

63/1 (SEM-3) CC5/CHMHC3056

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(Held in 2023)

CHEMISTRY

Paper : CHMHC3056

(Inorganic Chemistry—II)

Full Marks : 60

Pass Marks : 24

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) The Styx number of diborane is

(i) [0, 2, 2, 0]

(ii) [2, 0, 0, 2]

(iii) [2, 1, 0, 2]

(iv) [1, 0, 0, 1]

(b) Pentlandite is an ore of

(i) Ni

(ii) Ag

(iii) Al

(iv) Hg

(c) The formula of diamond is

(i) C_3

(ii) C_4

(iii) C_5

(iv) C_6

(d) The type of hybridization present in XeF_4 is

(i) sp^3

(ii) dsp^2

(iii) sp^3d^2

(iv) sp^3d

(e) CaH_2 is an example of

(i) salt-like hydride

(ii) molecular hydride

(iii) metallic hydride

(iv) polymeric hydride

2. Answer the following questions : $2 \times 5 = 10$

(a) Write four anomalous behaviours of nitrogen from rest of the elements of group 15.

(b) Arrange the following molecules in increasing order of acid strength (give reason) :



(c) Why does noble gas form compounds with only oxygen and fluorine?

(d) Explain the diagonal relationship of lithium (Li) and magnesium (Mg).

(e) Write the preparation methods of XeF_4 and draw its structure.

3. Answer any five of the following questions :

$5 \times 5 = 25$

(a) Write a short note on silicates.

(b) What do you mean by interhalogen compounds? How many types of interhalogen compound are there? Write examples of each type. Draw the structure of ClF molecule. $1+1+2+1=5$

(c) Draw the Ellingham diagram to show the reduction of FeO .

(d) What do you mean by allotropy? Write a short note on fullerene along with its structure. $1+4=5$

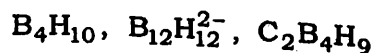
(4)

- (e) How can you prepare boron nitride (BN)? Write some properties of boron nitride and mention two uses of it. 1+2+2=5
- (f) Draw the structures of white and red phosphorus and write some differences between them. 2+3=5
- (g) Define inorganic polymer. What are the differences between addition and condensation polymers? Write some characteristics of inorganic polymers. 1+2+2=5

4. Answer any two of the following questions :

10×2=20

- (a) (i) Write any two preparation methods of diborane. Discuss the properties of diborane mentioning at least two uses of it. 2+3+1=6
- (ii) What is Wade's rule for the classification of boranes? Classify the following boranes and carboranes as *closo*, *nido* and *arachno* : 1+3=4



(5)

- (b) (i) What do you mean by 'dressing' of ore? Describe various processes carried out for the dressing or concentration of an ore. 1+3=4
- (ii) What are the different furnaces used for metallurgical operations? How is nickel (Ni) extracted from its ore by Mond's process? 2+4=6
- (c) (i) Write the HSAB principles with examples. 2
- (ii) How can clathrates be prepared? Mention one use of clathrates. 2+1=3
- (iii) Explain the Lux-Flood theory of acids and bases. What do you mean by levelling and differentiating solvents? Explain with suitable examples. 2+3=5
