

B.Sc. 6th Semester (Honours) Examination, 2021 (CBCS)

Subject: Chemistry

Paper: CC-13

Time: 2 Hours

Full Marks: 40

Candidates are required to give their answers in their own words as far as practicable.

Answer any eight questions from the following:

8×5 = 40

1. (a) State the function of Zn(II) ion for the hydration of CO₂ by human carbonic anhydrase.
(b) ‘In chlorophyll, the chlorin ring without Mg(II) is fluorescent but after incorporation of Mg(II), it becomes phosphorescent’- explain.
2. (a) What is Wilson’s disease? ‘D-penicillamine (DPA) is clinically recommended for treatment of Wilson’s disease’-explain.
(b) Write the use of *cis*-platin. Give one example of second generation anticancer drug.
3. (a) What are the functions of cytochromes?
(b) What is the fundamental requirement of a metal centre to participate in redox metallo enzymes? Give examples in support of your answer.
4. (a) Write in brief the significance of Na⁺-K⁺ ion pump in biological system.
(b) Define Bohr effect in connection to oxygenation of hemoglobin and myoglobin with proper plot.
5. (a) Point out the structures and bonding of CO in Mn₂(CO)₁₀ and Fe₃(CO)₁₂ complexes.
(b) ‘Nitrosyl stretching frequency in its metal complexes appears at different positions for its different oxidation levels’-explain.
6. (a) Why the complex M(PEt₃)₃(CO)₃ exhibits ν_{CO} at 2090 and 2055 cm⁻¹ where M(PF₃)₃(CO)₃ exhibits ν_{CO} at 1937 and 1847 cm⁻¹? Out of these two phosphines, which one is more π bonding ligand?
(b) What is 18 electron rule? Considering the rule find out the value of ‘n’ in the following complexes: Na₂Fe(CO)_n, W(η^6 -C₆H₆)(CO)_n and Fe(η^6 -Cp)(η^1 -Cp)(CO)_n
7. (a) Write the catalytic cycle for hydrogenation of ethylene catalyzed by (Ph₃P)₃RhCl. Indicate the rate determining step.
(b) Distinguish oxidative addition and reductive elimination with proper examples.
8. (a) How is ferrocene obtained? Draw the structure of ferrocene and ruthenocene with proper confirmation.
(b) What is the catalytic species used in Wacker’s process and how is it generated?
9. (a) Distinguish between kinetic and thermodynamic stability of metal complexes.
(b) Write a short note on ‘Linear Free Energy Relationship (LFER)’.
10. (a) Compare the rate of base hydrolysis of [Co(NH₃)₅Cl]⁺ and [Co(py)₅Cl]⁺ with reason.
(b) ‘Substitution reactions of [Cr(CO)₆] are very slow, consistent with a low spin d⁶ complex, but the isoelectronic complex [V(CO)₅NO] is very reactive’-comment.