

RAMAKRISHNA MISSION VIDYAMANDIRA

(Residential Autonomous College under University of Calcutta)

B.A./B.Sc. FOURTH SEMESTER EXAMINATION, MAY 2015

SECOND YEAR

CHEMISTRY (Honours)

Paper : IV

Date : 22/05/2015

Time : 11 am – 12 noon

Full Marks : 25

Group – C

Unit - I

[Answer any one question]

1. a) Compare the hydrolytic behaviour of NCl_3 and PCl_3 . [3]
b) Write a short note on positive oxidation states of iodine. [3]
c) NO_2 dimerises readily but ClO_2 does not —Elucidate. [2]
d) AlF_3 does not dissolve in anhydrous HF but it dissolves in the presence of NaF . If BF_3 is passed through this solution, reprecipitation of AlF_3 takes place. —Account for the observation. [3]
e) $(\text{H}_3\text{Si})_3\text{N}$ is planar but $(\text{H}_3\text{Si})_3\text{P}$ is pyramidal —why? [2]
2. a) Compare the Lewis acidity of the halides of boron with proper examples. [3]
b) Explain the origin of paramagnetism in ClO_2 . [2]
c) Electrical resistance for α – graphite and C_8K are 28.4 ohm cm and 1.02 ohm cm respectively at 285 K. Justify the data. [2]
d) The stability of pentahalides of As, Sb and Bi differ significantly —justify. [3]
e) Compare the oxyacids of chlorine with reference to their redox behaviour. [3]

Unit - II

[Answer any one question]

3. a) Explain how freons deplete the ozone layer. [3]
b) Give reasons for the products obtained by thermal decomposition of KBrCl . [2]
c) Show the structures of $(\text{NPCl}_2)_3$ and $(\text{NPCl}_2)_4$. Why does substitution of Cl atoms in $(\text{NPCl}_2)_3$ by F atoms affect the P – N bond lengths? [3]
d) What happens when
 - i) Neutral FeCl_3 is added to $\text{Na}_2\text{S}_2\text{O}_3$ solution. [2]
 - ii) $\text{S}_2\text{O}_8^{2-}$ is added to aqueous solution of Mn^{2+} in H_2SO_4 in the presence of AgNO_3 and heated under low flame. [2]
4. a) Why does NH_2OH exhibit both oxidising and reducing reactions? Illustrate. [3]
b) Illustrate the oxidation, disproportionation and complexation reactions of pseudohalides. [3]
c) Write down the structural characteristics of S_4N_4 . [2]
d) Write down the steps in the preparation of hexachlorotricyclophosphazene from PCl_5 and NH_4Cl . [2]
e) How does dithionic acid differ structurally from polythionic acids. [2]

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