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B.Sc. RNLKWC(A)-/C13T/22

2022

CHEMISTRY

[Honours]

B.Sc. Sixth Semester End Examination - 2022

PAPER - C13T

Full Marks : 40

Time : 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.*

Illustrate the answers wherever necessary.

Group - A

1. Answer any five questions : - 5×2=10
- (i) Give two examples of electron transport protein mentioning their active site structure.
- (ii) What is 'Trigger mechanism'?
- (iii) What is 'insertion reaction'? Give example.
- (iv) $[n^5\text{-CpOs}(\text{CO})_2]_2$ has an Os-Os single bond and obey 18 electrons rule. Find out the value of 'x'.

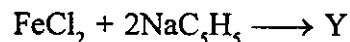
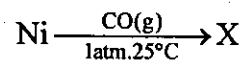
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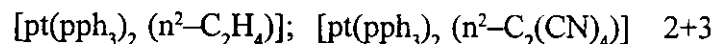
- (v) What is the importance of 'CuCl₂' in 'Wacker process'.
- (vi) Define 'Synergic effect'.
- (vii) What is CFAE?
- (viii) $[\text{NiXL}_5]^+ + \text{H}_2\text{O} \longrightarrow [\text{NiL}_5\text{H}_2\text{O}]^{2+} + \text{x}^-$ is much faster if 'L' is 'NH₃' instead of 'H₂O' – explain.

2. Answer any four questions. 4×5=20

- (i) (a) For the following reaction, find the metal complexes X and Y.



- (b) Comment on the C–C bond length of the olefin in the following complexes.



- (ii) (a) Applying Trans effect prepare cis- and trans-isomers of $[\text{pt}(\text{NH}_3)_2\text{Cl}_2]$ starting from $[\text{ptCl}_4]^{2-}$ and $[\text{pt}(\text{NH}_3)_4]^{2+}$ ions respectively.

- (b) What are the differences between 'pump' and 'channel'?

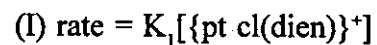
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(3)

- (iii) Draw the active structure of 'deoxy' and 'oxy' Hemocyanin. Compare their color and magnetic property. What is the driving force for oxygen uptaking to deoxy hemo-cyanin. 5

- (iv) (a) $[\text{ptCl}(\text{dien})]^+ + \text{I}^- \longrightarrow [\text{pt I}(\text{diene})]^+ + \text{Cl}^-$ considering the above equation predict the path of the reaction when



K_1, K_2 are the rate constants in two paths.

- (b) Compare the magnetic behaviour of deoxy hemoglobin and oxy-hemoglobin. 3+2

- (v) (a) Match the $[\text{Rh}(\text{CO})(\text{phosphine})_2\text{Cl}]$ complexes with their corresponding CO stretching frequency (γ_0, cm^{-1}).

phosphine	$\gamma_0(\text{cm}^{-1})$
$\text{P}(\text{C}_6\text{F}_5)$	1923
$\text{P}(\text{p-C}_6\text{H}_4\text{F})_3$	1965
$\text{P}(\text{p-C}_6\text{H}_4\text{Me})_3$	1984
$\text{p}(\text{t-C}_4\text{H}_9)_3$	2004

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(4)

- (b) Find the total no. of M–M bond present in $\text{Ru}_3(\text{CO})_{12}$ and $\text{Co}_4(\text{CO})_{12}$.
- (vi) (a) What is meant by active transport in Sodium Potassium pump?
- (b) Give a diagrammatic presentation of the process and explain the mechanism involved. $2+3=5$
- 3. Answer any one question. $10 \times 1 = 10$**
- (i) (a) The Wacker process is used for the synthesis of aldehyde and Ketones from alkenes using a Palladium Catalyst in aqueous medium. How would you prepare acetone from 1-propene? Write a suitable mechanism.
- (b) What will be the expected product from Wacker process be if the reaction is carried out in (I) methanol medium and (II) a hydrocarbon medium.
- (c) What is 'Bohr effect'? Define 'co-operative interaction'. $4+2+4$
- (ii) (a) When one CO group is replaced by pPh_3 in $[\text{Cr}(\text{CO})_6]$, which one of the following statement is true. Give explanation for your answer.

(5)

- (I) The Cr–C bond length increases and Co bond length decreases.
- (II) Both Cr-C and CO bond length decreases.
- (III) The Cr-C bond length decrease and CO bond length increases.
- (IV) Both the Cr-C and CO bond length increases.
- (b) How will you remove lead from human body by chelation therapy?
- (c) Explain why Sq. planar complexes prefer an associative mode of activation?
- (d) Identify A to D
- $$\text{Cp}_2\text{Fe} \xrightarrow[\text{AlCl}_3]{\text{ClCH}_2\text{CH}_2\text{Cl}} \text{A} \xrightarrow{\text{AlCl}_3} \text{B} \xrightarrow{\text{heat}} \text{C} \xrightarrow{\text{Cp}_2\text{Fe}} \text{D}$$
- (e) What is Ziegler–Natta Catalyst. $3+1+2+2+2$