



‘সমানো মন্ত্র: সমিতি: সমানী’

UNIVERSITY OF NORTH BENGAL

B.Sc. Honours 4th Semester Examination, 2022

CC8-CHEMISTRY

INORGANIC CHEMISTRY

Time Allotted: 2 Hours

Full Marks: 40

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

Answer any four questions of the following

- (a) Addition of excess HCl to pale pink $[\text{Co}(\text{H}_2\text{O})_6]^{+2}$ changes to blue but has no effect on $[\text{Ni}(\text{H}_2\text{O})_6]^{+2}$. Explain with the help of CFSE. 3

(b) Show how the experimental determination of the number of isomers of $[\text{Co}(\text{NH}_3)_4(\text{CO})_2]^{2+}$ would enable one to show that the coordination geometry is octahedral and not trigonal prismatic. 3

(c) What is the difference between inner orbital complex and outer orbital complex? 2

(d) The ‘d’ block elements are generally coloured whereas ‘s’ and ‘p’ block elements are colourless. — Explain. 2
- (a) $[\text{Ni}(\text{NH}_3)_6]^{+2}$ exist but $[\text{Pt}(\text{NH}_3)_6]^{+2}$ does not exist — Explain using CFT. 3

(b) The d – d transition of $[\text{Ti}(\text{H}_2\text{O})_6]^{+3}$ shows a single broad peak with intensity maxima at 20300 cm^{-1} . Calculate CFSE of the complex (Given $1 \text{ kJ / mole} = 83.7 \text{ cm}^{-1}$). 3

(c) In the crystal structure of CuF_2 , the Cu^{+2} is six-coordinate with four F^- at a distance of 1.19 \AA and two F^- at a distance of 2.27 \AA . Explain. 3

(d) A double salt is not a coordination compound — Rationalize. 1
- (a) What is cooperative interaction? The binding of haemoglobin with oxygen is cooperative in nature. Justify. 3

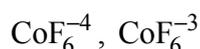
(b) How would you account for the diamagnetic character of oxygenated haemoglobin? 3

(c) Mention the differences between metalloprotein and a metalloenzyme. 2

(d) Describe the role of carboxy peptidase metalloenzyme in biological system. 2
- (a) Why do lanthanides show +3 as a common oxidation state? 2

(b) Explain the separation of lanthanides by ion-exchange method. 4

- (c) Why does Eu exhibit +2 oxidation state instead of +3 oxidation state? 2
- (d) Why the electronic absorption spectra of lanthanides consists of sharp lines rather broad? 2
5. (a) What are apoproteins and holoproteins? 3
- (b) Name a non-heme protein and state it's function. 3
- (c) Transition metal compounds are well known for their complex formation, abilities and catalytic properties — Explain. 3
- (d) Write down the simple schematic diagram of haemoglobin. 1
6. (a) Square planar complexes do not show optical isomerism. — Explain. 2
- (b) Why $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$ is coloured while anhydrous CuSO_4 is colourless? Draw the structure of $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$. 2+2
- (c) State the basic postulates of CFT. 4
7. (a) In the spectrochemical series, H_2O ligand is more stronger than OH^- in terms of field strength. — Explain. 3
- (b) Solution of the compound having molecular formula $\text{PtCl}_2 \cdot 2\text{NH}_3$ on treatment with an excess of AgNO_3 solution precipitates $\text{Ag}_2[\text{PtCl}_4]$ leaving the complex $[\text{Pt}(\text{NH}_3)_4](\text{NO}_3)_2$ in solution. Find the structure of the parent complex and also give the IUPAC name. 3
- (c) Hydrazine does not behave as a chelate ligand — Explain. 2
- (d) Give an example of purely inorganic optically active complex. Draw it's structure. 2
8. (a) Higher oxidation states are more stable in actinoids than in the lanthanoids. — Explain. $2\frac{1}{2}$
- (b) The magnetic moment of a certain octahedral Co(II) complex is $4.0 \mu\text{B}$. What is it's 'd' electron configuration? $2\frac{1}{2}$
- (c) Draw all the possible geometrical isomers of $[\text{Co}(\text{en})(\text{NH}_3)_2\text{Cl}_2]^+$ ion and also indicate the optically active species. 3
- (d) Which one of the following have the higher crystal field splitting parameter? Justify. 2



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