

**B.Sc. CHEMISTRY
FOURTH SEMESTER
INORGANIC CHEMISTRY III
BSC – 402 [REPEAT]**
[USE OMR FOR OBJECTIVE PART]

**SET
A**

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 Nitrogen atom of the nitrosyl group is directly bonded to the
 - metal
 - Oxygen
 - NO⁻ ion
 - Halogen
- Ni(CO)₄ has a
 - Tetrahedral geometry
 - Square planer geometry
 - Trigonal Pyramidal geometry
 - Octahedral geometry
- Ferrocene is an organometallic compound because it has
 - Ionic bond
 - Covalent bond
 - Fe-C bond
 - van der Waal's forces
- 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
 - The number of nitrogen atoms that bind to the metal
- Color of aqueous solution of Mn²⁺ ion is
 - Blue
 - Green
 - Pink
 - Violet
- The highest oxidation state shown by Cr is
 - +2
 - +6
 - +3
 - +4
- $M^{2+x \text{ volt}} \rightarrow M^{+y \text{ volt}} \rightarrow M$
For the above Latimer diagram, the metal ion M⁺ will disproportionate when
 - x volt > y volt
 - x volt < y volt
 - x volt = y volt
 - None of the above
- Welding glasses contains
 - Nd₂O₃ and Pr₂O₃
 - Nd₂O₃ and Ce₄(NO₃)₂
 - Nd₂(NO)₃
 - Gd₂O₃

9. Highest elemental composition in 'mish metal' is of
- | | |
|-------|-------|
| a. La | b. Fe |
| c. Gd | d. Ce |
10. The color of Gd^{+3} ion in aqueous solution is
- | | |
|--------------|---------|
| a. Green | b. Pink |
| c. Colorless | d. Red |

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(Descriptive)

Time : 1 hr. 15 mins.

Marks: 25

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

1. a. Explain why the hapticity of ferrocene is 5? 2+1.5+1.5= 5
b. Why transition metals show catalytic property?
c. Why tripositive lanthanides show color?
2. a. Give a brief account of the coordination compounds of nitrosyl with metals. 4+4+2=10
b. Draw the structure of $\text{Fe}(\text{CO})_5$. How was it established?
c. Discuss the chemistry involved in 'ring test'.
3. a. Justify that in Metal Carbonyl Nitrosyls, the NO^+ ions are more firmly attached than the CO group. 4+3+3=10
b. What is Latimer diagram? What are the uses of Latimer diagram?
c. How does the UV-vis spectra of aqueous solutions of Cu^{+2} differ from that of Sm^{+3} ? Explain.
4. a. Describe the origin of the colours shown by transition metal complexes. 4+3+3=10
b. Why transition metals tend to form complex?
c. Write electronic configuration and magnetic moments of Cu^{2+} and Mo^{2+} metal ions.
5. a. Explain the process of separation of lanthanide elements using ion exchange method. 3+2+2+2+1=10
b. Aqueous solution of Ce^{+3} is colourless whereas Ce^{+4} is blood red in color. Why?
c. Why lanthanides undergo contraction in their atomic or ionic radii as we move across the period?

d. Calculate the magnetic moment of Eu^{+2} ion. [Eu = 63].

e. Fill up the blanks:

- (i) ----- is used as a mordant for alizarin dyes.
- (ii) Lanthanides are used in ----- reactions due to their extraordinary reducing property.

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