

**3 SEM TDC CHMH (CBCS) C 5**

**2023**

( 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 alternatives : 1×6=6

(a) Metals generally occur in their native state in nature have

- (i) positive standard electrode potentials
- (ii) high affinity to oxygen
- (iii) incompletely filled *d*-orbitals
- (iv) negative standard electrode potentials

( 2 )

(b) Which of the following is a soft acid?

(i)  $\text{Ag}^+$

(ii)  $\text{Al}^{3+}$

(iii)  $\text{Na}^+$

(iv)  $\text{H}^+$

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

(i) Li-Mg

(ii) B-Si

(iii) Be-Al

(iv) B-Al

(d) The noble gas most difficult to liquify is

(i) He

(ii) Ne

(iii) Ar

(iv) Kr

( 3 )

(e) The structure of  $(\text{NPCl}_2)_4$  is

(i) tetrahedral

(ii) tub-like

(iii) planar

(iv) pyramidal

(f) The shape of  $\text{XeO}_3$  molecule is

(i) triangular planar

(ii) pyramidal

(iii) tetrahedral

(iv) octahedral

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

2×2=4

(a) Mond's process of refining

(b) Zone refining

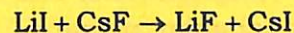
(c) Parting process

( 4 )

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

(a) What are Lewis bases? Classify different types of Lewis bases with examples.  $1 + 2 = 3$

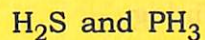
(b) Explain HSAB principle with suitable example. Using this principle, predict whether the following reaction is feasible or not :  $2 + 1 = 3$



(c) What is inert pair effect? Why does the inert pair effect increase down the group?  $1\frac{1}{2} + 1\frac{1}{2} = 3$

4. Answer the following questions (any five) :  $2 \times 5 = 10$

(a) Which one of the following is more acidic and why?  $1 + 1 = 2$



(b)  $\text{H}_3\text{PO}_2$  is a good reducing agent. Why? 2

( 5 )

(c) Draw the electronic structure of  $\text{H}_3\text{PO}_4$  and  $\text{N}_2\text{O}_4$ .  $1 + 1 = 2$

(d) Lithium has dissimilarities with other alkali metals. Why? 2

(e)  $\text{HCO}_3^-$  ion behaves as an amphoteric substance. Why? 2

(f) What is the general repeating unit in silicones? State a unique character of silicones.  $1 + 1 = 2$

5. Answer the following questions (any five) :  $3 \times 5 = 15$

(a) Give one method of preparation of diborane. Explain the formation of (3c—2e) bond in diborane.  $1 + 2 = 3$

(b) Write one method of preparation and structure of boron nitrides.  $1 + 2 = 3$

(c) Discuss the structural difference of diamond and graphite. 3

( 6 )

- (d) What is catenation? The catenation property is more significant in carbon than other elements. Why?  $1+2=3$
- (e) Explain why—
- (i) halogens exhibit +1, +3, +5 and +7 oxidation states;
- (ii) reaction between iron and HCl produces  $\text{FeCl}_2$  not  $\text{FeCl}_3$ .  $1\frac{1}{2}+1\frac{1}{2}=3$
- (f) Write a note on main allotropic forms of sulphur. 3

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

- (a) Explain the structures of  $\text{XeF}_4$  and  $\text{XeOF}_4$ .  $1\frac{1}{2}+1\frac{1}{2}=3$
- (b) Give one method of preparation and one chemical property of  $\text{XeF}_2$ .  $1\frac{1}{2}+1\frac{1}{2}=3$
- (c) (i) No chemical compound of He is known. Explain.  $1\frac{1}{2}$
- (ii) What are clathrates? Give example.  $1+1\frac{1}{2}=1\frac{1}{2}$

( 7 )

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

- (a) What are linear and cyclic silicones? Give example of each.  $1\frac{1}{2}+1\frac{1}{2}=3$
- (b) What is inorganic benzene? Why is it called inorganic benzene?  $1+2=3$
- (c) What are silicones? Mention two applications of silicones.  $2+1=3$

\*\*\*