REV-01
BSC/02/05

2023/08

SET A

B.Sc. CHEMISTRY
SIXTH SEMESTER
INORGANIC CHEMISTRY IV
BSC - 601 SPECIAL REPEAT]

[USE OMR FOR OBJECTIVE PART]

Duration : 3 hrs. **Full Marks : 70**

Objective

Time : 30 min. **Marks : 20**

Choose the correct answer from the following: ***1X20=20***

1. Homogeneous hydrogenation of alkene with Wilkinson catalyst take place in -
   a. 10 Atmospheric Pressure & 25° C
   b. 1Atmospheric Pressure & 25° C
   c. 1 Atmospheric Pressure & 25° F
   d. 1 Atmospheric Pressure & 25K

2. In the Hydroformylation of alkene, what reaction gives linear aldehyde?
   a. Markovnikov
   b. Anti-Markovnikov
   c. Fridel-Craft reaction
   d. Wilkinson Catalysis

3. The Water Gas shift reaction $CO_{(g)} + H_2O_{(l)} \rightleftharpoons CO_{2(g)} + H_{2(g)}$ is
   a. Exothermic
   b. Endothermic
   c. Exothermic- entropy driven
   d. Endothermic-entropy driven.

4. In which complex there is only σ-bond between the ligand and metal atom ?
   a. $W(CH_3)_6$
   b. $(\eta^5\text{-}\ C_5H_5)_2Fe$
   c. $K[Pt(C_2H_4)Cl_3]$
   d. $CH_3Mn(CO)_5$

5. Choose the Catalyst for preparation of Isotactic Polypropylene
   a. Wilkinson Catalysts
   b. Wacker Catalysts
   c. Ziegler-Natta catalysts
   d. Lithium Alkyls

6. Zeise' salt is
   a Potassium-platinum chloride
   b Potassium trichloro (ethylene palatinate) hydrate
   c Potassium ethylene trichloride
   d None of the above.

7. The ions are precipitated when the
   a Ionic concentration equals the solubility product.
   b Ionic concentration is greater than solubility product.
   c Ionic concentration is smaller than solubility product
   d None of the above

8. Interfering acid radicals interfere with systematic analysis
   a. After group V
   b After group II
   c. After group III A
   d None of the above

9. Terminally bonded CO group absorbs at
   a 2050 -1900 cm^{-1}
   b 1800-1700 cm^{-1}
   c 1900-1800 cm^{-1}
   d None of the above

10. CO group in a metal carbonyl cation absorbs at
    a A lower frequency as compared to a neutral metal carbonyl
    b A higher frequency as compared to a neutral metal carbonyl
    c The same frequency as neutral metal carbonyl
    d None of the above.

11. The structure of $Fe(CO)_5$ is confirmed by
    a. UV-visible spectroscopy
    b. IR-spectroscopy
    c. Mass spectroscopy
    d. None of the above.

12. $Fe_2(CO)_9$ is prepared by
    a. Thermal decomposition of $Fe(CO)_5$
    b. Photolysis of $Fe(CO)_5$
    c. Reductive carbonylation $Fe(CO)_5$
    d. None of the above

13. The dimeric cyclopentadienyl rhodium has a
    a. Tetrahedral geometry
    b. Square planar geometry
    c. Trigonal bypyramidal 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 week 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 $[PtCl_2(NO_2)(NH_3)]^-$
    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

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Descriptive

Time : 2 hrs. 30 mins. 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 $[Pt(C_2H_4)(NH_3)Cl_2]$
   (ii) cis & trans $[Pt(NH_3)_2Cl_2]$

   c. Explain the bonding in $Al_2(CH_3)_6$.

2. Explain the (i) Mechanism of Wilkinson's hydrogenation of alkene. 5+5=10
   (ii) Wacker catalysis for synthesis of aldehyde.

3. Explain the bonding and structure of 5+5=10
   (i) Trialkyl aluminium
   (ii) $K[Pt(C_2H_4)Cl_3]$

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 and common ion effect? How they related to precipitation of a compound? 5+5=10
   b. Why barium oxalate acts as interfering reagent in qualitative analysis. Explain why oxalate has to be removed before proceeding to group III.

6. a. Draw the structure of Ni $(CO)_4$. How is the structure justified by Raman Spectral studies? 3+2=5
   b. Write all the group reagents for qualitative group analysis of cations.

7. a. Define trans effect. Write the theories of trans effect. 5+5=10
   b. Explain the mechanism of nuleophilic substitution reaction in square planar complexes.

8. Discuss the mechanism of two electron transfer reactions. 5+5=10

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