Total No. of Printed Pages—7

3 SEM TDC CHMH (CBCS) C 5

2020

(Held in April–May, 2021)

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. Select the correct answer : 1×6=6

(a) Which of the following can act as Lewis acid?

(i) H_2O

(ii) NH_3

(iii) SO_3

(iv) OH^-

(b) The metal hydride, $TiH_{1.7}$ is classified as

(i) covalent hydride

(ii) ionic hydride

(iii) interstitial hydride

(iv) mixed hydride

(c) Which of the following pairs is not an example of diagonal relationship?

(i) Li^+, Mg^{2+}

(ii) K^+, Ca^{2+}

(iii) Be^{2+}, Al^{3+}

(iv) None of the above

(d) Choose the wrong combination of hybridization of interhalogen compounds :

(i) $ClF_3 : sp^3d$

(ii) $IF_7 : sp^3d^3$

(iii) $BrF_5 : sp^3d^2$

(iv) $IF_5 : sp^3d$

(e) Hybridization involved in the formation of $XeOF_4$ molecule is sp^3d^2. The shape of the molecule is

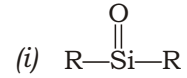
(i) octahedral

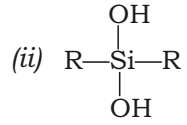
(ii) square pyramidal

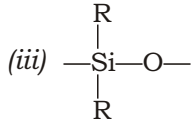
(iii) trigonal bipyramidal

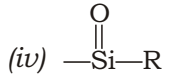
(iv) pentagonal bipyramidal

(f) Silicones have the structural unit

(i)


(ii)


(iii)


(iv)


2. Answer the following questions : 2×7=14

(a) Write briefly about zone refining of metals. 2

(b) What do you mean by the term 'conjugate acid-base pair'? Give one example. Write the conjugate base of HCO_3^- ion. 1+½+½=2

(c) Draw the structure of N_2O_5 and NO_2 molecules. 1+1=2

(d) How can you prepare boric acid from borax? Write the chemical reaction. 1+1=2

(e) Draw the structure of boric acid. 2

(f) Xenon hexafluoride cannot be stored in glass vessel. Explain with chemical reaction. 2

(g) Borazine is called inorganic benzene. Explain with reason. 2

3. *(a)* Describe the changes taking place during roasting of a sulphide ore. 1½

(b) Describe the Mond's process of refining of nickel. 1½

4. Explain levelling solvents with a suitable example. 3

Or

Explain hard and soft acids and bases (HSAB) principle. Discuss its applications.

5. Answer any *four* of the following questions : 3×4=12

(a) Applying Wade's rule, predict the structure of the following : 1+1+1=3

(i) $[B_6H_6]^{2-}$

(ii) B_5H_{11}

(iii) $C_2B_4H_8$

(b) What are closo, nido and arachno boranes? Give one example of each. 1×3=3

(c) Explain the structure of B_2H_6. 3

(d) Draw the electronic structure of three oxyacids of phosphorus. 1×3=3

(e) What are peroxoacids of sulphur? Give the electronic structure of the following : 1+(1+1)=3

(i) Peroxysulphuric acid

(ii) Peroxydisulphuric acid

(f) What are pseudohalides and pseudohalogens? Give example of each of them. 1½×2=3

6. Answer any *two* of the following questions : 3½×2=7

(a) What are interhalogen compounds? Explain the geometry of the following : ½+(1½+1½)=3½

(i) ClF_3

(ii) IF_5

(b) What are boron nitrides? Explain the structure of boron nitrides $(BN)_x$. ½+3=3½

(c) What are silanes? Give one method of preparation and one chemical property of silanes. ½+(1½+1½)=3½

7. Explain the geometry of the following compounds on the basis of VSEPR theory : 2+2=4

(a) XeF_2

(b) XeF_6

8. *(a)* What are silicones? How are cross-linked silicones prepared? 1+1=2

(b) What are silicates? Give one example of it. 1+1=2

★★★