2019

B.Sc.

4th Semester Examination

CHEMISTRY (Honours)

Paper - C9T

(Inorganic Chemistry)

Full Marks : 40 Time : 2 Hours

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

Group - A

1. Answer any *five* questions : 5×2

   (a) HF cannot be stored in glass bottle. Explain.

   (b) Write two characteristic features of Ellingham diagram.

   (c) What are fluorocarbons ? How are they prepared ?

(d) Suggest a structure for a dimer of $BeCl_2$ and explain how its formation illustrates $BeCl_2$ acting as a Lewis acid.

(e) Why the reactivity at borazine contrasts sharply with that of benzene ?

(f) $\left[Co\left(NH_3\right)_5 NO_2\right]^{2+}$ may have two different colors. Comment.

(g) What happen when XeO_3 reacts with KI in presence at dil H_2SO_4?

(h) Draw the structure of polythionates of type $\left[SnO_6\right]^{2-}$. How are they prepared ?

Group - B

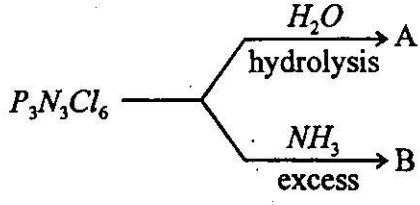
Answer any *four* questions. 4×5

2. (a) Write notes on the structures of XeF_2, XeF_4 and XeF_6. 3

(b) Outline the principle of zone refining. 2

3. (a) State basic concepts of Werner's coordination theory and mention its limitations. 3

(b) Give the product *A* and *B*



2

4. (a) Write IUPAC nomenclature of

(i) $K\left[Pt\,Cl_3\left(C_2H_4\right)\right]$

(ii) $\left[Co\left(Co\left(NH_3\right)_4\left(OH\right)_2\right)_3\right]^{6+}$ 2

(b) Describe how BH_3 can behave as both an electron acceptor and an electron donor in the adduct $OC.BH_3$. 2

(c) Explain why PCl_3 and $SbCl_3$ behave differently in water. 1

5. (a) $B\left(OH\right)_3$ behave as a weak acid but acid strength increases in presence of 1, 2-diols. Explain. 2

(b) Suggest why the NSi_3 skeleton in $N(SiMe_3)_3$ is planar. 2

(c) Complete the following equation

$$[10_3]^- + I^- + H^+ \longrightarrow$$ 1

6. (a) Both NO and NO_2 are odd electron molecules but only NO_2 dimerizes readily. Explain. 2

(b) Give a short account on the structure and bonding of B_2H_6. 3

7. (a) What are siloxanes ? 1

(b) Show stepwise hydrolysis product of P_4O_{10}. 2

(c) Describe a suitable synthesis of Xenon trioxide. 2

Group - C

Answer any *one* question. 1×10

8. (a) Copper can be extracted by hydrometallurgy but not zinc. Explain. 2

(b) Which of the complexes

(i) $\left[Cr(EDTA)\right]^{-}$

(ii) $\left[Ru(en)_3\right]^{2+}$

(iii) $\left[Pt(dien)Cl\right]^{+}$

are chiral ? 3

(c) Explain the different colours of halogen molecules. 2

(d) Discuss the structure of $S_2O_3^{2-}$. 2

(e) Give the application of noble gases. 1

9. (a) Write note on pseudohalide. 2

(b) What is ferrosilicon ? 1

(c) Arrange the following in order of increasing acid strength and give reasons for your choice :

BF_3, BCl_3, BBr_3. 3

(d) The triiodide ion, I_3^- is linear, but I_3^+ is bent. Explain. 2

(e) The bond angles for the hydrides of the Group 15 elements are as follows : NH_3, 107.8°, PH_3, 93.6°; AsH_3, 91.8°; and SbH_3, 91.3°. Account for this trend. 2