



Date:  
Registration number:

ST. JOSEPH'S COLLEGE (AUTONOMOUS), BENGALURU-27

M.Sc. CHEMISTRY -IV SEMESTER

SEMESTER EXAMINATION: APRIL 2022

(Examination conducted in July 2022)

**CHDE 0318 – GREEN CHEMISTRY**

Time- 2 ½ hrs

Max Marks-70

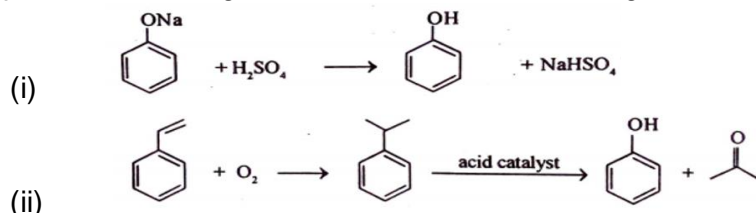
This question paper contains **three** printed pages and **three** parts

**PART A**

Answer any **six** questions. Each question carries **two** marks.

**(2 X 6 = 12)**

1. Compare the following two reactions and assess for greenness.



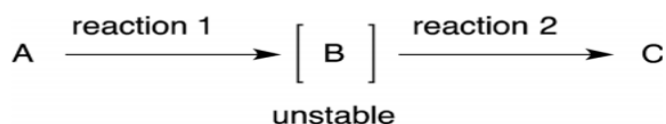
- What is an auxiliary substance? What are the disadvantages of using dichloromethane, one of the most highly used solvents in industry?
- As grinding apparatus, 'mortar-pestle' or 'ball-mill', which is better and why?
- In organic reactions, what are the problems faced due to reactants present in two different phases?
- Give an example of Barton reaction.
- What is Robinson annulation reaction?
- What do you mean by Suzuki coupling reaction? Give an example.
- Give the structural representation of Merrifield resin.

**PART B**

Answer any **four** questions. Each question carries **twelve** marks.

**(12 x 4 = 48)**

- (a) Explain the cavity theory of ultrasound reactions. What are the advantages of organic reactions under ultrasound conditions? Give examples of esterification reactions under this condition.  
(b) Give the synthesis of (-) oseltamivir using Michael addition, which belongs to type 1 of one-pot synthesis, as shown below.



(c)  $\tan \delta$  values of a few organic solvents are given below. How do these values explain suitability of solvents for reactions under microwave conditions? **(6+3+3)**

Solvent	$\tan \delta$
Hexane	0.020
Dichloromethane	0.042
Chloroform	0.091
Acetic acid	0.174

10. (a) What is a crown ether, cryptate and a cryptand? Draw the structures of (i) [12]-thiacrown-3 (ii) [2,2,2] cryptand and (iii) cryptate of ii.

(b) How are phase transfer catalysts classified? Between n-butylammonium bromide and methyl trioctyl ammonium bromide, which offers better lipophilicity?

(c) How do you prepare polymer bound peracid? Give any two of its applications. **(6+3+3)**

11. (a) What are the desired properties of polymer supports? What are the advantages of using polymer supported synthesis?

(b) How are oligosaccharides synthesised using polymer supports?

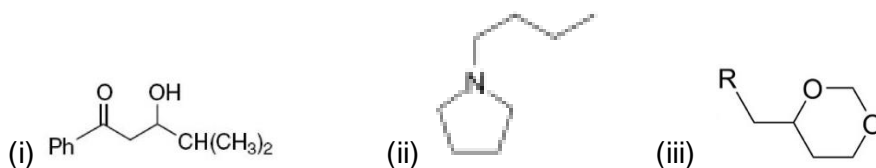
(c) What are the products formed by oxidation of p-toluidine under mechanochemical method? Discuss the selectivity of products using various oxidising agents in the presence of  $\text{Al}_2\text{O}_3$  and  $\text{SiO}_2$  as milling auxiliary. **(4+4+4)**

12. (a) Write the mechanism for Sharpless asymmetric epoxidation.

(b) Explain the greener aspect of Mannich reaction.

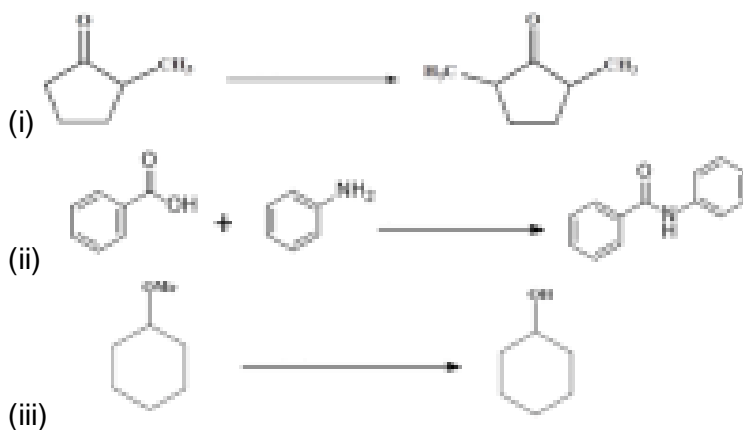
(c) What is the use of DDQ in organic synthesis? Explain using suitable example. **(4+4+4)**

13. (a) How would you synthesize (i) using Mukaiyama reaction, (ii) using Hofmann-Löffler- Freytag reaction, and (iii) using Prins reaction?



(b) Discuss the role of substituents present of aryl ring undergoing birch reduction. Write the general mechanism for the reaction. **(9+3)**

14. (a) Provide the reagent/s for the following reactions:





(b) Discuss any two applications of lead acetate in organic synthesis. Give suitable examples.

(c) Discuss the role of Woodward and Prevost reagents in organic synthesis. **(4+4+4)**

### PART-C

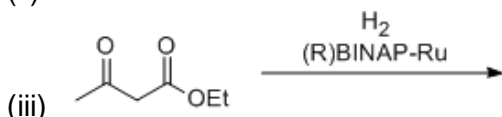
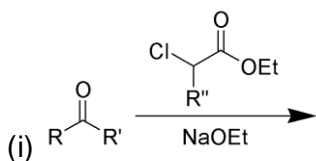
Answer any **two** questions. Each question carries **five** marks.

**(5 x 2 = 10)**

15. (a) Carbonyl compounds undergo reduction under acidic or basic conditions as given below. Identify the reagents for the above conditions and name the reactions involved.



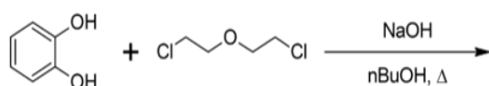
(b) Complete the following reactions:



**(2+3)**

16. (a) In solid phase peptide synthesis, the yields are often low. This can be overcome by reducing the number of amino acids with multiple functional groups as one of the methods. How does this method help?

(b) What is the probable product of the following reaction?



**(3+2)**

17. (a) In a one-pot synthesis of an organic compound, the solvents employed were acetic acid (bp 118°C) for the 1<sup>st</sup> step and acetone (bp 56°C) for the 2<sup>nd</sup> step. Is the choice of solvents justified? Analyse and explain.

(b) Nitroalkanes give carbonyl compounds under certain set of reaction conditions **A**. While changing the conditions to **B**, it produces  $\beta$ -hydroxy nitro compounds. Identify the conditions **A** and **B** and write the reactions to show the formation of products (no mechanism is required).

**(2+3)**

X-----X

