

Total No. of Printed Pages—7

3 SEM TDC CHMH (CBCS) C 5

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(Nov/Dec)

CHEMISTRY

(Core)

Paper : C-5

(Inorganic Chemistry)

Full Marks : 53

Pass Marks : 21

Time : 3 hours

*The figures in the margin indicate full marks
for the questions*

1. Choose the correct answer from the following : 1×5=5

(a) Which of the following acids results from better hard-hard combination?

(i) HCN

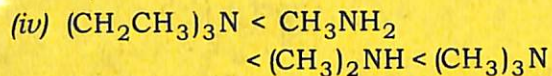
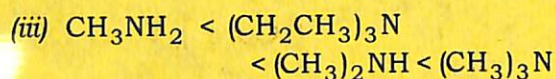
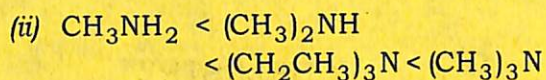
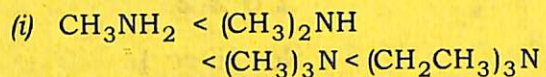
(ii) HI

(iii) HCl

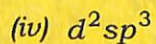
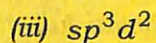
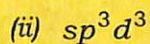
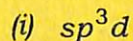
(iv) HNO₂

(2)

(b) Which one of the following is the correct order of increasing basicity?



(c) The type of hybridization for IF_5 is



(d) The shape of XeOF_4 molecule with sp^3d^2 hybridization is

(i) pentagonal bipyramidal

(ii) octahedral

(iii) trigonal bipyramidal

(iv) square pyramidal

(3)

(e) In clathrates, the host-guest interaction is also known as

(i) covalent interaction

(ii) ionic interaction

(iii) coordination interaction

(iv) non-covalent interaction

2. Answer any six questions of the following :

2×6=12

(a) What are interhalogen compounds? Give examples.

(b) Compare the acid strength of $[\text{Fe}(\text{H}_2\text{O})_6]^{3+}$ and $[\text{Fe}(\text{H}_2\text{O})_6]^{2+}$.

(c) Give two reactions to show resemblance of lithium with magnesium.

(d) Draw the structure of boric acid.

(e) Write a short note on hydrometallurgy.

(f) Why helium and neon do not form clathrates?

(4)

- (g) XeF_6 cannot be stored in glass vessel. Explain with chemical reaction.
- (h) Discuss the effect of dielectric constant of solvents in relative strength of acids and bases.

3. Answer any *four* questions of the following :

3×4=12

- (a) What are *closo-*, *nido-* and *arachno-* boranes? Give one example of each.
- (b) What are polyhalides? Among the halogens, iodine has the maximum tendency to form polyhalide anion. Explain the statement.
- (c) What are silicones? Give the preparation of cross-linked silicones.
- (d) Why is borazine called inorganic benzene? How is it prepared from diborane? Give a reaction to distinguish borazine from benzene.
- (e) What are hydrides? Classify different types of hydrides with one example of each.

(5)

- (f) Discuss the formation of $3c-2e$ bonds in diborane from molecular orbital theory. (Give the required MO diagrams)

4. Answer any *three* questions of the following :

4×3=12

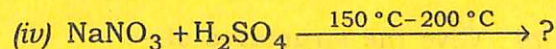
- (a) Mention the Wade's rules for determining the skeletal structure of boranes. Applying these rules, predict the structure of B_5H_{11} and $\text{C}_2\text{B}_4\text{H}_8$.

2+2=4

- (b) Define acids and bases from solvent system theory. Discuss the acid-base behaviour of NH_4Cl and KNH_2 in liquid ammonia.

2+2=4

- (c) Complete the following reactions : 1×4=4



- (d) What is meant by diagonal relationship of elements in the periodic table? Discuss the diagonal relationship between lithium and magnesium. 1+3=4

(6)

5. Answer any *three* questions of the following :

3×3=9

(a) What are phosphazines? Discuss the structure of hexachlorocyclotriphosphazine. 1+2=3

(b) State the HSAB principle. Explain why $[\text{CoF}_6]^{3-}$ is more stable than $[\text{CoI}_6]^{3-}$. 1+2=3

(c) What are the reasons for the anomalous behaviour of fluorine with its group members? Compare the variation of oxidation states of group 17 elements. 2+1=3

(d) Give the names of oxo-acids of chlorine. Compare the acid strength of oxo-acids of chlorine. 2+1=3

6. Answer *either* (a) or (b) from the following : 3

(a) Give the structures of—

(i) P_2O_5

(ii) $\text{H}_2\text{S}_2\text{O}_8$

(iii) HClO_4 1+1+1=3

(7)

(b) Write short notes on any *two* of the following : $1\frac{1}{2}\times 2=3$

(i) Zone refining

(ii) Fullerenes

(iii) Carbon reduction
