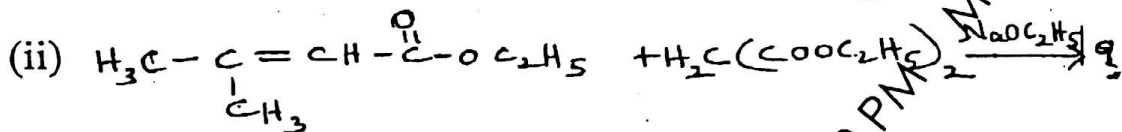
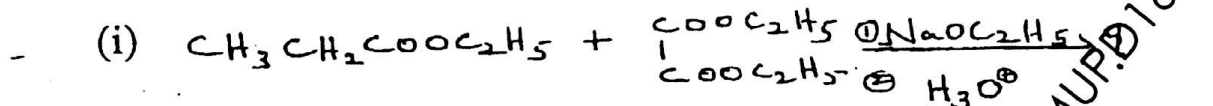


- N.B.:** (1) All questions are compulsory.
 (2) Figures to the right indicate full marks.

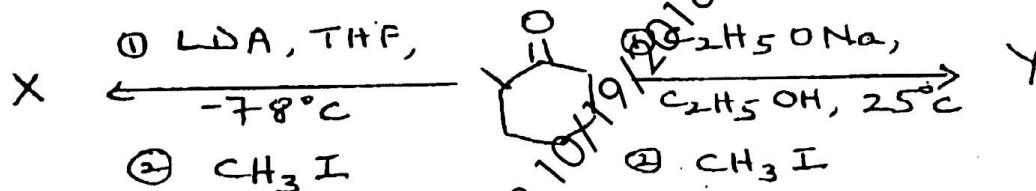
1. (A) Answer any two of the following:-

(a) Write the mechanism of Mannich reaction and give one additional example of the reaction.

(b) Predict the products and name the following reactions :-



(c) Give the structures of X and Y and explain their formation under the given reaction conditions:

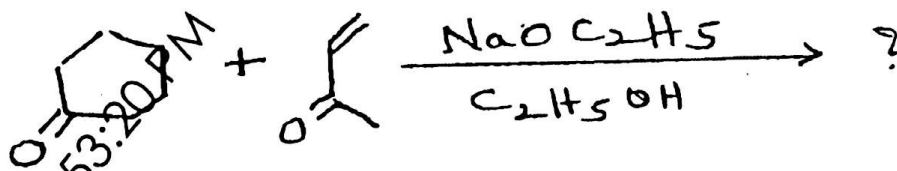


(d) Complete the following reaction, name it and explain the mechanism:-

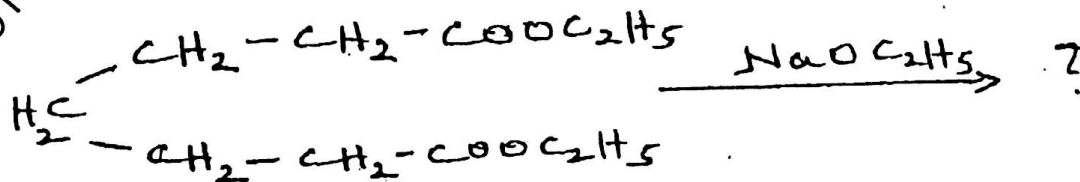


(B) Answer any one of the following :-

(a) Complete the following reaction, name it and give its mechanism:-



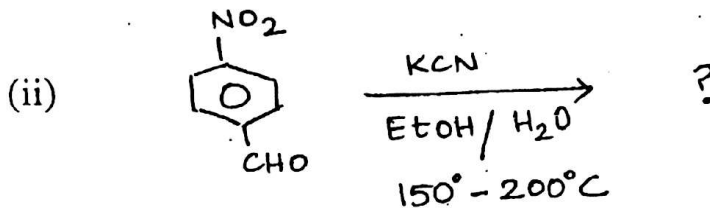
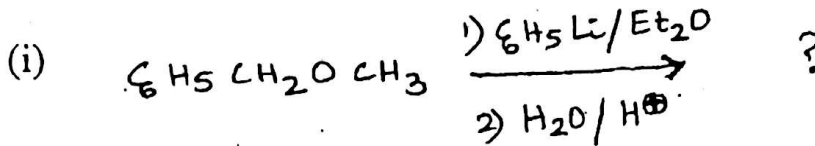
(b) Complete the following reaction and explain its mechanism:-



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2. (A) Answer any two of the following :-

(a) Complete the following reactions and name them :-



(b) Explain the mechanism of Favorskii rearrangement with an example.

(c) Give the mechanism for the following conversions :-

(i) Alkyl sulfoxide \rightarrow α -acyloxythioether

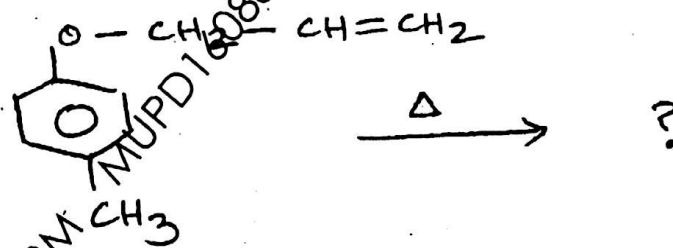
(ii) Cyclobutylmethylamine \rightarrow Cyclopentanone

(d) Give complete equations for the following rearrangements :-

(i) Brook (ii) Dienone-Phenol

(B) Answer any one of the following :-

(a) Complete the following reaction and give its mechanism :-



(b) Giving suitable examples, compare Schmidt and Lossen rearrangement with respect to the following :-

(i) Substrate and (ii) Reagent used.

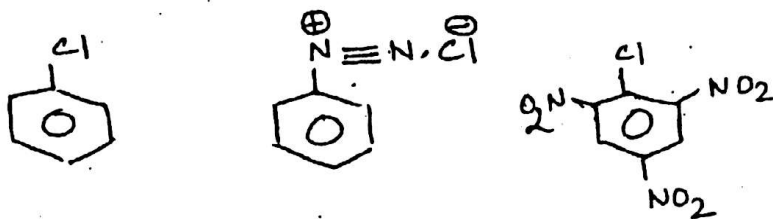
Which of the two is synthetically more useful and why?

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- 3 -

3. (A) Answer any two of the following:-

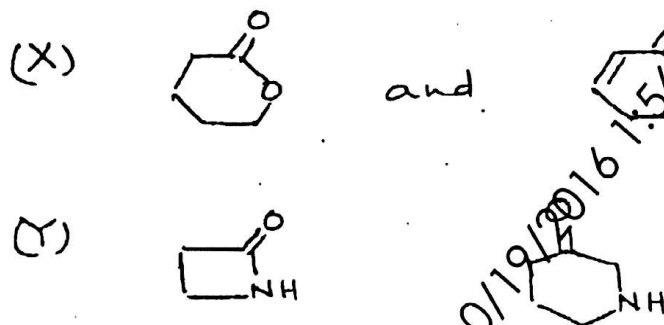
(a) Which of the following is the most likely to undergo nucleophilic substitution through 'Benzyne mechanism'? Explain. 4



(b) Comment on the stereochemistry of S_N1 reactions. 4

(c) Answer the following :- 4

(i) How will you distinguish between the following pairs on the basis of IR spectroscopy?



(ii) Calculate λ_{\max} for the given structure :-



(d) Explain the following :- 4

(i) Aniline absorbs at 280nm but in acidic solution the band shifts to 203nm.

(ii) Ethanol is used as a solvent in UV but not in IR spectroscopy.

(B) Answer any one of the following:-

(a) Give the mechanism of an ester hydrolysis via the tetrahedral intermediate. 4

(b) Explain the following:- 4

- (i) Fundamental bands and overtones with respect to IR spectroscopy.
 (ii) Effect of conjugation on the position of UV bands.

4. (A) Answer any two of the following :-

(a) What is vicinal coupling in NMR spectroscopy? Mention two factors that affect the vicinal coupling constant. 4

(b) Explain the fragmentation pattern of the following in mass spectrometry: 4

- (i) Benzoic acid (ii) Ethyl methyl ketone

(c) On the basis of NMR, how will you distinguish between: 4

- (i) cis and trans alkene (ii) equatorial and axial protons in cyclohexane

(d) Explain the following terms in mass spectrometry: 4

- (i) Retro Diels Alder reaction
 (ii) Nitrogen rule

(B) Answer any one of the following :-

(a) Spectral data of an organic compound having molecular formula $C_8H_8O_2$ is as follows:- 4

UV ; λ_{max} : 229 nm and 257 nm

IR ; ν cm^{-1} : 1710 cm^{-1}

NMR ; δ ppm : 7.2 (5H, s), 3.5 (2H, s), 10.1 (1H, s)

mass ; m/z : 136, 91, 45

Deduce the structure of the given compound.

(b) Explain the following in mass spectrometry: 4

- (i) Ortho effect
 (ii) McLafferty rearrangement

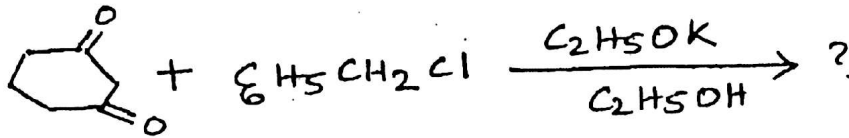
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RM-Con. 1558-16.

5. Answer any four of the following:-

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- (A) What is haloform reaction? Explain the mechanism with a suitable example.
 (B) Predict the product and write the mechanism of the following reaction :-

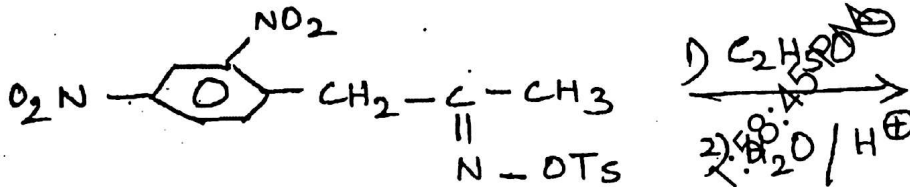


(C) What is olefin metathesis?

Give equations to represent the following:-

- (i) Cross metathesis (ii) Ring closure metathesis

(D) Complete the following reaction and give its mechanism :-



- (E) Using IR spectroscopy, how will you distinguish between cis - and trans-cinnamic acid?
 (F) Explain the term 'Ambident Nucleophile' using relevant examples.
 (G) Acetylenic proton appears much down field in PMR spectrum. Explain.
 (H) What is the characteristic effect in mass spectra of compounds containing one bromine atom.