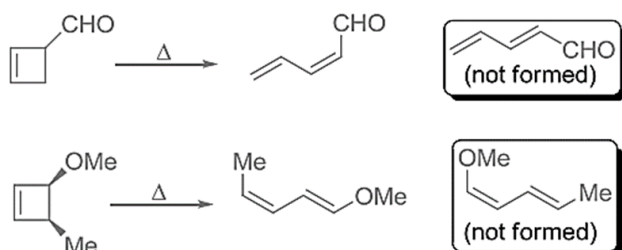


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PG CBCS
M.SC. Semester-III Examination, 2021
CHEMISTRY
 PAPER: CEM 302
(ORGANIC SPECIAL)

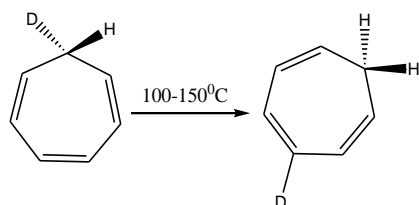
Full Marks: 40**Time: 2 Hours****Answer any FOUR questions from the following:****4 X 10=40**

1. Write down the Woodward-Hoffmann selection rules for H-and C-migration in sigma-tropic reaction. Draw the pi-molecular orbital diagram of cyclopentadienyl radical indicating symmetry of molecular orbitals, electron occupancy, node of molecular orbital wave functions, SOMO and LUMO and explain the feasibility of [1,5] hydrogen shift of cyclopentadiene system in thermal condition using the above pi-molecular orbital. Define supra and antara facial processes in sigmatropic reactions. 4+4+2
2. (a) Write short notes on **any two** of the following the following: 6
 (i) Ene reaction (ii) Claisen rearrangement (iii) Oxy-cope rearrangement
 (b) Explain selective formation of products in the following electrocyclic reactions: 4

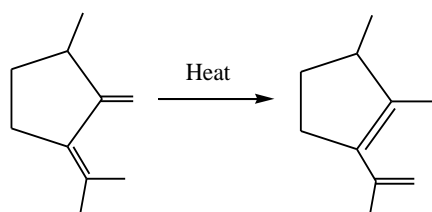
3+3+4

3. Suggest mechanism for following pericyclic reactions: 2.5x4

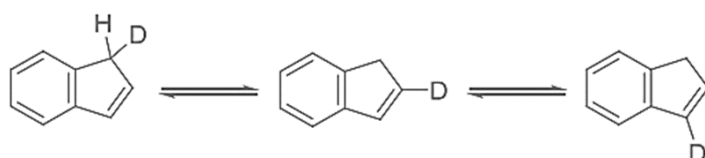
(a)



(b)

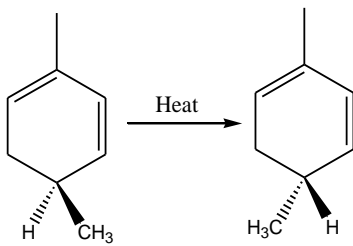


(c)

**(P.T.O.)**

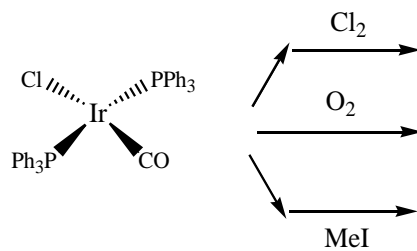
(2)

(d)



4. (a) Describe oxidative addition and reductive elimination reaction in organometallic compounds. 3+3

(b) Give the products of following reactions: 3

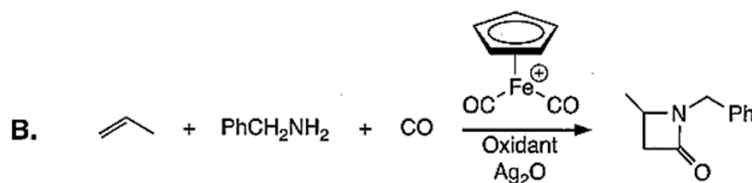
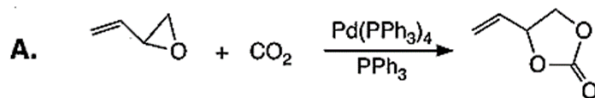


(c) Why ferrocene is more stable than cobaltocene? 1

5. (a) Write short note on the following: 6

(i) Wilkinson Catalyst (ii) Fluxional molecule

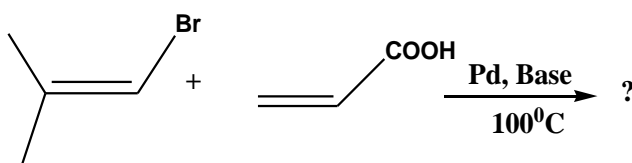
(b) Propose mechanism for the following reactions. The first step of which is catalytic.



4

6. (a) Write the product and suggest the mechanism of following reactions: 4x2

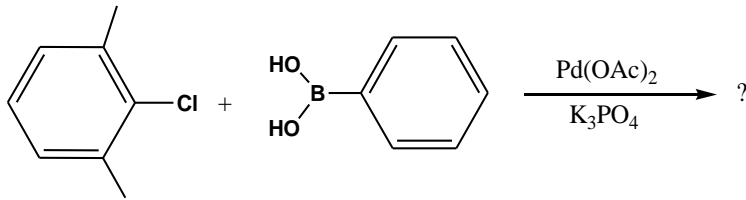
(i)



(P.T.O.)

(3)

(ii)

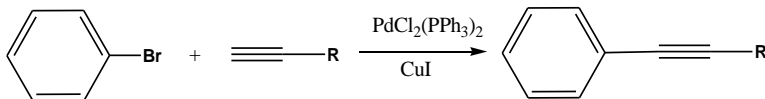


(b) Why TMEDA (tetra methyl ethylene diamine) is required for dilithiation of ferrocene? 2

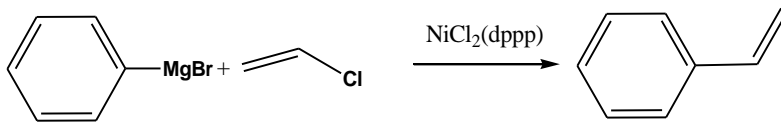
(a) Suggest mechanism of following reactions:

3x3

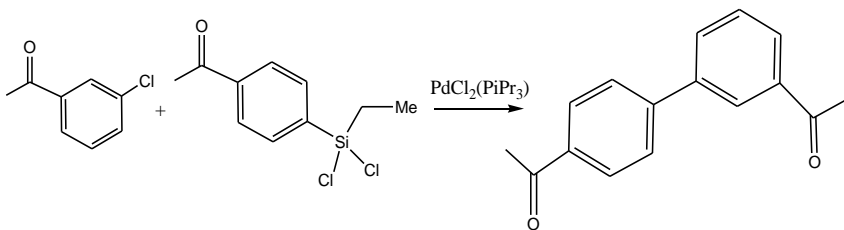
(i)



(ii)



(iii)



(b) What is the oxidation state of iron in ferrocene?

1

8. (a) Draw the molecular orbital diagram of ferrocene.

6

(b) Define sigmatropic shift of order $[i,j]$ with an example. Show that $[1,5]$ -H suprafacial shift is allowed by the Woodward-Hoffmann rule for thermal pericyclic reactions with the help of Frontier molecular orbital diagram.

4

9. Derive the Hammett equation (LFER). What are reaction constant and substituent constant?

6+2+2

(P.T.O.)

(4)

10. (a) The ρ value for the benzylation of *m*- and *p*-substituted anilines is -2.69 and ρ value for base catalysed hydrolysis of *m*- and *p*-substituted ethyl benzoates is +2.51. Explain its significance. 3+3

(b) Describe the Taft modification of Hammett equation. What is Yukawa-Tsuno equation?

2+2
