

B.Sc. 3rd Semester (Honours) Examination, 2021 (CBCS)

Subject: Chemistry

(Inorganic Chemistry-II)

Paper: CC-6

Time: 2 Hours

Full Marks: 40

Candidates are required to give their answers in their own words as far as practicable

Answer any *eight* questions from the following:

8 × 5 = 40

1. “Water has its highest density at 4⁰C”-Explain. “The electrical conductivity of metal decreases with the rise in temperature but the reverse occurs with semiconductors”-Explain.
2. Define dipole moment and explain the low dipole moment value of CO molecule. “BaSO₄ is insoluble in water”-Give reason.
3. Draw MO diagram for O₂⁺, O₂⁻ and O₂²⁻ and predict the stability order and magnetic properties in each case.
4. A piece of wood was found to have ¹⁴C: ¹²C ratio 0.7 times to that in a living plant. Calculate the period when the plant died (t_{1/2} of ¹⁴C=5760 years). “Radioactive iodine has an important application in life sciences”-Mention it.
5. Suggesting suitable reason rank the following in the order of decreasing bond angles of OF₂, OCl₂, OH₂, ON₂. Explain the term polarizing power and polarisability.
6. Describe Frenkel and Schottky defects. Discuss the kind of crystal defect observed when ZnO is heated. State the detectable change.
7. What is Born-Haber Cycle? Calculate the lattice energy of NaCl crystal from the following data by use of Born-Haber Cycle. Sublimation energy (S) = 108.7 kJmol⁻¹, Dissociation energy for Cl₂ (D) = 225.9 kJmol⁻¹, Ionization potential of Na(g) (I) = 489.5 kJmol⁻¹, Electron affinity of Cl (g) (E) = -351.4 kJmol⁻¹, Enthalpy of formation of NaCl (ΔH_f) = -414.2 kJmol⁻¹
8. “AlCl₃ anhydrous is covalent but AlCl₃.6H₂O is ionic in nature.” - How would you account for this behaviour? “N₃⁻ is more resonance stabilized than HN₃”. Comment.
9. What are the hazards of radiation and what are their safety measures? Write short notes on ‘artificial transmutation’.
10. The C-Cl bond distance in CH₃Cl and CF₃Cl are 1.78 Å & 1.75 Å respectively. Comment on this difference of bond distance with the help of Bent’s Rule. “The nature of hybridization of the bonding atom has strong influence on its electronegativity”-illustrate.