

This question paper contains 3 printed pages]

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S. No. of Question Paper : 2426

Unique Paper Code : 2172301

F-4

Name of the Paper : Chemical Bonding (Inorganic Chemistry)

Name of the Course : Allied Course : Physics/Electronics

Semester : IV

Duration : 3 Hours

Maximum Marks : 75

(Write your Roll No. on the top immediately on receipt of this question paper.)

Attempt six questions in all.

Question No. 1 is compulsory and carries 15 marks

Attempt any five questions from Question.

No. 2 to Q. No. 8, each of which carries 12 marks.

1. Explain the following :

- (a) Which molecule has higher dipole moment NH_3 or NF_3 ?
- (b) BeF_2 is linear but SF_2 is angular although both are triatomic.
- (c) N_2 molecule is diamagnetic while O_2 is paramagnetic.
- (d) H_2O is liquid and H_2S is gas at room temperature.
- (e) Arrange the chlorides of alkali metals in decreasing order of their melting points.
- (f) $\text{MgSO}_4 \cdot 7\text{H}_2\text{O}$ is soluble in water whereas BaSO_4 is insoluble.

6×2.5=15

P.T.O.

2. Define Lattice energy. Calculate the lattice energy of NaCl crystal from the following data by the use of Born-Haber cycle : 4,8

$$\text{Sublimation Energy (S)} = 108.7 \text{ kJ mol}^{-1}$$

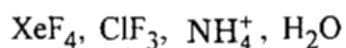
$$\text{Dissociation Energy Cl}_2(\text{D}) = 225.9 \text{ kJ mol}^{-1}$$

$$\text{Ionization Energy for Na(g) (I)} = 489.5 \text{ kJ mol}^{-1}$$

$$\text{Electron Affinity for Cl(g) E} = -351.4 \text{ kJ mol}^{-1}$$

$$\text{Heat of formation of NaCl } (\Delta H_f) = -414.2 \text{ kJ mol}^{-1}$$

3. (a) What do you understand by hybridization ?
- (b) How many types of hybridization ? Explain with examples. 3,9
4. Write the postulates of valence bond theory. Predict the shape of the following molecules/ions using VSEPR theory : 4,4×2



5. (a) Differentiate between atomic orbitals and molecular orbitals.
- (b) Draw the molecular orbital diagram and calculate the bond order of the following molecules :
F₂ and CO. 4,2×4
6. (a) What is doping the crystals ? Explain for extrinsic conduction.
- (b) Discuss the defects present in stoichiometric compounds. 2×6

7. (a) Define Hydrogen bonding. How many types of hydrogen bonding.
- (b) Why ice floats on water ? 8.4
8. Write short notes on any *four* :
- (a) Bent's rule
- (b) Fajan's rule
- (c) Hexagonal closed packing
- (d) Equivalent and non-equivalent hybrid orbitals
- (e) London forces. 4×3