

U.G. 6th Semester Examination - 2025

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.*1. Answer any **five** from the following questions:

2×5=10

- a) How many planes of symmetry does a benzene molecule possess? Between BF_3 and CO_2 , which molecule has a centre of inversion? 1+1
- b) Draw sketches to identify symmetry elements present in SO_4^{2-} ion. Determine its point group. 1+1
- c) Write the name and oxidation state of the metal present in Carbonic Anhydrase (CA). 1+1
- d) Which form of mercury (Hg) is most toxic for human and why? 1+1

[Turn Over]

e) Write name of one gold complex used as drug and draw its structure. 1+1

f) Using the 18-electron rule as guide, determine the probable number of CO ligand present in $[\text{Rh}(\eta^5\text{-C}_5\text{H}_5)(\text{CO})_n]$.

g) Write IUPAC names of $[\text{Ni}(\eta^3\text{-C}_3\text{H}_5)_2]$ and $\text{Li}[\text{Mo}(\text{CH}_3\text{CO})(\text{CO})_5]$.

h) Which metal is responsible for Wilson Disease? How chelation therapy is used in this disease? 1+1

2. Answer any two from the following questions:

5×2=10

a) i) Determine point group of SF_6 molecule.

ii) Draw the structure of ATP. 2+3

b) i) Which metal carbonyl between $[\text{Fe}(\text{CO})_4]^{2-}$ and $[\text{Co}(\text{CO})_4]^{2-}$ will be more basic towards proton? Explain your answer.

ii) Give examples of η^2 - and η^4 - metal complexes of 1, 3-butadiene. 3+2

c) i) What happens when $\text{Mn}_2(\text{CO})_{10}$ is treated with Na in THF medium?

ii) Draw the active site structure of Chlorophyll a. 2+3

d) Write down the steps involved in hydroformylation reaction (using $\text{Co}_2(\text{CO})_8$ as catalyst). 5

3. Answer any two from the following questions:

10×2=20

a) i) Determine point group of staggered ferrocene, NHF_2 and SiHClBrF .

ii) Explain the principle of active transport of Na^+ and K^+ across the plasma membrane?

iii) What is Zeise's salt? How it is prepared? 3+5+(1+1)

b) i) How do you prepare ferrocene? What happens when ferrocene is reacted with conc. H_2SO_4 ?

ii) Write the composition of Ziegler-Natta catalyst. What is the use of it?

iii) What is the role of ferredoxin in photosynthesis? (2+2)+(1+2)+3

c) i) A molecule with D_{4h} point group can never be polar- Justify the statement.

- ii) What is the main function of myoglobin? Draw its active-site structure. What is the oxidation state of iron present in myoglobin when it binds to oxygen?
- iii) Briefly discuss the toxic effects of lead in human body. $3+(2+2+1)+2$
- d) i) What is cis-platin? Mention its use.
- ii) How would you prepare $\text{Ni}(\text{CO})_4$?
- iii) Cite an example where CO acts as bridging ligand.
- iv) Which catalyst is used in Wacker Process?
- v) Briefly describe the role of British anti-Lewisite (BAL) to treat poisoning by arsenic. $(1+1)+2+2+1+3$
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