

Reg. No

Name

23U606

B. Sc. DEGREE END SEMESTER EXAMINATION : MARCH 2023

SEMESTER 6 : CHEMISTRY

COURSE : 19U6RCHE09: INORGANIC CHEMISTRY

(For Regular - 2020 Admission and Supplementary - 2019 Admission)

Time : Three Hours

Max. Marks: 60

PART A

Answer All (1 mark each)

1. Why are macrocyclic ligands more stable?
2. Give an example of an interhalogen compound
3. What are super acids? Give an example.
4. What is the coordination number of cation and anion in ZnS structure?
5. Predict whether the following complexes are Jahn-Teller distorted or not?
a) $[\text{Fe}(\text{Cl})_6]^{3-}$ b) $[\text{Fe}(\text{CN})_6]^{4-}$
6. What is meant by chelate? Give an example.
7. Name the two impurity defects.
8. What type of defect create F-centres in the crystal?

(1 x 8 = 8)

PART B

Answer any 6 (2 marks each)

9. Discuss the geometry of ClF_3 and ICl_4^-
10. Arrange the following oxo acids in the increasing order of their acid strengths; HClO_4 , HClO_3 , HClO_2 , HClO .
11. $\text{La}(\text{OH})_3$ is most basic while $\text{Lu}(\text{OH})_3$ is least basic. Why?
12. In $[\text{Cu}(\text{H}_2\text{O})_6]^{2+}$, the axial Cu-O bonds are longer than equatorial Cu-O bonds, Why?
13. When a coordination compound $\text{CoCl}_3 \cdot 6\text{NH}_3$ is mixed with AgNO_3 , three moles of AgCl is precipitated per mole of the compound. Write the structural formula of the complex and its IUPAC name.
14. State and explain Jahn-Teller Theorem.
15. Explain why crystal defects are sometimes called thermodynamic defects.
16. In a metallic oxide, oxide ions are arranged in HCP array and the metal ions occupy two-thirds of octahedral voids. What is the formulae of metal oxide?

(2 x 6 = 12)

PART C

Answer any 4 (5 marks each)

17. What is limiting radius ratio? Explain how it is helpful in structural determination of ionic crystals.
18. What is lanthanide contraction? What are its causes?

19. Discuss in detail about the magnetic and spectral properties of actinides.
20. Explain, why $[\text{NiCl}_4]^{2-}$ is paramagnetic while $[\text{Ni}(\text{CO})_4]$ is diamagnetic using valence bond theory?
21. Discuss the various factors that affect the stability of complexes.
22. Explain the electrical conduction mechanism in silicon which is doped with a) Gallium and b) Phosphorous.

(5 x 4 = 20)

PART D

Answer any 2 (10 marks each)

23. Explain the preparation, properties, and bonding in diborane.
24. How do the following properties vary in the transition elements? (a) ionic character (b) variable oxidation states (c) ability to form complexes (d) atomic radii
25. Describe the postulates of Werner's coordination theory. Discuss how it is used to explain the structure and the bonding in coordination complexes?
26. Explain the salient aspects of molecular orbital theory. Describe the MO diagram of $[\text{CoF}_6]^{3-}$ and predicts its magnetic behavior.

(10 x 2 = 20)