



**UNIVERSITY OF NORTH BENGAL**  
B.Sc. Honours 1st Semester Examination, 2020

**CC1-CHEMISTRY**

**INORGANIC CHEMISTRY**

Full Marks: 40

**ASSIGNMENT**

*The figures in the margin indicate full marks.  
All symbols are of usual significance.*

**Answer any four questions from the following**

10×4=40

1. (a) What are the postulates of Bohr's atomic model? 3
- (b) Write down the Schrodinger Wave equation for H-atom. Explain the meaning of various terms involved. 2
- (c) State and explain Heisenberg's uncertainty principle. 3
- (d) What is the wavelength of light emitted when the electron in hydrogen atom undergoes transition from energy level with  $n = 4$  to  $n = 2$ ? 2
  
2. (a) Giving reason, arrange the following molecules in order of increasing bond angle:  $H_2O, NH_3, PH_3$ . 3
- (b) Draw the molecular orbital diagram for oxygen molecule and comment on its magnetic property. 2+1
- (c) Discuss the shape of  $ClF_3$  and  $ICl_4^-$  with the help of VSEPR theory. 2+2
  
3. (a) What are the limitations of Bohr's theory? 3
- (b) What is Born-Haber cycle and how the lattice energy of an ionic solid can be obtained from it? 3
- (c) Draw the shape of  $d$ -orbitals. 2
- (d) Explain why electron affinity of F is less than that of Cl. 2
  
4. (a) Calculate effective nuclear charge experienced by  $4d$  electron in Ag atom. 2
- (b) How does the size of atom vary from left to right in a period and on descending a group in the periodic table? What are the reasons for these changes? 3
- (c) First ionisation energy of Al is lower than that of Mg. Why? 3
- (d)  $K^+$  is smaller than  $Cl^-$ . Explain. 2

5. (a) What is  $sp^3d^2$  hybridization? Explain with an example. 4  
 (b) Explain why NaCl is soluble in water but BaSO<sub>4</sub> is not. 2  
 (c) Explain the difference between electron affinity and electronegativity. 2  
 (d) Why is 4s orbital has lower energy than 3d orbital? 2
6. (a) Discuss the basis of electronegativity scale as proposed by Pauling. 4  
 (b) Explain the terms: Polarization, Polarizing power and Polarizability. 3  
 (c) SnCl<sub>4</sub> is more covalent than SnCl<sub>2</sub>. Explain. 3
7. (a) Show that the volume of space occupied by a face centred cubic unit cell is 74%. 3  
 (b) What are redox indicators? Give examples. 2  
 (c) Discuss in detail the theories explaining hydrogen bond formation. 3  
 (d) Predict the coordination number of Zn<sup>2+</sup> in ZnS on the basis of radius-ratio rule. 2  
 Given radii of Zn<sup>2+</sup> and S<sup>2-</sup> are 0.74 Å and 1.84 Å respectively.
8. (a) State and explain Pauli's exclusion principle.  $2\frac{1}{2}$   
 (b) AlCl<sub>3</sub> is anhydrous but AlCl<sub>3</sub> · 6H<sub>2</sub>O is ionic. Explain.  $2\frac{1}{2}$   
 (c) Calculate the percentage ionic character in HCl molecule if the observed dipole moment is 1.08 D. Given the bond length = 1.276 Å.  $2\frac{1}{2}$   
 (d) Draw the Lewis structure of carbonate ion.  $2\frac{1}{2}$

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