



UNIVERSITY OF NORTH BENGAL
B.Sc. Honours 4th Semester Examination, 2021

GE4-CHEMISTRY

Full Marks: 40

ASSIGNMENT

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

Use separate Answer scripts for Section-A (Inorganic) and Section-B (Physical)

SECTION-A

INORGANIC CHEMISTRY

Answer any two from the following

10×2 = 20

1. (a) Write down the basic difference between double salt and coordination compound. 2
- (b) Write down the IUPAC nomenclature of the following complex compounds: 2
 - (i) $K_3[Fe(CN)_6]$
 - (ii) $[Cr(NH_3)_6][Co(CN)_6]$
- (c) Define bridging ligands with examples. 2
- (d) Discuss linkage isomerism with suitable examples. 2
- (e) What is spectrochemical series? 2

2. (a) Zr and Hf have almost similar properties. Why? 3
- (b) Cu(I) is diamagnetic whereas Cu(II) is paramagnetic. Explain. 2
- (c) Discuss the splitting of d-orbitals in tetrahedral field of ligands. 4
- (d) What is the oxidation state of Os in $K_2[OsCl_5NH_3]$? 1

3. (a) Explain, with suitable examples, the terms inner orbital and outer orbital octahedral complex. 3
- (b) Discuss the electronic configuration of lanthanoids. Why does Eu exhibit +2 oxidation state instead of +3 oxidation state? 2+2
- (c) Discuss the factors on which Δ_0 depend. 3

4. (a) The magnetic moment of $[MnBr_4]^{2-}$ is 5.9 BM. Predict the structure with the help of valence bond theory. $2\frac{1}{2}$
- (b) Which of the following ion will undergo Jahn-Teller distortion and why: 3
 - (i) Low spin octahedral d^6
 - (ii) High spin octahedral d^5 .

- (c) Write down the differences between lanthanide ions and first series of transition metal ions. 2½
- (d) Calculate CFSE for high spin octahedral complex of metal having four electrons in its d-orbitals. 2

SECTION-B

PHYSICAL CHEMISTRY

Answer any two from the following

10×2 = 20

5. (a) $A + A \rightarrow \text{Product}$ 4
 Derive the rate constant for this Second Order Reaction.
- (b) What is Half Life? Derive the Half Life Period of a Second Order Reaction. 1+2
- (c) A First Order Reaction Completed its 75% in 32 minutes. What is the Half Life of the reaction? 3
6. (a) Define Surface Tension. What is its unit? 2+1
- (b) Give the relation between Temperature and Coefficient of viscosity. 2
- (c) Write down the differences between Order and Molecularity. 3
- (d) Give a method to determine the Order of a reaction. 2
7. (a) What are the causes of deviation of gases from ideal behaviour? 2
- (b) Derive the Van der Waal's Equation of state: $\left(P + \frac{an^2}{V^2}\right)(V - nb) = nRT$. 4
- (c) Give the SI units of the Van der Waal's Constants, a and b . 2
- (d) Calculate the Root Mean Square Velocity of CO_2 molecule at 27°C . 2
8. (a) Write down the expression for Maxwell's distribution of molecular velocities, explaining the terms involved. 2
- (b) Discuss the effects of Temperature on the distribution of molecular velocities. 3
- (c) Write short notes on: Collision theory and Transition State theory. 2½+2½

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