

Birla Institute of Technology and Science, Pilani (Pilani Campus)

1st Semester 2022-2023, Comprehensive Examination

Course: Organic Chemistry-I

Part-A (Close Book)

Duration: 90 minutes

Course Number: CHEM F212

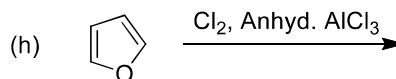
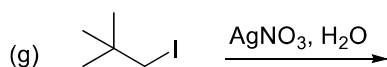
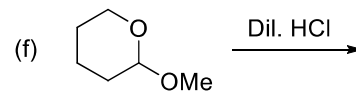
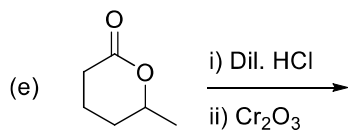
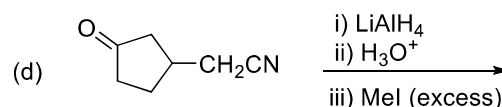
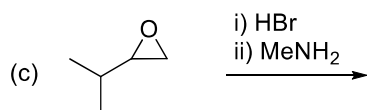
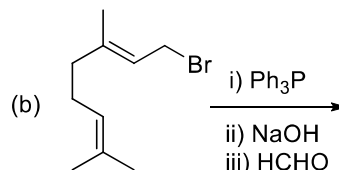
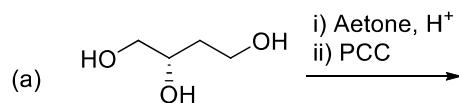
Maximum Marks: 40

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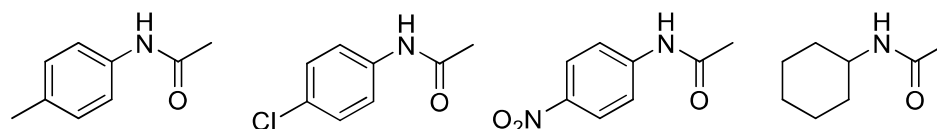
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Q1. Write product of the following reactions.

8

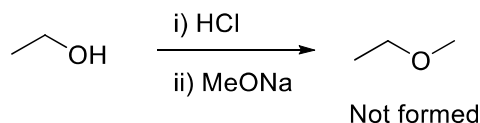


Q. 2 (a) Arrange following amides in order of decreasing reactivity towards acid catalyzed hydrolysis. 2



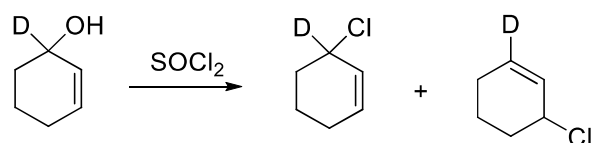
(b) Treating $\text{CH}_3\text{CH}(\text{Br})\text{CH}_3$ with alcoholic KOH produces 1-propene and 2-propanol. When $\text{CD}_3\text{CH}(\text{Br})\text{CD}_3$ is taken in place of $\text{CH}_3\text{CH}(\text{Br})\text{CH}_3$, rate of formation of alcohol is unchanged while the rate of formation of alkene is slowed by a factor of 7. Explain 2

(c) What is wrong with following proposed synthesis of ethyl methyl ether? 1.5



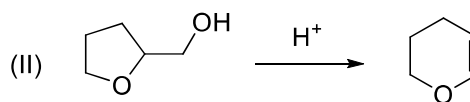
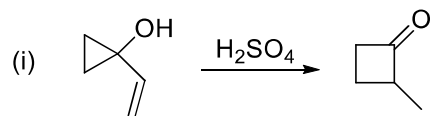
(d) Write structure of all the possible major products formed when 1-bromo-2-methylcyclohexane is heated in methanol. 2.5

Q3. (a) Explain formation of the products in the following reaction. 3



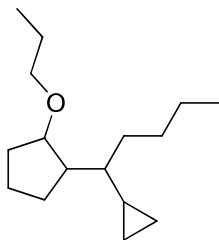
(b) Propose mechanism of the following reactions.

4



Q4 (a) Develop synthesis of the following compound using cyclopentanol, alcohols containing no more than four carbon atoms and any common reagents and solvents.

6



(b) Provide at least two different approaches to prepare 3-hexanone using formaldehyde as source of carbonyl carbon.

4

Q5 (a) Draw Howarth projection of D-glucose. D-Glucose can be obtained from (-)-arabinose, draw the Fischer projection of (-)-arabinose.

4

(b) Draw the structure of a disaccharide (in chair form) in which one unit of α -D-galactose is linked with β -D-mannose via 1-4-glycosidic linkage. Comment on the ability of this disaccharide for reduction of silver ions.

3

END

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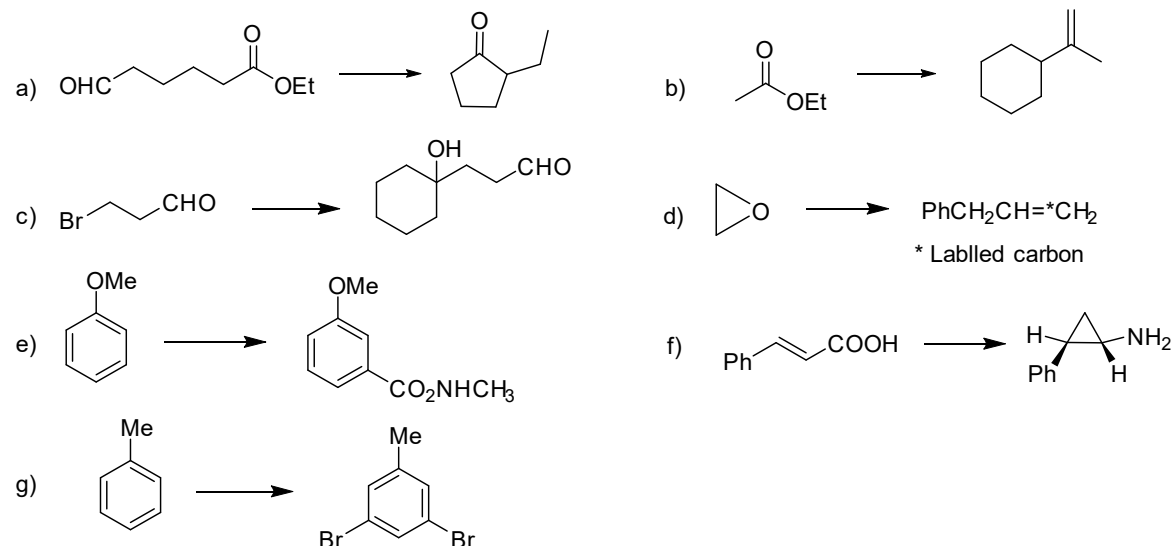
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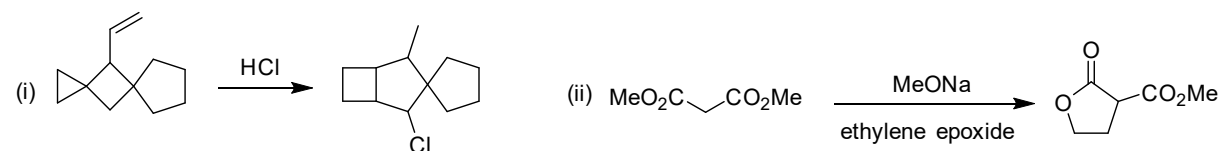
Q1 Write reagents and conditions for sequential reaction to prepare following compounds (any six) from corresponding given substrates? 3 × 6 = 18



Q2 (a) A chemist isolated an organic compound with molecular formula C₆H₄Br₂. On careful nitration of his compound he isolated three isomers of formula C₆H₃NO₂Br₂. Propose structure of the original compound and three isomers obtained on nitration. 2

(b) 2,4-Dichlorophenoxyacetic acid (2,4-D) is a herbicide for killing broadleaf weeds. Propose a synthesis of 2,4-D from benzene, chloroacetic acid and any other necessary reagents and solvents. 2

(c) Propose mechanism of each of the following reactions. 2 × 3 = 6



Q3 (a) The Hammett plot for the reaction of *p*-substituted benzaldehyde with NH₂NHCONH₂ to produce ArCH=NHNHCONH₂ at pH 4 is given in figure 1. Propose mechanism of this reaction and explain the observed Hammett plot based on this mechanism. 4

(b) Propose at least four different experiments to support that the substitution of benzyl bromide in ethanol to give ethyl benzyl ether proceeds by S_N1 mechanism. Explain, how the outcome of each experiment will support the proposed mechanism. 8

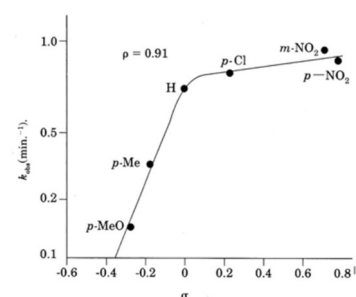


Figure 1

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