

**B.Sc. CHEMISTRY  
FOURTH SEMESTER  
INORGANIC CHEMISTRY III  
BSC – 402**

**SET  
A**

[USE OMR FOR OBJECTIVE PART]

Duration: 1:30 hrs.

Full Marks: 35

Time: 15 mins.

Marks: 10

**(Objective)**

*Choose the correct answer from the following:*

*1×10=10*

- Metal Nitrosyls are compounds, in which the nitrosyl group is directly bonded to the
  - metal
  - Oxygen
  - NO<sup>-</sup> ion
  - none of the above.
- Ni(CO)<sub>4</sub> has a
  - Tetrahedral geometry
  - Square planer geometry
  - trigonal Pyramidal geometry
  - none of the above.
- Ferrocene is an organometallic compound because it has
  - ionic bond
  - covalent bond
  - Fe- C bond
  - none of the above.
- Hapticity refers to
  - The number of carbon atoms of the ligand that bind to the metal.
  - The number of hydrogen atoms of the ligand that bind to the metal.
  - The number of oxygen atoms that bind to the metal
  - None of the above.
- The sum of the oxidation number and coordination number in the complex [Co(NH<sub>3</sub>)<sub>6</sub>]<sup>3+</sup>
  - 6
  - 9
  - 5
  - 7
- The catalyst and promoter used in Haber's process respectively
  - Fe and Mo
  - Pt and Fe
  - Co and Ni
  - Na and K
- Which of the following transition metal oxide used in contact process
  - FeO
  - V<sub>2</sub>O<sub>5</sub>
  - CuO
  - Na<sub>2</sub>O
- Lanthanide oxides are used for
  - Colouring of glass
  - Sunglass making
  - Both a and b
  - None of the above

9. Lanthanides which show +2 oxidation states are
- |                 |                      |
|-----------------|----------------------|
| a. Eu           | b. Yb                |
| c. Both a and b | d. None of the above |
10. Eluting agent used for ion-exchange separation method of lanthanides is
- |          |                     |
|----------|---------------------|
| a. EDTA  | b. diketone         |
| c. Resin | d. Ammonium citrate |
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**( Descriptive )**

Time : 1 hr. 15 mins.

Marks: 25

*[ Answer question no.1 & any two (2) from the rest ]*

1.
  - a. What are the uses of lanthanides? 2+1+2
  - b. Explain why the hapticity of ferrocene is 5. =5
  - c. What are the catalytic properties of 3d series transition metals?
  
2.
  - a. Justify that in Metal Carbonyl Nitrosyls, the  $\text{NO}^+$  ions are more firmly attached than the CO group. 4+3+2+  
1=10
  - b. How lanthanides are separated by solvent extraction method?
  - c. Why Zn, Cd, Hg does not consider transition metal?
  - d. Which of the 3d series transition metal has highest oxidation state? Give reason.
  
3.
  - a. What is Zeise's salt? How is it prepared? Discuss its structure. 4+3+3
  - b. Draw the structure of  $\text{Fe}(\text{CO})_5$ . How was it established? =10
  - c. Discuss the Chemistry involved in Ring Test.
  
4.
  - a. Write the properties of transition metals. 2+4+4  
=10
  - b. Explain the following complex using Crystal field theory(CFT)  
(i)  $[\text{Co}(\text{NH}_3)_6]^{3+}$     (ii)  $[\text{FeF}_4]^{2-}$
  - c. Complete and balance the following reaction in acidic medium  
(i)  $\text{Cr}_2\text{O}_7^{2-} + \text{Fe}^{2+} + \text{H}^+ \longrightarrow$   
(ii)  $\text{MnO}_4^- + \text{I}^- + \text{H}^+ \longrightarrow$
  
5.
  - a. What is Lanthanide contraction and what are the consequences of it? 5+5=10
  - b. Describe how lanthanides are separated using ion-exchanger method showing related reactions involved.

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