

Bachelor of Science (B.Sc.) Semester—I (C.B.S.) Examination

CHEMISTRY

(Inorganic Chemistry)

Compulsory Paper—1

Time : Three Hours]

[Maximum Marks : 50

N.B. :— (1) All questions are compulsory and carry equal marks.

(2) Write equations and draw diagrams wherever necessary.

1. (A) State and explain :

(i) Heisenberg's uncertainty principle and

(ii) Hund's rule of maximum multiplicity.

5

(B) Define ionization potential. What are the factors affecting it ? How does it vary in a group and in a period ?

5

OR

(C) What are quantum numbers ? Discuss the significance of principal quantum number.

2½

(D) Discuss Pauling scale of electronegativity.

2½

(E) Calculate the effective nuclear charge for a 3d electron in zinc atom ($Z = 30$).

2½

(F) Write Schrodinger wave equation for hydrogen atom and give the significance of the terms associated with it.

2½

2. (A) Explain Heitler and London treatment for the formation of H_2 molecule with potential energy diagram.

5

(B) Define solvation and solvation energy of ions. How is lattice energy determined for ionic solid by Born-Haber cycle ?

5

OR

(C) Discuss sp^3d^2 hybridization with suitable example.

2½

(D) Using VSEPR theory explain the structure of H_2O molecule.

2½

(E) Discuss the structure of NaCl.

2½

(F) Discuss the Fajan's rule.

2½

3. (A) What are S-block elements ? Write electronic configuration of S-block elements. 5
- (B) Discuss the structure and bonding in
- (i) XeF_6 and
- (ii) XeOF_4 . 5

OR

- (C) Discuss diagonal relationship between lithium and magnesium. $2\frac{1}{2}$
- (D) Define hydrogen bonding. Explain why H_2O is liquid while H_2S is gas. $2\frac{1}{2}$
- (E) What happens when Xenon tetrafluoride reacts with :
- (i) Hydrochloric acid and
- (ii) Hydrogen gas ? $2\frac{1}{2}$
- (F) Discuss the structure and bonding in Xenon-difluoride. $2\frac{1}{2}$
4. (A) What are p-block elements ? Discuss the following properties of block elements with respect to :
- (i) Atomic and ionic radii and
- (ii) Oxidation state. 5
- (B) Explain the structure and bonding in diborane. 5

OR

- (C) Compare electronegativity of 'p' block elements. $2\frac{1}{2}$
- (D) Discuss diagonal relationship between Boron and Silicon. $2\frac{1}{2}$
- (E) What are peroxyacids ? Discuss the structure of Caro's acid. $2\frac{1}{2}$
- (F) What are hydrides ? Draw the structure of NH_3 and PH_3 . $2\frac{1}{2}$
5. Attempt any **ten** of the following :
- (i) Define electron affinity. 1
- (ii) Define screening constant. 1
- (iii) Draw the shape of d_{z^2} orbitals. 1

- | | |
|---|---|
| (iv) Write any two limitations of VBT. | 1 |
| (v) Give the geometry and type of hybridization of PCl_5 . | 1 |
| (vi) Define polarizing power of anion. | 1 |
| (vii) What are types of Hydrogen bonding ? | 1 |
| (viii) Draw the structure of XeOF_2 . | 1 |
| (ix) Why S-block elements act as reducing agent ? | 1 |
| (x) Draw the structure of P_2O_3 . | 1 |
| (xi) Draw the structure of P_2O_5 . | 1 |
| (xii) Which element is more electronegative in p-block elements ? | 1 |