



WEST BENGAL STATE UNIVERSITY
B.Sc. Honours 4th Semester Examination, 2023

CEMACOR09T-CHEMISTRY (CC9)

INORGANIC CHEMISTRY-III

Time Allotted: 2 Hours

Full Marks: 40

*The figures in the margin indicate full marks.
Candidates should answer in their own words and adhere to the word limit as practicable.
All symbols are of usual significance.*

Answer any *three* questions taking *one* from each unit

Unit-I

1. (a) Describe the principle and reactions related to the extraction of Aluminium by electrolytic reduction. 3
- (b) Out of C and CO, which is a better reducing agent for ZnO and why? 2
- (c) Write down the principle and importance of Zone refining process. 3
- (d) What are differences between ore and alloy? Give examples. 2
2. (a) What are cast and wrought iron? 2
- (b) Briefly discuss the van Arkel-de Boer process. Which metals are produced and refined by this process? 3
- (c) How are Gold and Silver extracted by Hydrometallurgy method? 3
- (d) The choice of flux depends upon the impurities present in the ore — Comment. 2

Unit-II

3. (a) Draw the structures of different oxyacids of sulphur and compare their acidic strength. 3
- (b) Give one example of graphitic compound. How is it prepared? 1+1
- (c) Draw the structure of borax. Why does borax form a glassy mass when heated? 1+1
- (d) How is XeF₄ prepared? Discuss its molecular shape using VSEPR theory. 1+2
- (e) What are pseudohalogens? Give examples. Why these are called pseudohalogens? 2
- (f) Aqueous solution of sodium perxenate is alkaline in nature. Explain. 2
- (g) How synthetic Zeolites can be used as water softener? 2
- (h) Why XeF₆ can not be handled in glass or quartz container? Give necessary reactions. 2
- (i) Aluminium chloride is better formulated as Al₂Cl₆ — Explain. 2

4. (a) How does Be differ from other alkaline earth metals? 2
- (b) Compare and Contrast the Chemistry of C, Si and Ge with respect to following points: 2+2+2
- (i) Oxidation states
- (ii) Hydrides
- (iii) Halides. 2+2
- (c) What are silicone resin and silicon rubber? Write their uses. 1+2+3
- (d) What are interhalogens? Classify different binary interhalogens and give examples of each type. Comment on their hydrolysis products and structures. 2
- (e) What happens when: (Give reaction)
- Silver nitrate solution is added to a solution of sodium thiosulphate.

Unit-III

5. (a) Mention IUPAC nomenclature of $[\text{Co}(\text{NO}_2)_2(\text{NH}_3)_4]\text{Cl}$ and draw all the possible isomers. 1+2
- (b) Explain why chelate affect is called an entropy effect. 2
- (c) How will you distinguish between, $1\frac{1}{2}+1\frac{1}{2}$
- (i) $[\text{Cr}(\text{OH}_2)_6]\text{Cl}_3$ and $[\text{Cr}(\text{OH}_2)_5\text{Cl}]\text{Cl}_2 \cdot \text{H}_2\text{O}$
- (ii) *cis*- $[\text{Pt}(\text{NH}_3)_2\text{Cl}_2]$ and *trans*- $[\text{Pt}(\text{NH}_3)_2\text{Cl}_2]$
- (d) Tetrahedral complexes do not show geometrical isomerism while square planar complexes do show this kind of isomerism. Comment. 2
6. (a) Predict the order (first/second/third) of the following innermetallic complexes with proper explanation: 1+2
- (i) $\text{Na}[\text{Co}(\text{acac})_3]$ and (ii) $[\text{Co}(\text{gly})_3]$
- (b) With suitable example explain the facial and meridional isomerism. 2
- (c) Draw the possible geometrical isomers of $[\text{Co}(\text{en})(\text{NH}_3)_2\text{BrCl}]^+$ and hence predict which of them would be optically active. 3
- (d) Write the formula of the following compounds: 2
- (i) Ammonium pentafluoroaquanickelate(IV)
- (ii) Potassium tetrafluoroargentate(I)