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Sr. No. of Question Paper : 8456

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Roll No.....

Unique Paper Code : 217301

Name of the Paper : CHHT-305 : INORGANIC CHEMISTRY – II

Name of the Course : B.Sc. (H) CHEMISTRY, Part II

Semester : III

Duration : 3 Hours

Maximum Marks : 75

Instructions for Candidates

1. Write your Roll No. on the top immediately on receipt of this question paper.
2. Attempt any **Five** questions.
3. **All** questions carry equal marks.

1. (a) Calculate the limiting value of radius ratio for an ionic crystalline solid when the coordination number is 6. (8)
- (b) Why Lithium halides do not obey radius ratio rule. (4)
- (c) Explain the solubility pattern in water of LiI, NaI, KI, RbI, CsI (3)
2. (a) State Bent's rule. Predict whether H-C-H angle in CH_2F_2 is higher or lower than tetrahedral angle. (4)
- (b) Which will have higher dipole moment : NH_3 or NF_3 ? Explain. (4)
- (c) The dipole moment of HI is 0.384D and bond distance is 1.60Å. What will be the % of ionic character of HI ? (4)
- (d) CdCO_3 decomposes at 350°C while CaCO_3 at 900°C. Explain. (3)
3. (a) Using VSEPR theory predict the geometry and shape of following molecules/ions : XeF_4 , ClF_3 , ICl_2^- , XeOF_4 (8)
- (b) Bond angle in SnCl_2 is close to 120°C but the bond angle in I_3^- is 180°C. Explain. (3)
- (c) Using hybridization predict the geometry and shape of the following : NO_3^- , IF_7 (4)

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4. (a) Draw Coulson M.O. diagram for CO molecule. Explain which end in CO forms organometallic compounds ? (8)
- (b) Explain the observations that the Bond length in N_2^+ is greater than in N_2 , while the bond length in NO^+ is less than NO. (4)
- (c) Explain the term LCAO. (3)
5. (a) Draw the resonating structures for CO_3^{2-} , N_2O (6)
- (b) Which will have higher melting point/boiling point ? Ortho-nitrophenol or para-nitrophenol. Explain. (4)
- (c) Why ice floats on water ? Explain. (5)
6. Explain the following :
- (a) Arrange in increasing order of Basic strength in aqueous medium : $(CH_3)_3N$, $(CH_3)_2NH$, CH_3NH_2 (4)
- (b) Which is more acidic ? H_3PO_3 or H_3PO_4 (3)
- (c) Which is more stable ? $[CoF_6]^{3-}$ or $[CoI_6]^{3-}$ (3)
- (d) Which way the following reaction will proceed ?
 $CuI_2 + 2CuF = CuF_2 + 2CuI$ (2)
- (e) BF_3 is weaker Lewis acid than BCl_3 . (3)
7. (a) Using Band theory explain the electrical conductivity in Na metal. (4)
- (b) Explain with example the dipole-dipole interactions and instantaneous dipole-induced dipole interactions. (4)
- (c) Explain with example F-strain. (4)
- (d) Predict the Bond order and magnetic property in B_2 , N_2 . (3)
8. (a) Although the heat of formation of CaCl is negative (-182kJ/mol), it does not exist. Calculate ΔH_f for $CaCl_2$ from the given data and explain the results (All values are in kJ mol^{-1})
 $S = +201$; $D = +242$; $IE_1 = +590$; $IE_2 = +1146.4$; $E.A. = -349$; $U_{CaCl_2} = -2280.4$ (6)
- (b) Write the Kapustinskii equation for lattice energy and define the terms involved. (3)
- (c) Explain the defects present in non-stoichiometric compounds. (6)