

B.Sc. Semester-IV Examination, 2022-23**CHEMISTRY [Honours]**

Course ID : 41412 Course Code : SH/CHEM/402/C9

Course Title : Inorganic Chemistry III (T-9)

Time : 1 Hour 15 Minutes Full Marks : 25

*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 **five** questions: 1×5=5
- Why does solubility of iodine in water increase in presence of potassium iodide?
 - Why $(\text{CH}_3)_3\text{N}$ is more basic than $(\text{CF}_3)_3\text{N}$?
 - State the stereochemistry of $[\text{VO}(\text{acac})_2]$ with diagram.
 - Draw the structures of XeF_4 and XeF_6 considering VSEPR theory.
 - Write down the IUPAC name of $[\text{Co}(\text{NH}_3)_6][\text{Cr}(\text{CN})_6]$.
 - Why are the diatomic interhalogens more reactive than the halogens?
 - What is inorganic rubber?

h) Cite one example for 'Ligand isomerism'.

2. Answer any **two** questions: 5×2=10

- How do you separate copper from gold by Parting Process?
 - The stability of $[\text{Ni}(\text{en})_3]^{2+}$ (en = ethylenediamine) is much greater than that of $[\text{Ni}(\text{NH}_3)_6]^{2+}$, although both contain six Ni-N bonds.– Explain. 3+2=5
- What are silicones? How are they prepared? Draw the structures of silicones. 1+2+2=5
- State the stereochemistry of the following complexes with suitable drawings:
 $[\text{Ni}(\text{CO})_4]$, $[\text{Cr}(\text{en})_3]^{3+}$ and $\text{K}_2[\text{Ni}(\text{CN})_4]$.
 - Although hydrazine contains more than one donor atoms, it does not form chelate. Why? 3+2=5
- Provide experimental observations in order to establish non-equivalent nature of two sulphur atoms in sodium thiosulphate.
 - 'Borazine' is more reactive than benzene towards addition of HX– explain. 3+2=5

e) i) Draw the structural formula of the two isomers of the complex ion $[\text{Co}(\text{NO}_2)(\text{NH}_3)_5]^{2+}$ and define the type of isomerism involved.

ii) What is purely inorganic optically active compound? Give one example. $3+2=5$

3. Answer any **one** question: $10 \times 1 = 10$

a) i) Mention the structural principle of silicates and their uses.

ii) Explain why PbCl_2 is stable but PbCl_4 is unstable.

iii) How is diborane prepared? Explain its structure.

iv) Draw the structural formula of the two isomers of the complex ion $[\text{CoCl}_3(\text{NH}_3)_3]$ and name the type of isomerism involved. $3+2+3+2=10$

b) i) When $[\text{Ni}(\text{NH}_3)_4]^{2+}$ is treated with concentrated HCl , two products having the formula $[\text{Ni}(\text{NH}_3)_2\text{Cl}_2]$ (designated I and II) are formed. (I) can be converted into (II) by boiling in dilute HCl . A solution of (I) reacts with oxalic acid to

form $[\text{Ni}(\text{NH}_3)_2(\text{C}_2\text{O}_4)]$, (II) does not react with oxalic acid. Deduce the configuration of (I) and (II) and the geometries of nickel (II) complexes.

ii) Explain the dimeric structure of copper (II) acetate dihydrate.

iii) Differentiate π -acidic and π -complexing ligands with concrete examples.

iv) Write the structure and preparation of Marshall's acid. $3+2+3+2=10$
