U.G. 6th Semester Examination - 2021

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) Draw the structure of a molecule having C_{3h} point group and write down all the symmetry elements.

   b) Comment on the symmetry of $d_{x^2-y^2}$ orbital.

   c) Write down the symmetry operation of S_3 symmetry element.

   d) Write down names and structures of two platinum complexes that have anticancer activity.

   e) Draw the structure of Tebbe's reagent and comment on its use.

   f) Write down the structure and IUPAC name of $K\left[PtCl_3\left(C_2H_4\right)\right]$.

   g) Draw the structure of ADP.

   h) Explain why CP_2CO is a strong reducing agent.

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

   a) i) Write down all the symmetry operations of C_{2v} point group. Prove that S_2 is nothing but an inversion operation.

   ii) Determine the Point group of $fac-\left[Ru\left(CO\right)_3Cl_3\right]$. (1+2)+2

   b) Draw the structure of chlorophyll. Describe its functions in biology. 2+3

   c) i) What is BAL in chelation therapy? State its chemical composition.

   ii) Why organomercury compounds are more toxic than Hg^{2+} ion? (1+2)+2

   d) i) Ferrocene undergoes electrophilic substitution at a faster rate in comparison to benzene– Explain.

   ii) $Rh\left(Pet_3\right)_3Cl$ is not a suitable Wilkinson's type catalyst for hydrogenation of olefins– Explain. 3+2

3. Answer any **two** from the following questions. 10×2=20

a) i) "C_6- symmetry element confirms the presence of C_3"– Justify.

ii) Find the symmetry point group of cis-ML_4X_2 type of complexes indicating the symmetry elements present.

(L= Monodentate ligand and X=halide)

iii) Define the criteria of optical activity i.e. chirality and achirality on the basis of symmetry elements.

iv) Why molecules having D_n-symmetry have Zero dipole moment? 2+2+4+2

b) i) Which metal is associated with Minamata disaster?

ii) What do you mean by active transport?

iii) Describe the mechanism of O_2 transport by myoglobin.

iv) Discuss the mechanism of anticancer activity of cis-platin.

v) What is the physiological effect of pb? 1+2+3+3+1

c) i) How ferrocene can be prepared? What happens when ferrocene is treated with ethylene (C_2H_4) in presence of anhydrous $AlCl_3$.

ii) Differentiate between Fischer and Schrock type metal carbene complex with example.

iii) Discuss the catalytic cycle of hydrogenation of alkenes using Wilkinson catalyst. (2+2)+3+3

d) i) Describe the functions of Na^+-K^+-ATP-ase in the transport of Na^+ and K^+ ion inside and outside the cell.

ii) Write a note on co-operativity effect during oxygen uptaking by hemoglobin.

iii) Describe the Wacker process of oxidation of ethylene to acetaldehyde with catalytic cycle. 4+2+4

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