

Roll No.

Exam Code : F-25

Subject Code—64109

B. Sc. EXAMINATION

(Main/Reappear) (Batch 2020 Onwards)

(Sixth Semester)

CHEMISTRY

Course—III

CCL-603(i)

Organometallics and Bioinorganic Chemistry

Time : 3 Hours

Maximum Marks : 80

Note : Attempt *Five* questions in all, selecting *one* question from each Unit. Q. No. 1 is compulsory. All questions carry equal marks.

✓ 1. (a) Draw the structure of CrO_4^{2-} and $\text{Cr}_2\text{O}_7^{2-}$ ions. 2

✓ (b) Write the formula of sodium nitroprusside. How is it used in the detection of sulphide ion ? 2

✓ (c) What are symmetrical and asymmetrical organometallic compounds ? 2

✓ (d) Draw the structure of Zeise's salt. Write its IUPAC name. 2

✓ (e) What is π acid ligand ? Give one example. 2

✓ (f) Among aluminium triethoxide and Grignard reagent which is an organometallic compound and why ? 2

✓ (g) What is the role of chlorophyll ? 2

✓ (h) What type of bond is present in polypeptide chain ? 2

Unit I

2. (a) What are the important oxidation states of nickel ? Discuss the chemistry of nickel (+2) compounds. 8

(b) Draw and explain the structure of copper (II) acetate. 6

(c) Is $\text{Cr}(\text{CH}_3\text{COO})_2 \cdot \text{H}_2\text{O}$ paramagnetic or

Handwritten notes:
 $\text{MnO}_2 + \text{KOH} \rightarrow \text{K}_2\text{MnO}_4 + \text{H}_2\text{O}$
 or K_2CO_3
 $\text{K}_2\text{MnO}_4 + \text{H}_2\text{O} \rightarrow \text{KMnO}_4 + \text{H}_2\text{O}$
 $\text{K}_2\text{MnO}_4 + \text{Cl}_2 / \text{H}_2\text{O} / \text{O}_2$
 diamagnetic ? + CO_2
 Structure of $\text{Cr}(\text{CH}_3\text{COO})_2 \cdot \text{H}_2\text{O}$ is shown with a central Cr atom bonded to two oxygen atoms of water molecules and two oxygen atoms of acetate groups. The acetate groups are shown as CH_3COO with a methyl group (me) and a carbonyl group (C=O). The water molecule is H_2O . The coordination number is 2.

3. (a) How is KMnO_4 prepared ? Explain its oxidising properties in acidic medium. 8

(b) Discuss the structure and magnetic property of $[\text{Co}(\text{NH}_3)_6]\text{Cl}_3$. para

(c) Cu^{+2} is more stable than Cu^+ in aqueous medium. Explain. 4

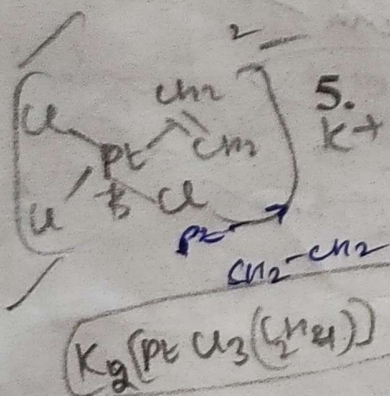
Unit II

4. (a) Explain the following organometallic compounds with examples : 12

- (i) Ionic
- (ii) Electron deficient
- (iii) Transition metal organometallic compounds.

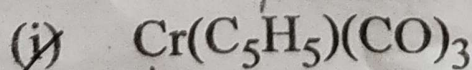
(b) Write IUPAC names of the following : 4

- (i) $[\text{Mn}(\text{CO})_5\text{C}_2\text{H}_4]^+$
- (ii) $\text{Fe}_2(\text{CO})_4(\text{C}_5\text{H}_5)_2$
- (iii) $(\text{CO})_5\text{Mn}-\text{Mn}(\text{CO})_5$
- (iv) $(\text{C}_6\text{H}_6)\text{Cr}(\text{CO})_3$.

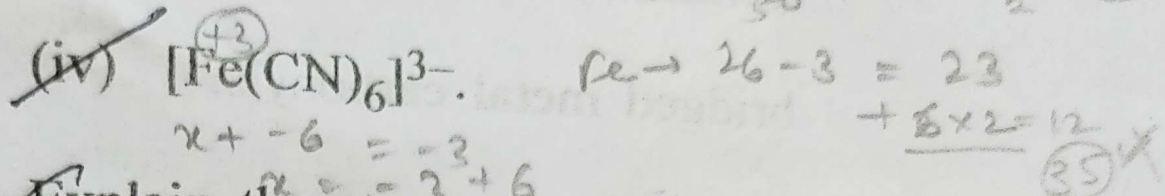
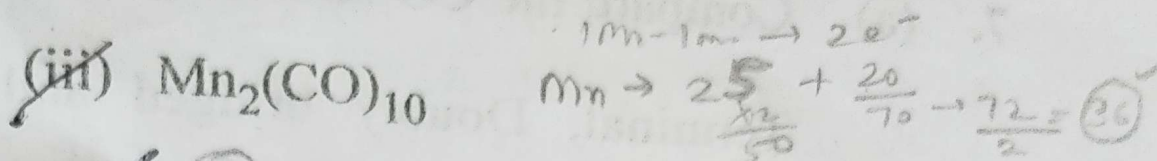
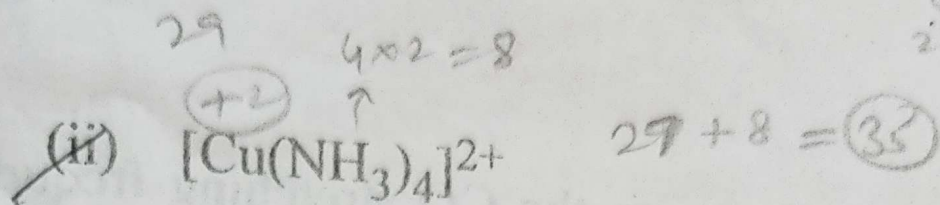


5. (a) Discuss the salient features of structure of Zeise salt. 8

(b) Calculate the EAN value of the following : 4



$\downarrow$
 $24 + 5 + 6 = 35$
 $\text{35} \times$

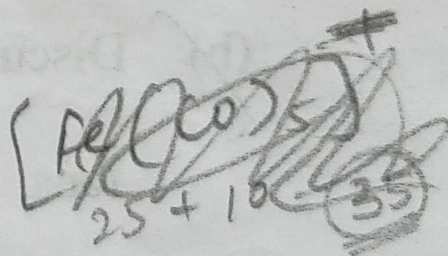
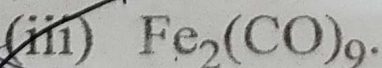
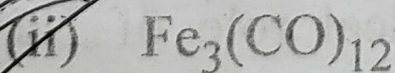
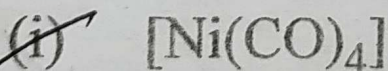


(c) Explain the structure of methyl lithium.
 $x + -6 = -3$
 $x = -3 + 6$
 $= +3$

$\frac{36}{12} = 3$ 4

Unit III

6. (a) What are metal carbonyls ? Discuss the structure of the following metal carbonyls : 12



(b) Explain two methods for the preparation of metal carbonyls. 4

7. (a) Compare the CO stretching frequency of Terminal, Doubly bridged and Triply bridged metal carbonyls. 8
- (b) What happens to CO stretching frequency in metal carbonyls when negative charge is placed on the metal atom ? 6
- (c) What is Synergic effect ? 2

Unit IV

8. (a) Discuss the biological role of Ca^{2+} and Mg^{2+} ions. 8

(b) Discuss biological role of Na^{+} and K^{+} ions. 8

9. (a) What are Proteins ? Briefly discuss their structure. 8

(b) What do you understand by Blood Clotting ? Which metal plays a role in Blood Clotting ? 4

(c) Comment on structural protein of bones. 4



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