

SRIPAT SINGH COLLEGE

CHEMISTRY (HONOURS)

6th SEMESTER (UG)

Mock Test-2024

Paper: CHEMHT-4-Org

F.M.=20

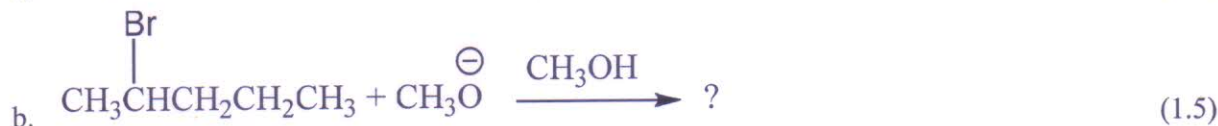
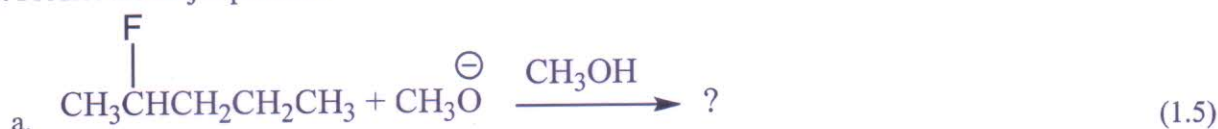
• TIME-1.5 hr

The figures in the margin indicate full marks.

Q1. In case of naphthalene, which bond is shorter between C1-C2 bond and C2-C3 bond? Explain. (1+2)

Q2. Which one is more basic between pyrrole and pyridine? Explain. (1+2)

Q3. Predict the major product.



Q4. Draw the products you expect from conrotatory and disrotatory cyclisation of (2Z,4Z,6Z)-2,4,6-octatriene. (1.5+1.5)

Q5. Which one is more stable between α - and β -anomers of D-glucopyranose? Explain why. (1+2)

Q6.

a. Indicate the peptides which would result from cleavage by the indicated reagent.

Ala-Lys-Phe-Gly-Met-Pro-Ser by CNBr (1)

b. Write down the name and structure of an essential amino acid containing sulphur. (2)

Q7. The rate law for the reaction with HO^- with tert butyl bromide to form an elimination product in 75% ethanol/25% water at 30°C is the sum of the rate laws for the E2 and E1 reactions.

$$\text{Rate} = 7.1 \times 10^{-5} [\text{tert-butyl bromide}] [\text{HO}^-] + 1.5 \times 10^{-5} [\text{tert-butyl bromide}]$$

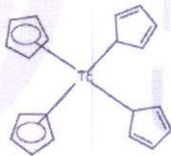
What percentage of the reaction takes place by the E2 pathway under the same condition when $[\text{HO}^-] = 5.0 \text{ M}$? (2)

1

Give the hapticity of the cyclopentadienyl groups in

i) $[\text{Fe}(\text{C}_5\text{H}_5)_2(\text{CO})_2]$ complex (considering it obeys 18 electron rule)

ii)



2

From the given list of ν_{CO} bands, match the correct values to the third row (5d) transition metal carbonyls. Justify in one word
 $[\text{Hf}(\text{CO})_6]^{2+}$ $[\text{Ta}(\text{CO})_6]^-$ $[\text{W}(\text{CO})_6]$ $[\text{Re}(\text{CO})_6]^+$ $[\text{Os}(\text{CO})_6]^{2+}$ $[\text{Ir}(\text{CO})_6]^{3+}$

1977, 2085, 2254, 2190, 1850, 1757

3

The sandwich complex $\eta^5\text{-CpCoC}_n\text{H}_n$ is an 18 electron species, where 'n' is

(a) 6 (b) 4 (c) 3 (d) 5

4

Following the 18-electron rule as guide, determine x, y, z in the following complexes

(i) $[\eta^5\text{CpOs}(\text{CO})_x]_2$ has an Os-Os single bond(ii) $[\eta^6\text{-}(\text{C}_6\text{H}_6)\text{Mn}(\text{CO})_2\text{CH}_3]^y$ (iii) $[\eta^5\text{Cp}(\text{CO})_2\text{Fe}(\text{PhC}=\text{CH})]^z$ (a) $x = 2, y = 1, z = +1$ (b) $x = 1, y = 0, z = +1$ (c) $x = 1, y = 1, z = +1$ (d) $x = 2, y = 0, z = +1$

5

Using 18 electron rule as a guide, indicate the values of m, n and the 3d metal (M) in the following

i) $[(\eta^6\text{-C}_6\text{H}_6)_m\text{Cr}(\text{CO})_n]$ ii) $[\text{Co}(\pi\text{-C}_3\text{H}_5)(\text{CO})_n]$ iii) $[(\eta^5\text{-C}_5\text{H}_5)\text{M}(\text{C}_2\text{H}_4)_2]$

6

Two different structures are consistent with 18 e⁻ rule for $\text{Co}_2(\text{CO})_8$. How will you predict the structures on the basis of IR spectral studies?

7

What is Ziese's salt? Write its chemical formula and draw its molecular structure. What is the bond order of the ethylene molecule bonded to the metal in Ziese's salt. Write its preparation in brief.

8

Draw the structure of ferrocene. What are its two possible conformations? Is it an organometallic compound? Discuss its synthesis.

9

Which of the following complexes will have the shortest C-O bond, $[\text{Ni}(\text{CO})_4]$, $[\text{Co}(\text{CO})_4]^-$ and $[\text{Fe}(\text{CO})_4]^{2-}$ and why?

10

Which of the following complexes will have the shortest C-O stretching frequency, $[\text{Cr}(\text{CO})_6]$, $[\text{V}(\text{CO})_6]^-$ and $[\text{Fe}(\text{CO})_4]^{2-}$ and why? Arrange the following in ascending order of C-O stretching frequency with proper justification, M-CO , $\text{M}_2\text{-CO}$ and $\text{M}_2\text{-CO}$.

11

Using 18 electron rule tell the number of M-M bonds and bridging CO ligands in the following complexes: $\text{Co}_2(\text{CO})_8$, $\text{Fe}_2(\text{CO})_9$, $\text{Fe}_3(\text{CO})_{12}$ and $\text{Ir}_3(\text{CO})_{12}$.

12

Using 18 electron rule tell the number of CO ligands in the following complexes: $\text{Fe}(\text{CO})_n(\text{NO})_2$, $[\text{Fe}(\eta^3\text{-allyl})(\text{CO})_n\text{Cl}]$ and $\text{HCo}(\text{CO})_n$.

13

Explain why despite being a 17 electron species $\text{V}(\text{CO})_6$ does not dimerise.

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6th SEMESTER (UG)

INTERNAL EXAMINATION-2024

Paper: CHEMHT-4-Org

F.M. =10

TIME-1 hr

The figures in the margin indicate full marks.

1. Draw the pi molecular orbitals of 1,3,5 hexatriene. (3)

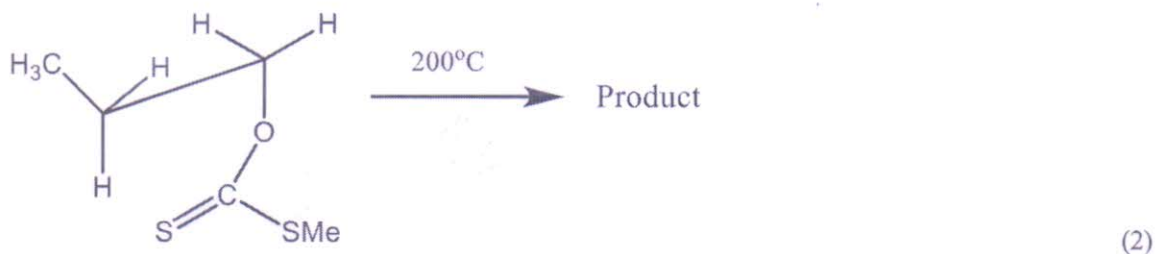
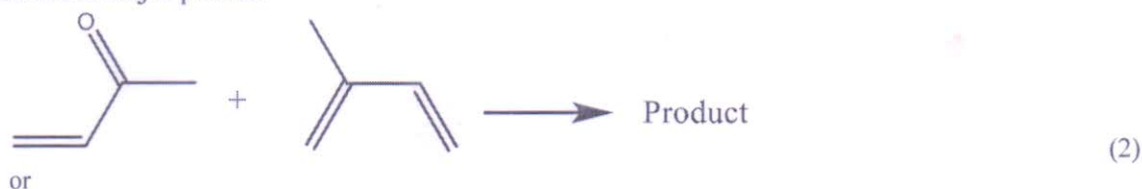
or

Addition of water has a large accelerating effect on the Diels Alder reaction. Explain why. (3)

2. S_N1 reaction gives product with (1)

- Inversion only,
- Retention only,
- Racemisation with some excess amount of inverted product,
- None of the above.

3. Predict the major product

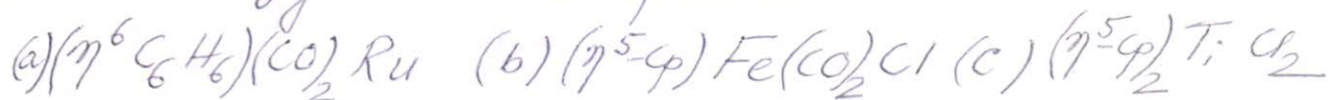


4. What is epimer? Illustrate with example. (2)

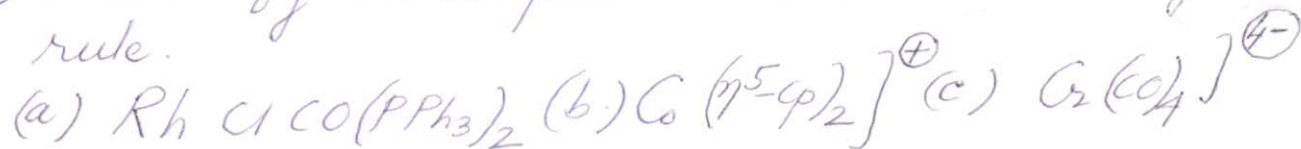
5. What is mutarotation? Explain with example. (2)

Q.1 Answer any ten (10) questions. $[1 \times 10 = 10]$

(i) Identify the 18 e species -

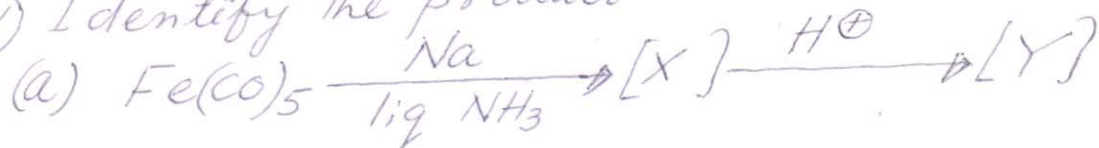


(ii) Identify the complex which does not obey 18e rule.



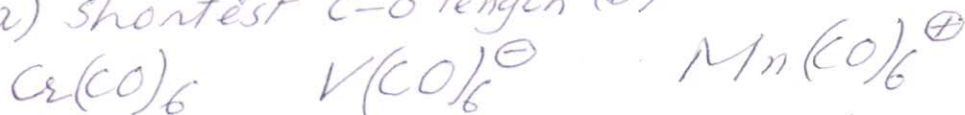
(iii) Comment: 17 e species is oxidizing agent.

(iv) Identify the product -



(v) Identify -

(a) shortest C-O length (b) lowest ν_{CO} (c) highest $\nu_{\text{M-C}}$

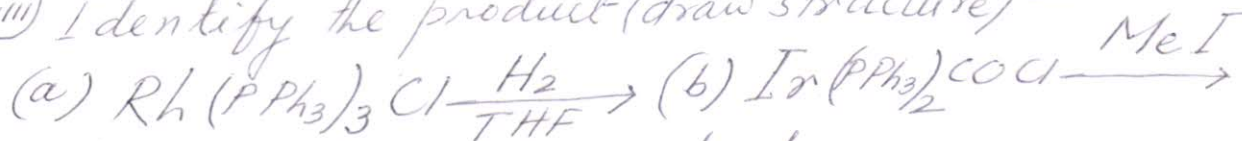


(vi) Mn does not form a mononuclear carbonyl. Why?

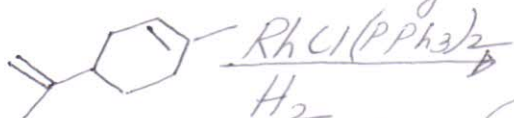
(vii) Find out M-M bond order in -



(viii) Identify the product (draw structure) -



(ix) Predict the major product



(x) Draw the structure (gas and solid phase) of ferrocene.

(xi) Ferrocene behaves as a Lewis base - Comment.

(xii) Define hapticity

(xiii) Explain why Cp_2Co is a strong reducing agent.

(xiv) Differentiate between Fischer and Schrock carbene.

(xv) How would you prepare Zeise's salt from K_2PtCl_6 .

(xvi) Define insertion reaction.