

M. SC. IN CHEMISTRY/M. SC.

IN ANALYTICAL

CHEMISTRY

(MSCCHEM/MSCANCHEM)

Term-End Examination

June, 2026

MCH-016 : INORGANIC CHEMISTRY-II

Time : 2 Hours

Maximum Marks : 50

Note : Answer any *five* questions. All questions carry equal marks.

1. (a) Explain why the magnitude of rate constants for water exchange for $[\text{Cr}(\text{H}_2\text{O})_6]^{3+}$ and $[\text{Cr}(\text{H}_2\text{O})_6]^{2+}$ differ by more than 13 orders. 5

- (b) Explain giving suitable reasons, the following graph : 5

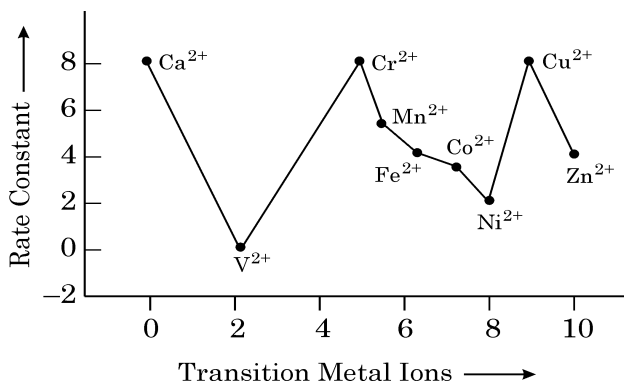


Fig. Rate constant for the exchange of water molecules in the 1st coordination sphere of $[\text{M}(\text{H}_2\text{O})_6]^{n+}$ in aqueous solution.

2. (a) Describe the role of the entering group in the substitution in square planar complexes with a suitable example. 6

- (b) With the help of suitable examples show the trans-effect in octahedral complexes where CO and substituted phosphines are used as ligands. 4
3. (a) With the help of suitable diagrams explain the possible mechanisms by which the bis-chelate complex of type $(A-B)_2M$ may have inversion of configuration. 5
- (b) Explain how the precursor complex is rearranged and electron transfer takes place in an outer sphere reaction. 5
4. (a) Explain the mechanism that may be predicted for the reaction when two complexes form a bridged intermediate. 5

- (b) In order to synthesize coordination compounds how is the outer sphere electron transfer reaction utilized ? Explain. 5
5. (a) Give the relevant equations for the equilibrium constant regarding the oxygen binding by myoglobin. 5
- (b) Explain side-on peroxo bridging in the case of tridentate Cu-ligand in cytochromes. Give suitable diagrams. 5
6. (a) What is the function of nitrogenase ? Which nitrogenase is most abundant ? Name the *two* separately purifiable protein components by nitrogenase. 5

- (b) Draw the structure of catalase, and explain its bonding. 5
7. (a) Write the applications of transition-metal complexes as shape-selective probes. Give any *two* examples. 5
- (b) What is hypokalemia ? How can it be diagnosed ? How is it different from hyperkalemia ? Give the role of beta-blockers in the latter case. 5

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