B.Sc. CHEMISTRY
INORGANIC CHEMISTRY IV
SIXTH SEMESTER
BSC – 601 [SPECIAL REPEAT]
[USE OMR FOR OBJECTIVE PART]

SET
A

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. 1 Atmospheric 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

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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. Fe $(CO)_5$ exhibits
    a. Trigonal bipyramidal geometry   b. Square pyramidal geometry
    c. Square planar geometry   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   d. All of the above
       spin

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   d. None of the above
       not present in t_{2g} set of orbitals

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   d. All of the above
       and made

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Descriptive

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

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

2. Explain the   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. $(LiCH_3)_4$
       ii. $K[Pt(C_2H_4)Cl_3]$

4. a. What is synergetic effect? Explain in terms of bonding in   5+5=10
       transition metal carbonyls.

    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   5+5=10
       compound?

    b. What is an interfering acid radical? How is phosphate removed in
       systematic group analysis?

6. a. Draw the structure of $Ni(CO)_4$. How is the structure justified by   3+2=5
       Raman Spectral studies?

    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 nuleophilic substitution reaction in square planar complexes.

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

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