PG Odd Semester (CBCS) Exam., December—2017

CHEMISTRY

(3rd Semester)

Course No. : CHMCC–302

(Organic Chemistry—III)

Full Marks : 70

Pass Marks : 28

Time : 3 hours

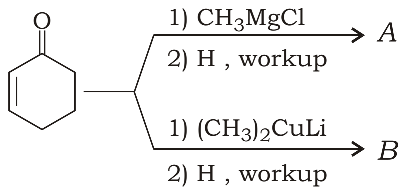
The figures in the margin indicate full marks for the questions

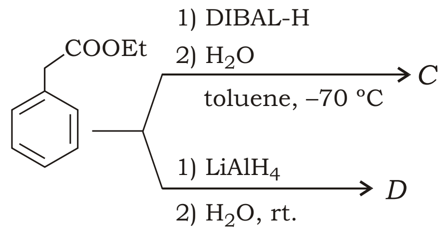
Answer **five** questions, selecting **one** from each Unit

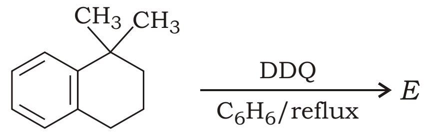
UNIT—I

1. (a) Write the laboratory synthesis of homocuprate. Explain, why organocopper reagents are weaker nucleophile in comparison to organocuprate reagents. 2+2=4

(b) Predict the product(s) and show the mechanism : 4+4+2=10

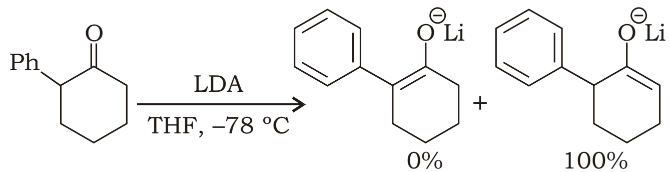
(i) 

(ii) 

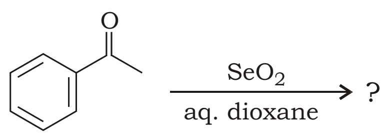
(iii) 

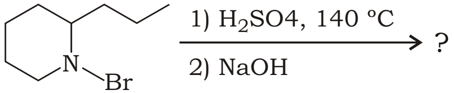
2. (a) What is umpolung? Write the mechanism for the synthesis of 1-acetyl-2-cyclohexen-1-ol from appropriate reagents utilizing umpolung phenomenon. 2+2=4

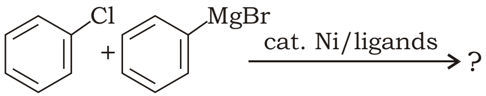
(b) Suggest the mechanism with appropriate transition state for the following conversion : 4



(c) Predict the product(s) and provide plausible mechanism : 2×3=6

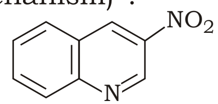
(i) 

(ii) 

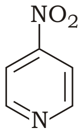
(iii) 

UNIT—II

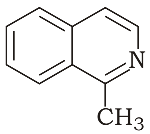
3. *(a)* Strategies the synthesis of the given transformations to ensure no side-product (provide the reaction and mechanism) : 2×3=6

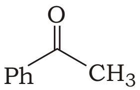
(i) 

from quinoline

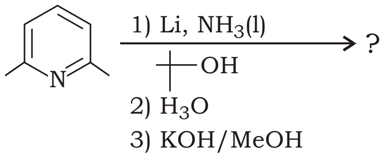
(ii) 

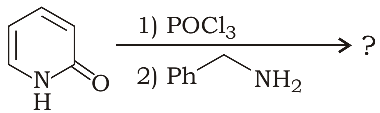
from pyridine

(iii) 

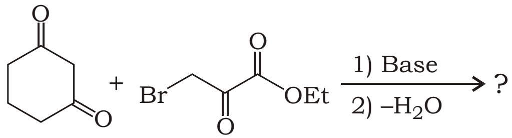
from 

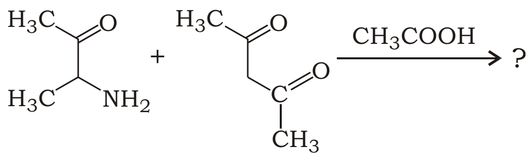
(b) Suggest products for the following reactions with mechanism : 2×2=4

(i) 

(ii) 

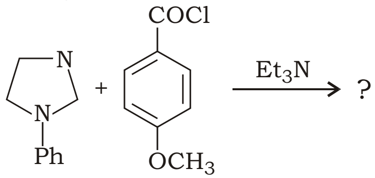
(c) Predict the products with mechanism : 2×2=4

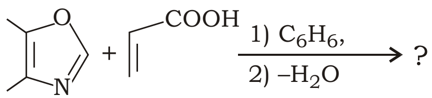
(i) 

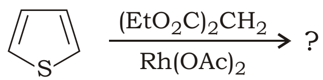
(ii) 

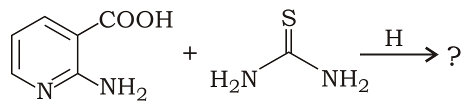
4. *(a)* Discuss the synthesis of 1,3-thiazole derivative from thioamide and an -haloketone. 2

(b) Predict the products and depict the mechanism : 2½×4=10

(i) 

(ii) 

(iii) 

(iv) 

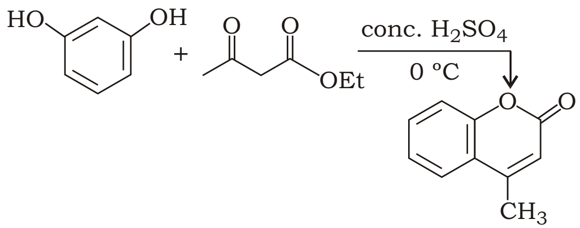
(c) Provide a strategy to control the production of 3-nitroquinoline from quinoline (with mechanism). 2

UNIT—III

5. *(a)* What do you mean by 'atom economy' of a reaction? How does it differ from E-factor? Calculate atom economy for the following reactions : 1+1+2+2=6

(i) $CaCO_3 \longrightarrow \underset{\text{desired product}}{CaO} + CO_2$

(ii)



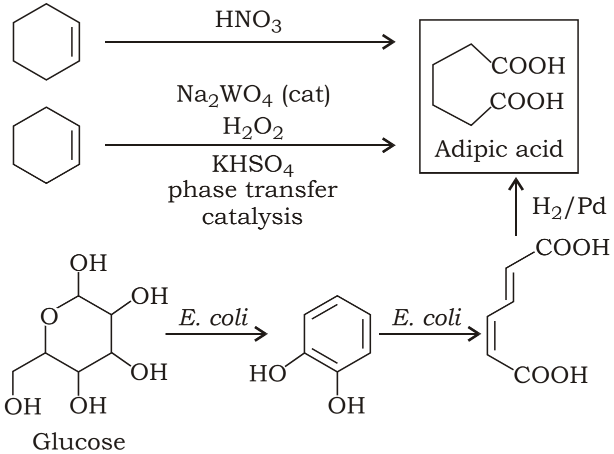
(b) How does application of microwave in chemical reactions make it 'greener'? 2

(c) Compare the following reactions and find the greener method amongst them (with justification) : 4

Scheme I

Scheme II

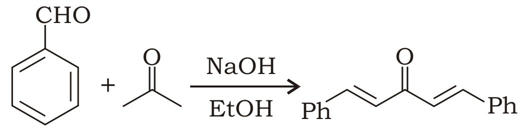
Scheme III



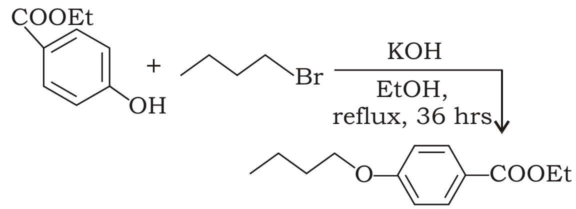
(d) Provide mechanism of phase transfer catalysis. 2

6. *(a)* Provide green alternative to the following reactions with justification in support of the alternative method : 2×2=4

(i)

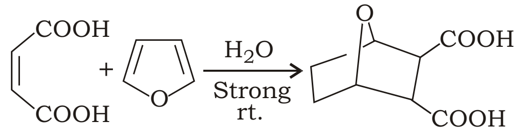


(ii)

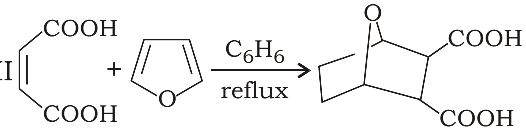


(b) Find the 'greener' route with justification : 3×2=6

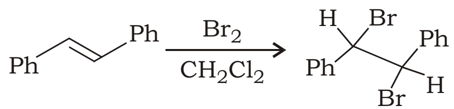
(i) Scheme I



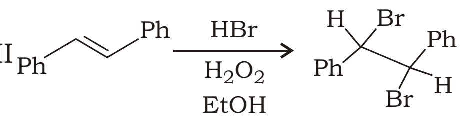
Scheme II



(ii) Scheme I



Scheme II



(c) How does reduction of derivatization make a chemical process green? 2

(d) How is ultrasound employed in chemical synthesis? 2

UNIT—IV

7. (a) Provide the scheme of synthesis of testosterone from cholesterol. 3

(b) What are cardiac glycosides? How do cardiac glycosides function? 1+2=3

(c) What is digitoxin? Draw the structure of digitoxin. Provide benefit and toxicity of digitoxin. 1+2+2=5

(d) Provide the semisynthesis of progesterone from the steroid diosgenin. 3

8. (a) Provide the synthetic routes for (–)-ephedrine from phenylalanine. 3

(b) State the occurrence and general properties of estrone. Provide an efficient total synthesis of ( ) estrone. 3+3=6

(c) Draw the absolute configuration of cholesterol and provide the natural synthesis of cholesterol. 1½+3½=5

UNIT—V

9. (a) Provide an example of an 'in-line displacement mechanism' to depict the chemical/biochemical interaction between D-glucose with ATP and ADP. How does AMP respond to D-glucose? 2½+½=3

(b) Why can the RNA be hydrolyzed 3 billion times faster than DNA? Provide the reaction pathway. ½+2½=3

(c) What is translation? Explain the role of codons in this process. 1+5=6

(d) Provide the structure (with absolute configuration) of cephalin. What is its role? 1+1=2

10. (a) Provide the scheme of Merrifield peptide synthesis with suitable example. 4

(b) Describe the mechanism of action of the enzyme lysozyme. 4

(c) Discuss the process of replication of DNA. 3

(d) Derive Michaelis-Menten equation of enzymatic reaction. 3

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