

# B.Sc. (Honours) Examination, 2017

## Semester-IV

### Chemistry (Honours)

#### Course: BCHC-41

#### ( Inorganic Chemistry )

**Time: Three Hours**

**Full Marks: 30**

Questions are of value as indicated in the margin.

Answer **any three** questions.

1. a) Magnetic moment of  $\text{Cu}(\text{CH}_3\text{COO})_2 \cdot \text{H}_2\text{O}$  and  $\text{Cr}(\text{CH}_3\text{COO})_2 \cdot \text{H}_2\text{O}$  are respectively 1.30 BM and 0.11 BM at 300 K – Explain why such difference. 4  
b) Sc, Y and La belongs to Transition and/or Non-Transition Series Elements – Comment (Ans. should require justification as well as specific examples including properties etc.). 3  
c) Justify the status of high-spin and low-spin of the compounds:  $[\text{Cr}(\text{acac})_3]$  and  $[\text{Mn}(\text{acac})_3]$  (acac = acetylacetonate anion). 3
  2. a) Stabilization of tetravalent nickel and manganese: explain taking specific ligand(s). 4  
b) Lanthanides shows predominantly trivalent oxidation state, but oxidation states of actinides are numerous – Explain. 3  
c) Discuss all possible ligating abilities of benzoate anion with some examples. 3
  3. a) Boiling point vs. molecular weight give a linear relationship,  $y = 0.616x - 85$  for the hydrides  $\text{H}_2\text{S}$ ,  $\text{H}_2\text{Se}$  and  $\text{H}_2\text{Te}$ ; [  $x$  = molecular weight of the compounds; and  $100^\circ\text{C} = 45.36 \text{ kcal}$ ]. Find out the Hydrogen bond energy per mole of  $\text{H}_2\text{O}$ . 4  
b) Write down a brief note on H-bonding: (i) it's identification; (ii) importance of H-bonding. 6
  4. a) Determine forbidden energy gap ( $E_g$ ) in case of the intrinsic semiconductor. 7  
b) What do you mean by 'slip plane'? 3
  5. a) State Wiedemann-Franz's law. 3  
b) Discuss about the electron sea model. 3  
c) Illustrate the role of Fermi level for the electrical conductivities of solids in the light of Band theory. 4
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