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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 : 1×6=6

(a) The number of terminal hydrogens
present in B_2H_6 is

(i) 4

(ii) 2

(iii) 3

(iv) 6

(2)

(b) The semiconductors are refined by

- (i) distillation
- (ii) solvent extraction
- (iii) zone refining
- (iv) electro-refining

(c) The conjugate base of H_2O is

- (i) H_3O^+
- (ii) OH^-
- (iii) O^{2-}
- (iv) None of the above

(d) The type of hybridization in NH_4^+ ion is

- (i) sp^2
- (ii) sp^3
- (iii) sp
- (iv) dsp^3

(3)

(e) The shape of XeF_2 molecule is

- (i) tetrahedral
- (ii) square planar
- (iii) linear
- (iv) octahedral

(f) The formula of inorganic benzene is

- (i) B_6H_6
- (ii) $\text{B}_3\text{N}_3\text{H}_6$
- (iii) Al_6H_6
- (iv) $\text{B}_3\text{Al}_3\text{H}_6$

2. Write short notes on the following (any two) :

2×2=4

- (a) Zone refining
- (b) Hydrometallurgy
- (c) Carbon reduction process

(4)

3. Answer the following questions (any two) :

3×2=6

(a) What are hard and soft acids and bases (HSAB)? Mention one application of HSAB principle. 2+1=3

(b) What are Lewis bases? Classify different types of Lewis bases. Give example. 2+1=3

(c) What is conjugate acid-base pair? Write the conjugate acids of $\text{OH}^\ominus$, $\text{HCO}_3^\ominus$, $\text{NH}^\ominus$, $\text{HS}^\ominus$ ions. 1+2=3

4. Answer the following questions (any five) :

2×5=10

(a) What is inert-pair effect?

(b) Explain the term 'diagonal relationship' with a suitable example.

(c) AlCl_3 is less covalent than AlI_3 . Why?

(d) Write the name and formula of oxyacids of phosphorus.

(5)

(e) What are pseudohalogens? Give example.

(f) What are silanes? Give examples.

5. Answer the following questions (any five) :

3×5=15

(a) Write one method of preparation and one use of boric acid. 2+1=3

(b) Draw the electronic structures of HNO_3 , N_2O_4 and HNO_2 . 1+1+1=3

(c) What are interhalogen compounds? Predict the geometry of ClF_3 and PCl_5 . 1+1+1=3

(d) Explain the (3c-2e) bond in diborane. 2+1=3

(e) What are carboranes? Give one example and structure of carborane. 1+1+1=3

(6)

- (f) Name the allotropes of sulphur and draw their structures. $1+1+1=3$

6. Answer the following questions (any two) : $3 \times 2 = 6$

- (a) Give one method of preparation and chemical property of XeF_6 .

- (b) Applying VSEPR theory, explain the geometry of XeF_4 .

- (c) What are clathrates? Give one example of clathrates of noble gases.

7. Answer the following questions (any two) : $3 \times 2 = 6$

- (a) What are phosphazenes? Give a method of preparation of trimeric phosphonitrilic chloride. What happens when triphosphazene chloride is hydrolysed? $1+1+1=3$

(7)

- (b) Give one method of preparation and bonding structure of borazine. $1+2=3$

- (c) Give one method of preparation of linear, cross-linked and cyclic silicones. $1+1+1=3$
