U.G. 6th Semester Examination - 2022

CHEMISTRY

[HONOURS]

Course Code : CHEM-H-CC-T-13

(Inorganic)

Full Marks : 40 Time : $2\frac{1}{2}$ Hours

The figures in the right-hand margin indicate marks.
Candidates are required to give their answers in their own words as far as practicable.

Answer all the questions.

1. Answer any **five** from the following questions: 2×5=10

   a) Starting from K_2PtCl_6 how would you prepare Zeise's salt?

   b) Write down the symmetry operation for S_5 and prove that if S_5 exists, C_5 and σ_h exist by their own right.

   c) Why organomercury compounds are more fatal?

   d) 'Presence of C_6 symmetry element confirms the presence of C_3'—Justify.

   e) What happens when ferrocene reacts with formaldehyde and diethylamine in the presence of acetic acid?

[Turn Over]

   f) Draw the structure of Heme-b group.

   g) Determine the point group of SF_4 molecule showing all the symmetry elements present in it.

   h) Define insertion reaction with example.

2. Answer any **two** questions: 5×2=10

   a) Define dihedral plane of symmetry (σ_d). Determine the symmetry point groups of the following molecules indicating all the symmetry elements and necessary criteria:

   $[Co(en)_3]^{3+}$, BrF_5, PCl_3F_2

   2+3

   b) Define hydroformylation reaction and write down the general reaction indicating catalyst. Show the catalytic cycle for hydroformylation reaction. 1+1+3

   c) i) On the basis of valence electron count (18 electron rule) identify the first row transition metal ions in the following:

   $[M(CO)_7]^+$ and $[(H_3C)M(CO)_5]$.

   ii) What do you mean by hapticity? Give examples of complexes where at least one of the η^2, η^3- type of binding modes is present. 2+(1+2)

d) i) Discuss on the calcium ion transport across the cell membrane indicating the enzyme associated with these process.

ii) Discuss the enzymatic activity of carbonic anhydrase in the formation of bicarbonate from water and carbon dioxide. 3+2

3. Answer any **two** questions: 10×2=20

a) i) Discuss the structure and function of haemoglobin.

ii) What are the similarities and differences between haemoglobin and myoglobin?

iii) What is met-haemoglobin?

iv) What is known as salt-bridge interactions in haemoglobin. (2+2)+(3)+1+2

b) i) Prove that S_2 is nothing but an inversion operation.

ii) Does the mer-$[Ru(CO)_3Cl_3]$ possesses C_3 axis? Give reason.

iii) Write down all the symmetry operation in a regular octahedron

iv) Give example of two molecules of C_s and C_{2h} point groups respectively.

3+2+3+2

c) i) How many Fe-Fe bond do you expect in $Fe_2(CO)_9$? Give Reason.

ii) Discuss the mechanism of Wacker oxidation process catalysed by Pd complexes.

iii) Differentiate between Fischer and Shrock type of metal carbene complexes. .

2+5+3

d) Write a brief notes on:

i) Chelation therapy

ii) Role of Mg^{2+} ion in the activity of Chlorophyll

iii) Anticancer activity of cis-Platin 4+3+3

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