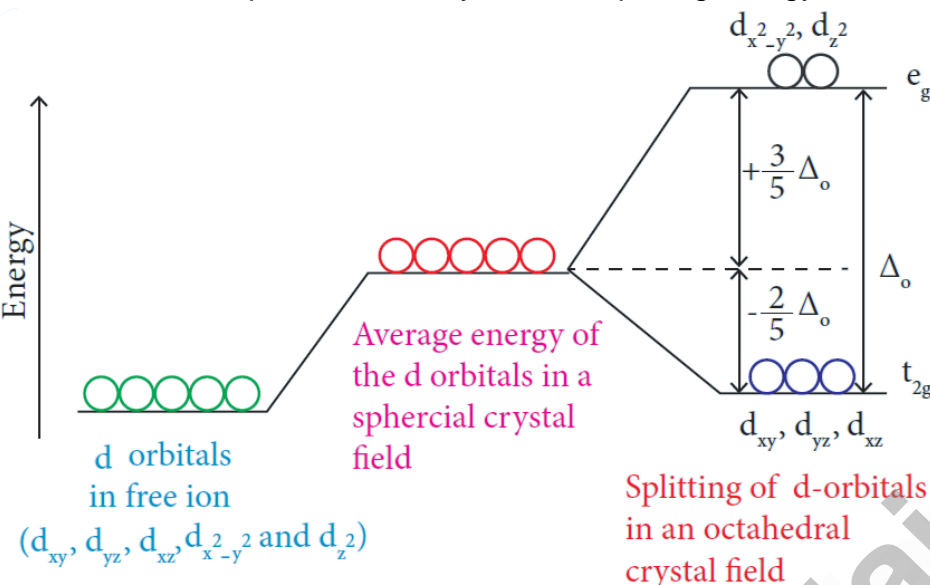
| Q. No | Answer               | Q. No | Answer                                 |
|-------|----------------------|-------|--|
| 1     | a) 3                 | 6     | b) Blue solution                       |
| 2     | b) Ionisation isomer | 7     | d) Acetanilide                         |
| 3     | a) 5F                | 8     | d) All the above                       |
| 4     | d) Nitrocellulose    | 9     | d) Both assertion and reason are false |
| 5     | c) F <sup>-</sup>    | 10    | c) Lithium – ion battery               |

## Part – II

Answer any 3 questions and question No. 15 is compulsory.

3 x 2 = 6

|    |   |
|----|---|
| 11 | <p><b>What are the limitations of VB theory?</b></p> <ul style="list-style-type: none"> <li>• it does not explain that colour of the complex.</li> <li>• it considers only their spin only magnetic moments and does not consider the other components of magnetic moments.</li> <li>• it does not provide a quantitative explanation as to why certain complexes are inner orbital complexes and the other or outer orbital complexes for the same metal. For eg, [Fe(CN)<sub>6</sub>]<sup>4-</sup> is diamagnetic (low spin) whereas [FeF<sub>6</sub>]<sup>4-</sup> is paramagnetic (high spin).</li> </ul> |
| 12 | <p><b>Why is AC current used instead of DC in measuring the electrolytic conductance?</b></p> <p>If DC current is used to measure electrolytic conductance, it will lead to the electrolysis of the solution taken in the cell. So, AC current is used for this measurement to prevent electrolysis.</p>  |
| 13 | <p><b>Write a note on Tyndall effect.</b></p> <p>When a beam of light is passed through the colloidal solution, the path of light is illuminated by the scattering of light by colloidal particles. The phenomenon of scattering of light by the solution particles is called Tyndall effect.</p>   |
| 14 | <p><b>Write a note on Gomberg reaction.</b></p> $  \text{C}_6\text{H}_5\text{N}_2^+\text{Cl}^- + \text{H}-\text{C}_6\text{H}_5 \xrightarrow{\text{NaOH}} \text{C}_6\text{H}_5-\text{C}_6\text{H}_5 + \text{N}_2\uparrow + \text{HCl}  $ <p style="text-align: center;">Benzene <span style="margin-left: 150px;">Biphenyl</span></p>  |
| 15 | <p><b>How is aryl halide prepared by using Cu<sub>2</sub>Cl<sub>2</sub> / HCl?</b></p> $  \text{C}_6\text{H}_5-\text{N}_2^+\text{Cl}^- \xrightarrow{\text{Cu}_2\text{Cl}_2 / \text{HCl}} \text{C}_6\text{H}_5-\text{Cl} + \text{N}_2  $ <p style="text-align: center;">Benzene diazonium chloride <span style="margin-left: 100px;">Chloro benzene</span></p>   |

|    |  |
|----|--|
| 16 | <p><b>In an octahedral crystal field, draw the figure to show splitting of d orbitals. (Sep-20)</b></p> <p>The energy of the orbitals <math>dx^2-y^2</math> and <math>dz^2</math> (represented as <math>e_g</math> orbitals) will increase by <math>3/5\Delta_o</math> while that of the other three orbitals <math>dxy</math>, <math>d_{yz}</math> and <math>dxz</math> (represented as <math>t_{2g}</math> orbitals) decrease by <math>2/5\Delta_o</math>. Here, <math>\Delta_o</math> represents the crystal field splitting energy in the octahedral field.</p>  |
| 17 | <p><b>Factors affecting electrolytic conductance? (Aug-21, May-22)</b></p> <p>Factors increasing conductors</p> <ol style="list-style-type: none"> <li>1. inter ionic attraction</li> <li>2. high dielectric constant</li> <li>3. decrease in viscosity</li> <li>4. increase in temperature</li> <li>5. increase in dilution</li> </ol>  |
| 18 | <p><b>How to prepare colloids by using electro dispersion method?</b></p> <p>An electrical arc is struck between electrodes dispersed in water surrounded by ice. When a current of 1 amp /100 V is passed an arc produced forms vapours of metal which immediately condense to form colloidal solution.</p> <p>By this method colloidal solution of many metals like copper, silver, gold, platinum, etc. can be prepared Alkali hydroxide is added as a stabilising agent for the colloidal solution.</p>  |
| 19 | <p><b>Write a note on Mustard oil reaction.</b></p> $  \begin{array}{c}  \text{S} \\     \\  \text{CH}_3 - \text{N} - \text{H} + \text{C} = \text{S} \\    \\  \text{H} \\  \text{Methylamine}  \end{array}  \longrightarrow  \begin{array}{c}  \text{S} \\     \\  \text{CH}_3 - \text{NH} - \text{C} - \text{SH} \\  \text{N - methyl} \\  \text{dithiocarbamic acid}  \end{array}  \xrightarrow{\text{HgCl}_2}  \begin{array}{c}  \text{CH}_3 - \text{N} = \text{C} = \text{S} + \text{HgS} + 2\text{HCl} \\  \text{Methyl} \\  \text{isothiocyanate} \\  \text{(Mustard oil smell)}  \end{array}  $  |
| 20 | <p><b>Write the IUPAC name of the following coordination compounds.</b></p> <ol style="list-style-type: none"> <li><math>[\text{Pt}(\text{NH}_3)_2\text{Cl}_2]</math> – diamine dichloride platinum (II)</li> <li><math>[\text{Fe}(\text{CN})_6]^{4-}</math> – hexacyanido <math>\kappa\text{C}</math> ferrate (II) ion.</li> <li><math>[\text{Ag}(\text{NH}_3)_2]^+</math> – diamine silver (I) ion.</li> </ol>   |

## Part – IV

Answer all the questions.

2 x 5 = 10

|    |  |  |   |
|----|--|--|---|
| 21 | <b>a) Write the postulates of werner's theory? (5)</b>   |  |   |
|    | 1. Most of the element's exhibit, two types of valences.   |  |   |
|    | <ul style="list-style-type: none"> <li>• Primary valence</li> <li>• Secondary valence</li> </ul>   |  |   |
|    |  | <b>Primary valence</b>   | <b>Secondary valence</b>  |
|    | 2  | It denotes oxidation state of the metal atom.  | It denotes the coordination number.   |
|    | 3  | It is positive in most of the cases and zero in certain cases. They are always satisfied by negative ions. | It is satisfied by negative ions, neutral molecules, positive ions or the combination of these. |
| 4  | It is non directional  | It is directional  |   |
|    | 5. According to Werner, there are two spheres of attraction around a metal atom/ion in a complex.  |  |   |
|    | <ul style="list-style-type: none"> <li>• The inner sphere is known as coordination sphere.</li> <li>• The outer sphere is called ionisation sphere.</li> </ul>   |  |   |
|    | 6. The geometry of the complex is determined by the spacial arrangement of the groups which satisfy the secondary valence. If the secondary valency is,<br>Six - octahedral geometry.<br>Four -either tetrahedral or square planar geometry. |  |   |
|    | <b>(or) b) i) State Faraday's Laws of electrolysis? (3)</b>  |  |   |
|    | <b>First Law:</b>  |  |   |
|    | The mass of the substance (m) liberated at an electrode during electrolysis is directly proportional to the quantity of charge (Q) passed through the cell.  |  |   |
|    | i.e $m \propto Q$ (or) $m \propto It$ (or) $m = Z It$  |  |   |
|    | <b>Second Law:</b>   |  |   |
|    | $m \propto Z$  |  |   |
|    | When the same quantity of charge is passed through the solutions of different electrolytes, the amount of substances liberated at the respective electrodes are directly proportional to their electrochemical equivalents.                  |  |   |
|    | <b>ii) Write a note on sacrificial protection? (2)</b>   |  |   |
|    | <b>Cathodic protection</b> – Metals such as Mg or zinc which is corroded more easily than iron can be used as a sacrificial anode and the iron material acts as a cathode. So iron is protected, but Mg or Zn is corroded.                   |  |   |
| 22 | <b>a) i) Differentiate chemisorption and physisorption (5)</b>   |  |   |
|    |  | <b>Chemisorption</b>   | <b>Physisorption</b>  |
|    | 1  | It is very slow  | It is instantaneous   |
|    | 2  | It is very specific depends on nature of adsorbent and adsorbate   | It is non-specific  |
|    | 3  | Chemical adsorption is fast with increase pressure, it cannot alter the amount                             | when pressure increases the extent of adsorption increases                                      |
|    | 4  | When temperature is raised chemisorption first increases and then decreases                                | Physisorption decreases with increase in temperature  |
|    | 5  | involves transfer of electrons between the adsorbent and adsorbate   | No transfer of electrons  |
|    | 6  | Heat of adsorption is high   | Heat of adsorption is low   |
|    | 7  | Monolayer of the adsorbate is formed   | Multilayer of the adsorbate is formed   |

|   |   |                                    |
|---|---|------------------------------------|
| 8 | occurs at fixed sites called active centres                                       | It occurs on all sides             |
| 9 | It involves the formation of activated complex with appreciable activation energy | Activation energy is insignificant |

(or) b) Compound  $C_2H_7N$  (A) react with trichloromethane in the presence of base to give the compound (B) which has an unpleasant smell. Compound (B) upon heating at  $250^\circ C$  give the compound (C). Find the compound A, B and C. Write the equations. (5)

