



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  $\text{Ni}(\text{CO})_4$  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)  $\text{XeF}_2$ ,  $\text{XeF}_4$  and  $\text{XeF}_6$  have comparable Xe-F bond energies – Explain.
- (b) How many stereoisomers are possible for  $[\text{Co}(\text{NH}_3)_3\text{Cl}_3]$  complex? Draw their structures.
- (c) Discuss the structure and bonding of diborane.
- (d) Beryllium chloride hydrates loses no water over  $\text{P}_4\text{O}_{10}$  – 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 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  $\text{I}_3^-$  ion in solid state depends on the size of counter cation – Explain.

3+3+2+2

6. (a) Describe the molecular geometry of  $\text{XeO}_2\text{F}_2$  using the VSEPR theory.
- (b) What do you mean by 'zone refining' method? How do you prepare pure Si from  $\text{SiO}_2$  using zone refining process?

- (c)  $\text{Me}_3\text{P}$  acts as stronger base than  $\text{Me}_3\text{N}$  in their reaction with  $\text{B}_2\text{H}_6$  – Explain.
- (d)  $\text{NO}_2$  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  $\text{Zn}^{2+}$  in a  $\text{Zn}^{2+}$  and  $\text{Cu}^{2+}$  mixture. 1+2+17

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