

U.G. 4th Semester Examination - 2022**CHEMISTRY****[HONOURS]****Course Code : BCEMCCHC402****Course Title : Inorganic Chemistry-III**

Full Marks : 30

Time : 2 Hours

*The figures in the right-hand margin indicate marks.**Candidates are required to give their answers in their own words as far as practicable.*

1. Answer any **ten** questions: $1 \times 10 = 10$
- Arrange the following compounds in order of their decreasing acidity: XeF_6 , XeF_4 , XeF_2
 - Draw the structure of XeF_5 and write the hybridization of Xe in the said compound.
 - Among Bauxite and Haematite, which ore can be concentrated by Magnetic separation?
 - State the hybridization and oxidation state of Nickel in $\text{Ni}(\text{CO})_4$.
 - Name the process by which Zirconium metal of very high purity can be obtained.
 - Give an example of a basic flux.
 - What is mosaic gold?
 - Draw the structure of fac $[\text{Cr}(\text{H}_2\text{O})_3\text{Cl}_3]$

- What happens when Microcosmic Salt is heated?
- What is the difference between didentate ligand and bridging ligand?
- How do you prepare Nitrolim? Cite one important use of Nitrolim.
- What is 'Producer Gas'?
- What do you mean by Silanes? Give one example.
- What do you mean by denticity of Ligand?
- Give one example of an Inner metallic complex of 2nd order.

2. Answer any **five** questions: $2 \times 5 = 10$
- Formation of $[\text{XeF}_2]^-$ from XeF_2 greatly increases the Xe – F bond length, but formation of $[\text{XeF}_2]^+$ from XeF_2 does not alter the Xe– F bond length significantly.— Explain.
 - Write the balanced equation of a Xenon compound which undergoes disproportionation reaction upon hydrolysis.
 - Extraction of Hg from HgO does not require any external reducing agent— Explain.
 - What happens when Sodium borohydride is treated with ammonium sulphate? Write the balanced equation.
 - Be_2C (Beryllium Carbide) on hydrolysis gives methane, whereas MgC_2 (Magnesium Carbide)

gives Acetylene on hydrolysis- Explain.

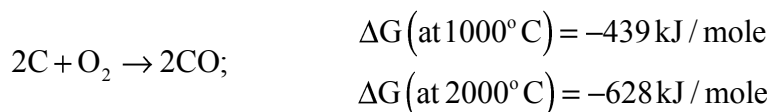
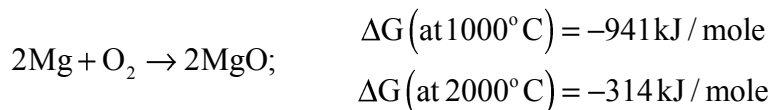
- f) Why Fluorine cannot act as a central atom in Interhalogen compounds?
- g) $\text{NH}_2\text{-NH}_2$ can act as a monodentate ligand as well as a bridging ligand, but cannot act as a Chelating ligand – Justify your answer.
- h) In $[\text{CoBr}(\text{NH}_3)_5]\text{SO}_4$, bromide ion is a ligand, while in $[\text{Co}(\text{SO}_4)(\text{NH}_3)_5]\text{Br}$, it is not a ligand - Explain.

3. Answer any **two** questions: $5 \times 2 = 10$

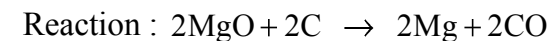
- a) i) Why sulphide ores typically undergo self-reduction?
- ii) Why a mixture of Cryolite and Fluorspar is used in the extraction of Aluminum from Bauxite?
- iii) "Borazine acts as a lewis acid as well as a lewis base"—Justify the statement.

$2 + 2 + 1 = 5$

- b) i) Consider the following reactions at 1000°C and 2000°C .



Calculate the free energy change of the reaction (given below) at 1000°C and 2000°C and prove that reduction of MgO with Carbon can occur at 2000°C and not at 1000°C .



- ii) What happens when ethanol is added to a basic solution of Carbon disulphide? Draw the structure of the product.

$3 + 2 = 5$

- c) i) Consider an octahedral complex $\text{Ma}_2\text{b}_2\text{Cd}$, where a, b, c and d are monodentate ligands. What is the number of enantiomeric pairs for the complex?
- ii) What is Tetraalkyl Lead? State its important use and also the drawbacks of its use.
- iii) Pentaamminenitro cobalt(III) chloride is yellowish brown in colour, while pentaamminenitrito cobalt(III) chloride is red –Explain.

$2 + 2 + 1 = 5$