

Time: 2hrs

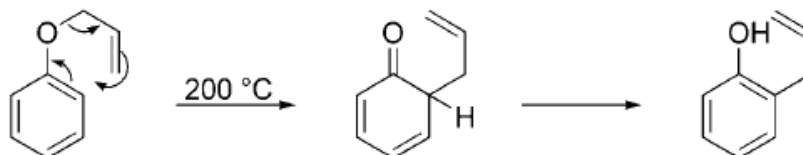
Total Marks: 40

**N.B.: 1. All Questions are compulsory****2. Figures to right indicate full marks****1. Answer the following question****(10)**

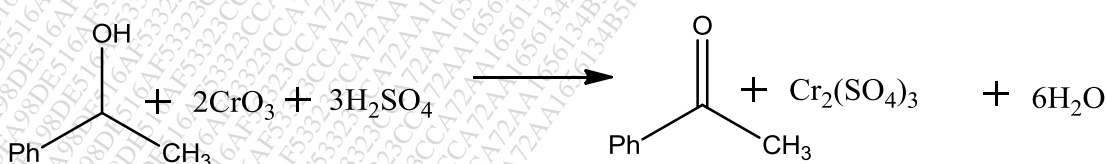
- Define the term: Atom Economy
- Give one example of an Atom Efficient Reaction.
- Fill in the blank:  
Calculation of \_\_\_\_\_ concentrates more on the waste generated than on the green factors.
- Give an example of a major process used for chemical recycling of post-consumer PET waste.
- Give the names of two EMS Frameworks.
- Give two examples of heterogeneous catalyst.
- Name the biocatalyst used for synthesis of 6-APA from Penicillin G.
- Zeolite beta is employed as a catalyst in a fixed-bed operation, for acetylation of anisole. State True or False and correct if necessary.
- Give examples of two Supercritical fluids.
- Phase transfer catalysts are preferred for biphasic reactions. Justify the statement with example.

**2. (a) Identify which of the following reactions are Atom Efficient Reactions and why?****(02)**

i



ii

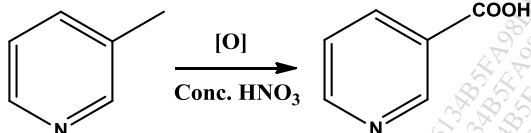
**(b) Write a note on Chemical Treatment of Waste****(02)****(c) Give examples of EMS frameworks and outline the key aspects on any one.****(02)****3. (a) Outline traditional route and greener catalytic route for any one of the following reactions****(02)**

- Benzene to Hydroquinone
- Synthesis of Caprolactam

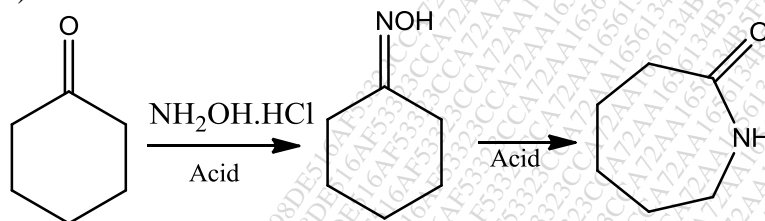
**(b) Enlist the ideal properties of a 'Green Solvent'.****(02)****(c) What is Biomass? How is it used in the production of renewable energy?****(02)**

4. (a) Differentiate between Conventional and Microwave heating (02)  
 (b) What is process intensification? (02)  
 (c) Discuss the green production of Vitamin C or Naproxen with reactions (02)
5. (a) Compare the homogenous and heterogeneous acylation reaction of anisole. (02)  
 (b) Supercritical water is a green solvent. Explain (02)  
 (c) Identify waste producing non-green component in the following reactions and suggest a suitable green alternative for the same with justification. (02)

(i)



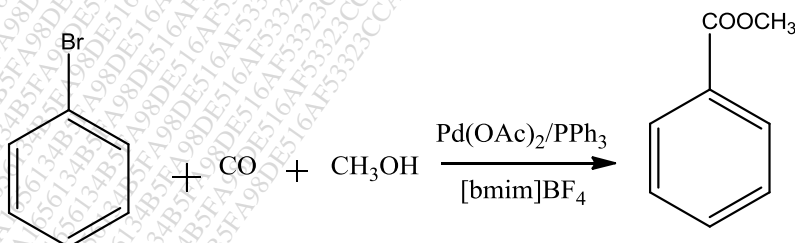
(ii)



6. (a) Match the Columns (02)

i	Ultracentrifugation	I	Biotreatment of Waste
ii	Neutralization Techniques	II	Polyethylene Terphthalate
iii	Cold Digestion	III	Physical Treatment of Waste
iv	Methanolysis	IV	Chemical Treatment of Waste
		V	Incineration

- (b) 'Electrochemistry is an emerging green technology'. Explain (02)  
 (c) With respect to the reaction given below answer the following questions (Any Two) (02)



- (i) Identify the solvent used in above reaction.  
 (ii) Mention the type of solvent used in the reaction.  
 (iii) Give the example and structure of one such type of solvent.

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