



বিদ্যাসাগর বিশ্ববিদ্যালয়
VIDYASAGAR UNIVERSITY
Question Paper

B.Sc. Honours Examinations 2022

(Under CBCS Pattern)

Semester - VI

Subject: CHEMISTRY

Paper : C 13 - T

(Inorganic Chemistry)

Full Marks : 40

Time : 2 Hours

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

The figures in the margin indicate full marks.

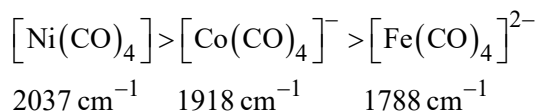
Group - A

Answer any **four** from the following questions :

5×4=20

1. (a) What are the functions of 'Heme' and 'Globin' in Hemoglobin? 2
- (b) How do you prepare ferrocene? Explain the stability of the complex. 3
2. (a) Write short note on Ziegler-Natta catalysis. 2
- (b) Write down the sequence of reactions in 'PS-I' and 'PS-II'. 3
3. (a) Draw the synergic bonding in metal carbonyls. 2
- (b) Which metal ion is present in carbonic anhydrase enzyme? Enumerate the anhydrase activity of this enzyme. 3

4. (a) Comment on the following CO stretching frequencies : 3

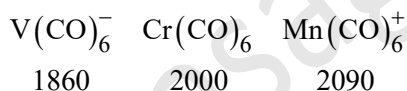


- (b) Explain the principle of chelation therapy with reference to the removal of arsenic. 2
5. (a) How does nature protect Fe(II) in Hemoglobin from its irreversible oxidation in presence of O₂ ? What do you mean by cooperative interaction in O₂ affinity of Hemoglobin? (2+1)
- (b) Low oxidation state organometallic complex tend to obey the 18-electron rule. Justify with example. 2
6. (a) What is nitrogenase ? What is its biological function ? 2
- (b) What is an insertion reaction ? Give two examples for this. 3

Group - B

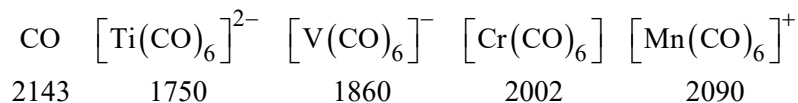
Answer any **two** from the following questions : 10×2=20

1. (a) Comment on the CO stretching frequencies ($\nu_{\text{CO}} \text{cm}^{-1}$) in the following compounds.



- (b) Sketch a catalytic cycle for the hydroformylation of RCH=CH₂ using an organometallic catalyst indicating steps where insertion and oxidative addition reactions occur.
- (c) Starting from (NH₄)₂[PtCl₄] how will you synthesize cis-and trans-platin. 2+4+4=10
2. (a) Show that Rh in $[(\text{CO})_2 \text{Rh}(\mu-\text{Cl})_2 \text{Rh}(\text{CO})_2]$ does not obeys 18-electron rule.
- (b) Based on EAN rule draw the structures of Mn₂(CO)₁₀, Co₂(CO)₈ and Fe₂(CO)₉. Count the number of bridging 'CO' groups.
- (c) Write down the roles of Na⁺, K⁺, Ca²⁺, Mg²⁺, Cu²⁺, Zn²⁺ in life.
- (d) Which one is more toxic -Hg²⁺, CH₃HgCl, (CH₃)₂Hg and why ? 2+3+3+2=10
3. (a) What is Wilkinson's catalyst ? Give the catalytic cycle for the hydrogenation of ethylene molecule using Wilkinson's catalyst.

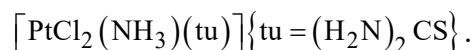
(b) Comment on the CO stretching frequencies ($\nu_{\text{CO}} \text{cm}^{-1}$) in the following compounds:



(c) Using 18-electron rule as guide, find the number 'n' of CO in the following compounds



4. (a) How would you design a synthesis of the complex trans-



(b) Do you expect any rotation of the ethylene molecule in the Zeise's salt without hampering the stability of the complex ? Explain.

(c) Compare the oxygen affinity of Hemoglobin and Myoglobin.

(d) The V-C bond lengths in $\text{V}(\text{CO})_6$ and $\text{V}(\text{CO})_6^-$ are 200 pm and 193 pm respectively. Explain. 2+3+2+3=10