

**B.Sc. CHEMISTRY
INORGANIC CHEMISTRY IV
SIXTH SEMESTER
BSC – 601**

(Use Separate Answer Scripts for Objective & Descriptive)

Duration : 3 hrs.

Full Marks : 70

[**PART-A: Objective**]

Time : 20 min.

Marks : 20

Choose the correct answer from the following:

1X20=20

- Homogeneous hydrogenation of alkene with Wilkinson catalyst take place in -
 - 10 Atmospheric Pressure & 25° C
 - 1 Atmospheric Pressure & 25° C
 - 1 Atmospheric Pressure & 25° F
 - 1 Atmospheric Pressure & 25K
- In the Hydroformylation of alkene, what reaction gives linear aldehyde?
 - Markovnikov
 - Anti-Markovnikov
 - Fridel-Craft reaction
 - Wilkinson Catalysis
- The Water Gas shift reaction $\text{CO}_{(g)} + \text{H}_2\text{O}_{(l)} \rightleftharpoons \text{CO}_{2(g)} + \text{H}_{2(g)}$ is
 - Exothermic
 - Endothermic
 - Exothermic- entropy driven
 - Endothermic-entropy driven.
- In which complex there is only σ -bond between the ligand and metal atom ?
 - $\text{W}(\text{CH}_3)_6$
 - $(\eta^5\text{-C}_5\text{H}_5)_2\text{Fe}$
 - $\text{K}[\text{Pt}(\text{C}_2\text{H}_4)\text{Cl}_3]$
 - $\text{CH}_3\text{Mn}(\text{CO})_5$
- Choose the Catalyst for preparation of Isotactic Polypropylene
 - Wilkinson Catalysts
 - Wacker Catalysts
 - Ziegler-Natta catalysts
 - Lithium Alkyls
- Zeise' salt is
 - Potassium-platinum chloride
 - Potassium trichloro (ethylene palatinate) hydrate
 - Potassium ethylene trichloride
 - None of the above.
- The ions are precipitated when the
 - Ionic concentration equals the solubility product.
 - Ionic concentration is greater than solubility product.
 - Ionic concentration is smaller than solubility product
 - None of the above
- Interfering acid radicals interfere with systematic analysis
 - After group V
 - After group II
 - After group III A
 - None of the above
- Terminally bonded CO group absorbs at
 - 2050 -1900 cm^{-1}
 - 1800-1700 cm^{-1}
 - 1900-1800 cm^{-1}
 - None of the above

10. CO group in a metal carbonyl cation absorbs at
- A lower frequency as compared to a neutral metal carbonyl
 - A higher frequency as compared to a neutral metal carbonyl
 - The same frequency as neutral metal carbonyl
 - None of the above.
11. $\text{Fe}(\text{CO})_5$ exhibits
- | | |
|----------------------------------|------------------------------|
| a. Trigonal bipyramidal geometry | b. Square pyramidal geometry |
| c. Square planar geometry | d. None of the above. |
12. $\text{Fe}_2(\text{CO})_9$ is prepared by
- | | |
|--|---|
| a. Thermal decomposition of $\text{Fe}(\text{CO})_5$ | b. Photolysis of $\text{Fe}(\text{CO})_5$ |
| c. Reductive carbonylation $\text{Fe}(\text{CO})_5$ | d. None of the above |
13. The dimeric cyclopentadienyl rhodium has a
- | | |
|----------------------------------|---------------------------|
| a. Tetrahedral geometry | b. Square planar geometry |
| c. Trigonal bipyramidal geometry | d. None of the above. |
14. Borate is removed by evaporation with
- | | |
|-------------|-----------------------|
| a. Conc HCl | b. NaOH |
| c. NaCl | d. None of the above. |
15. For a weak electrolyte the degree of dissociation is proportional to
- | | |
|----------------------------|-----------------------|
| a. Square root of dilution | b. The concentration |
| c. The amount of solvent | d. None of the above. |
16. The oxidation state of Pt in $[\text{PtCl}_2(\text{NO}_2)(\text{NH}_3)]^-$
- | | |
|-------|-------|
| a. +4 | b. +2 |
| c. +3 | d. +5 |
17. Which of the following is correct statement for outer sphere mechanism
- | | |
|--|------------------------------------|
| a. No chemical change | b. No formation of bridged complex |
| c. Both complexes should be in same spin | d. All of the above |
18. Which of the following are good bridging ligand
- | | |
|-----------------------|---------------------|
| a. Br^- | b. NCS^- |
| c. SO_4^{2-} | d. All of the above |
19. Which of the following is the conditions of outer sphere mechanism
- | | |
|--|--|
| a. Both complexes should not be inert | b. Both complexes should be in same spin |
| c. The electron to be transferred should not present in t_{2g} set of orbitals | d. None of the above |
20. The condition for inner sphere mechanism is
- | | |
|---|--|
| a. One complex must be labile | b. Two metal atoms forming a bridged complex |
| c. In this reaction bonds are broken and made | d. All of the above |

(PART-B : Descriptive)

Time : 2 hrs. 40 min.

Marks : 50

[Answer question no.1 & any four (4) from the rest]

1. a. What is Zeise's salt? How is it prepared? Give its structure. 4+3+3
=10
b. Write the synthesis of the following
 - i. cis & trans $[\text{Pt}(\text{C}_2\text{H}_4)(\text{NH}_3)\text{Cl}_2]$
 - ii. cis & trans $[\text{Pt}(\text{NH}_3)_2\text{Cl}_2]$c. Explain the bonding in $\text{Al}_2(\text{CH}_3)_6$.
2. Explain the 5+5=10
 - i. Mechanism of Wilkinson's hydrogenation of alkene.
 - ii. Wacker catalysis for synthesis of aldehyde.
3. Explain the bonding and structure of 5+5=10
 - i. $(\text{LiCH}_3)_4$
 - ii. $\text{K}[\text{Pt}(\text{C}_2\text{H}_4)\text{Cl}_3]$
4. a. What is synergetic effect? Explain in terms of bonding in transition metal carbonyls. 5+5=10
b. How is IR data able to explain the extent of back bonding in metal carbonyls?
5. a. What is solubility product? How is it related to precipitation of a compound? 5+5=10
b. What is an interfering acid radical? How is phosphate removed in systematic group analysis?
6. a. Draw the structure of $\text{Ni}(\text{CO})_4$. How is the structure justified by Raman Spectral studies? 3+2=5
b. Explain the principle behind the precipitation of Group I cations.

7. a. Explain the two theories of trans effect. 5+5=10
b. Explain the mechanism of nucleophilic substitution reaction in square planar complexes.
8. Discuss the mechanism of two electron transfer reactions. 5+5=10

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