বিদ্যাসাগর বিশ্ববিদ্যালয়

VIDYASAGAR UNIVERSITY

B.Sc. Honours Examination 2021

(CBCS)

4th Semester

CHEMISTRY

PAPER—C9T & C9P

INORGANIC CHEMISTRY – III

Full Marks : 60

Time : 3 Hours

The figures in the right-hand margin indicate full marks.

Candidates are required to give their answers in their own words as far as practicable.

THEORY : C9T

Answer any *two* questions. 2×15

1. (a) How do you prepare Ni from $Ni(CO)_4$ using Mond's process ?

(b) Write down the name of two allotropes for each of the following elements; O, C and S.

(c) What are Phosphazenes ? Describe their structural types. Discuss the synthesis of different types of substituted phosphazenes.

(d) What happens when S_4N_4 is allowed to react with (i) Cl_2 gas and (ii) AgF separately. 3+3+(2+3+2)+2

2. (a) ClO_2 shows no tendency for dimerization – Explain.

(b) Justify that cyanogen is a pseudohalogen.

(c) Inter-halogen compounds are always diamagnetic, covalent and more reactive than constituent halogens – Comment.

(d) Explain the structure of BeH_2 molecule.

(e) What happens when borax is fused with NH_4Cl ?

(f) Why silicon is not expected to form an allotrope with graphite like structure. 2+3+3+3+2+2

3. (a) Write down the IUPAC names of the following co-ordination compounds

(i) $[Mn_2(CO)_{10}]$ and (ii) $[Ni(en)_2]SO_4$ (en = Ethylene diamine).

(b) Discuss the Werner's theory of coordination complexes.

(c) Inner complex salt formation depends on the pH of a solution – Explain.

(d) What are clathrate compounds ? Can they be considered as chemical compounds ?

(e) What are freons ? How are they prepared ? Freons cause depletion of ozone layer in upper atmosphere-comment. 2+3+2+(2+1)+(1+2+2)

4. (a) XeF_2, XeF_4 and XeF_6 have comparable Xe-F bond energies – Explain.

(b) How many stereoisomers are possible for $[Co(NH_3)_3Cl_3]$ complex ? Draw their structures.

(c) Discuss the structure and bonding of diborane.

(d) Beryllium chloride hydrates loses no water over P_4O_{10} – Explain.

(e) How do you distinguish between the free boric acid and borate ?

(f) Diamond is hard and non-conductor whereas graphite is soft and conductor although both are the made of same element carbon – Explain. 2+3+3+2+2+3

Answer any *one* question. 1×10

5. (a) What is meant by chelating, bridging and flexidentate ligands ? Discuss with suitable complexes.

(b) Write a short note on silicone.

(c) Compare the chemistry of peroxy-monosulphuric acid and peroxy-disulphuric acid.

(d) The I-I distance in I_3^- ion in solid state depends on the size of counter cation – Explain. 3+3+2+2

6. (a) Describe the molecular geometry of XeO_2F_2 using the VSEPR theory.

(b) What do you mean by 'zone refining' method ? How do you prepare pure Si from SiO_2 using zone refining process ?

(c) Me_3P acts as stronger base than Me_3N in their reaction with B_2H_6 – Explain.

(d) NO_2 is paramagnetic and brown in vapour state but it is colourless and diamagnetic in liquid or solid state – Comment.

2+(1+2)+2+3

PRACTICAL : C9P

Answer any *one* question. 1×20

1. Write down the process of preparation of tris-(ethylenediamine)nickel (II)chloride. Draw its geometrical structure. 17+3

2. What do you mean by temporary hardness of water ? Discuss the principle and methodology involved in the determination of total hardness of water. 3+17

3. What is complexometry ? What are the conditions of a feasible complexometric titration ? Discuss the principle and methodology involved in the estimation of Zn^{2+} in a Zn^{2+} and Cu^{2+} mixture. 1+2+17