TDC (CBCS) Odd Semester Exam., 2022

CHEMISTRY

(Honours)

(3rd Semester)

Course No. : CHMHCC–301T

(*s*-, *p*-Block Elements and Metallurgy)

Full Marks : 50
Pass Marks : 20

Time : 3 hours

The figures in the margin indicate full marks for the questions

UNIT—I

1. Answer any *two* of the following questions : 2×2=4

(a) What is meant by diagonal relationship? Write one consequence of it. 1+1=2

(b) What is catenation? Comment on its condition. 1+1=2

(c) Write the chemistry of 'borax-bead test'.

2. Answer any *one* of the following questions : 6

(a) *(i)* How is H_3BO_3 prepared? Draw its structure. 2+1=3

(ii) What are carboranes? Give one example of each type. 1½+1½=3

(b) *(i)* How is peroxy sulphuric acid $H_2S_2O_5$ prepared? Draw its structure. 2+1=3

(ii) What are pseudohalogens? Write two characteristics of pseudo-halogens. 1+2=3

UNIT—II

3. Answer any *two* of the following questions : 2×2=4

(a) Write with balanced equation, the preparation of dichloroheptoxide.

(b) Write two important uses of helium.

(c) What is the action of moisture on XeF_6?

4. Answer any *one* of the following questions : 6

(a) *(i)* How is a mixture of noble gases isolated from air by charcoal absorption method? 3

(ii) Explain the structures of XeF_4 and XeF_6 following VSEPR theory and hybridization scheme. 1½+1½=3

(b) (i) How are XeO_3 and $XeOF_4$ prepared? Draw their structures. 2+2=4

(ii) Why are noble gases less-reactive? Give reasons. 2

UNIT—III

5. Answer any *two* of the following questions : 2×2=4

(a) What do you mean by conjugate acid-base pairs?

(b) Which of the following acts as Lewis acids? ½×4=2

(i) H_2O

(ii) SO_3^{2-}

(iii) OH^-

(iv) Ag^+

(c) HNO_3 is stronger acid than HNO_2. Explain.

6. Answer any *one* of the following questions : 6

(a) (i) Explain Pearson concept of hard and soft acids. Give examples. 3

(ii) What is meant by levelling effect? Explain on the basis of solvent system concept of acids and bases. 3

(b) (i) Define Bronsted-Lowry concept of acids and bases. Write one limitation of Bronsted-Lowry concept. 3

(ii) Explain why hard acids coordinate with hard bases and soft acids coordinate with soft bases. 3

UNIT—IV

7. Answer any *two* of the following questions : 2×2=4

(a) Write any two differences between inorganic and organic polymers.

(b) Draw the structure of $[Si_2O_7]^{6-}$.

(c) What are silicone rubbers? Write one use of it.

8. Answer any *one* of the following questions : 6

(a) (i) What are silicones? How are cross-linked silicones prepared? 1+2=3

(ii) How is $P_3N_3Cl_6$ prepared? Draw the structure of $(NPCl_2)_3$. Write one use of it. 1+1+1=3

(b) (i) Define the terms polymer, polymerization and macromolecules. Give one example in each case. 3

(ii) How is borazine prepared? What happens when it reacts with water? Draw its structure. 1+1+1=3

UNIT—V

9. Answer any *two* of the following questions : 2×2=4

(a) Define hydrometallurgy. Give one example. 1+1=2

(b) Distinguish between mineral and ore.

(c) Write one merit and one demerit of Ellingham diagram.

10. Answer any *one* of the following questions : 6

(a) (i) What is zone refining? How is impure metal purified by it? 1+2=3

(ii) What are Ellingham diagrams? How does it function using carbon as reductant? 1+2=3

(b) (i) What do you understand by electrolytic process to purify metals? 3

(ii) Which metal is purified by Mond's process? Write the reaction involved in it. 3

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