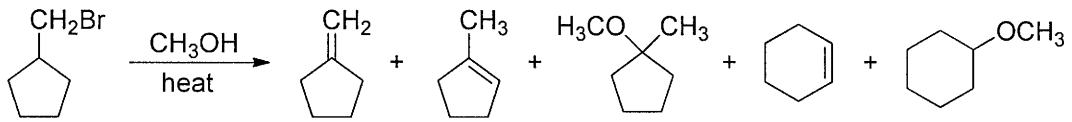
（102）輔仁大學碩士班招生考試題目	考試日期：102 年 3 月 8 日第 1 節
	本試題共 4 頁（本頁為第 1 頁）

科目：有機化學　　系所組：化學系碩士班甲組

1. Give a definition and an example for the following terms (10 points)

   a) Diastereotopic protons
   b) Hyperconjugation
   c) Zaitsev's rule
   d) Kinetic resolution
   e) The Dieckmann condensation

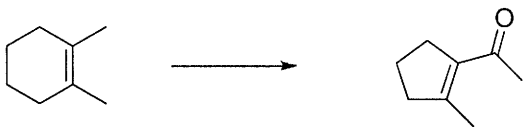
2. Solvolysis of bromomethylcyclopentane in methanol gives a complex product mixture of the following five compounds. Propose the mechanisms to account for these products. (10 points)



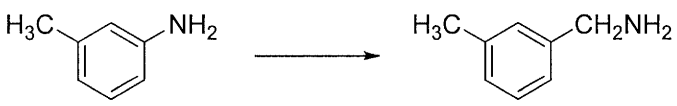
3. Provide the necessary reagents and conditions for the following transformation. (12 points)

1)

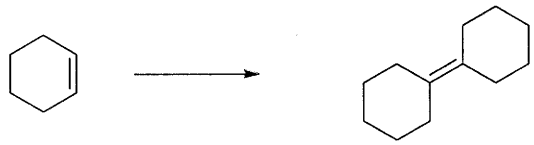
2)



3)



4)



4. Oxidation of alcohols is very important in Organic Chemistry. Oxidation of a primary alcohol initially forms an aldehyde, which is easily oxidized further to give a carboxylic acid. Oxidation of a secondary alcohol gives a ketone. However, a tertiary alcohol is resistant to oxidation. Use chromic acid reagent to show why and clearly show the reaction mechanism. (8 points)

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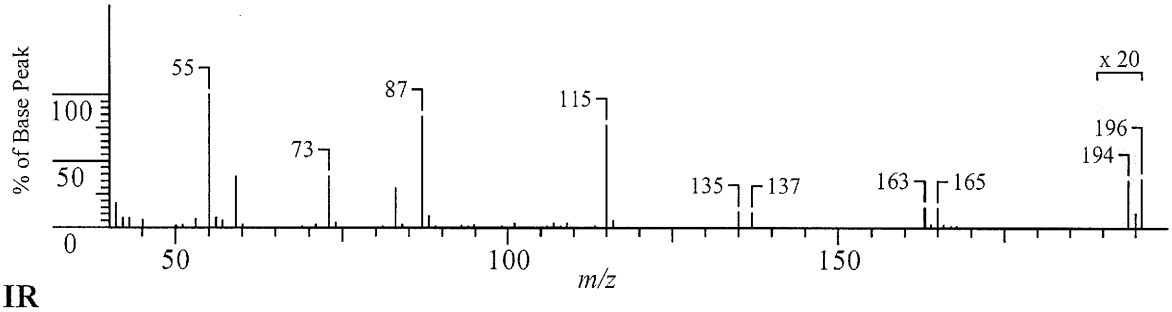
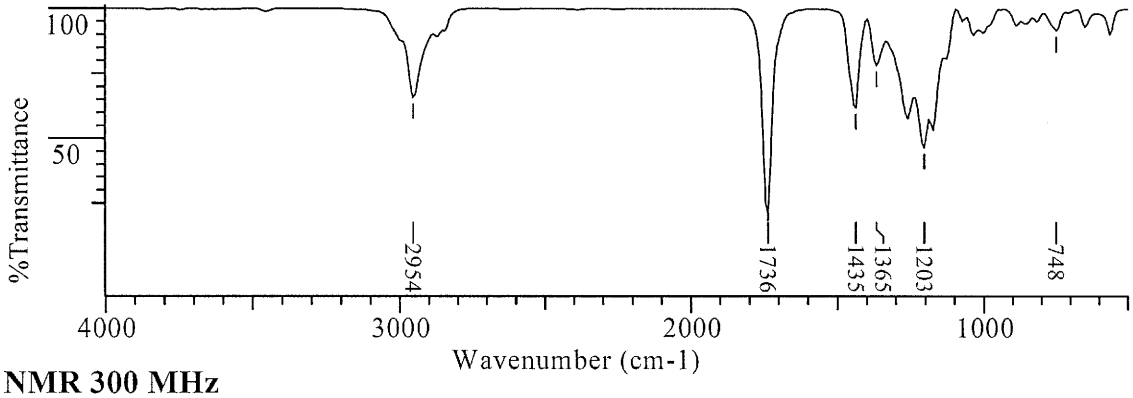
5. With the following spectra, try to identify the molecular structure as much as you can. (10 points)

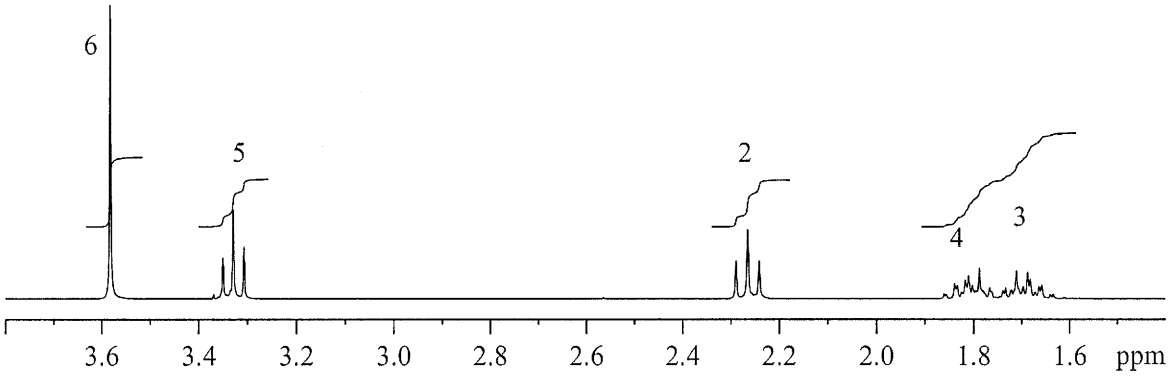
MASS



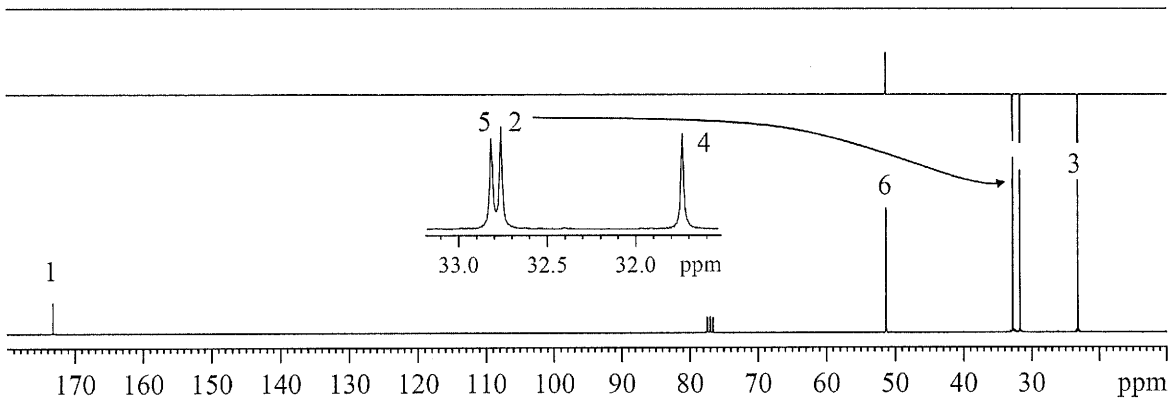
IR



^{1}H NMR 300 MHz



^{13}C/DEPT NMR 75.5 MHz



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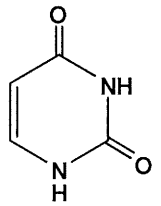
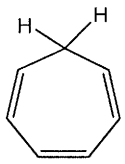
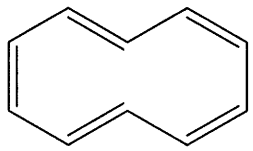
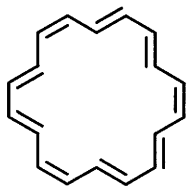
6. Which of the following compounds show aromatic properties? (4 points)

(a) (b) (c) (d)

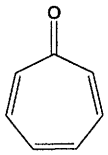




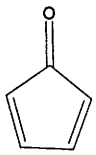




7. Give an explanation. For the following observation. (4 points)



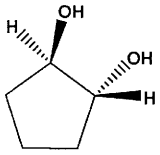
stable compound

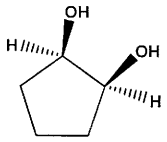


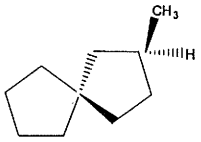
very reactive compound

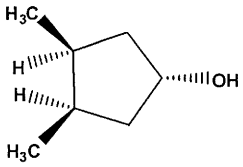
8. Which of the following structures represent meso compounds? (4 points)

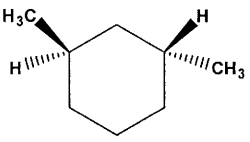
(a) (b) (c) (d) (e)



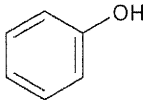


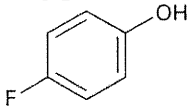


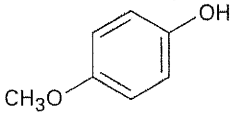


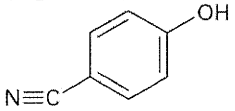


9. Rank the following phenol in order of increasing acidity. (4 points)



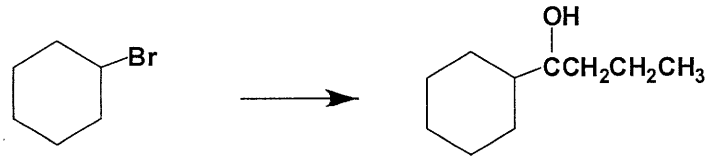






10. Complete the following synthetic transformations. Show all the regents needed and all the intermediate products obtained) (16 points)

(A)



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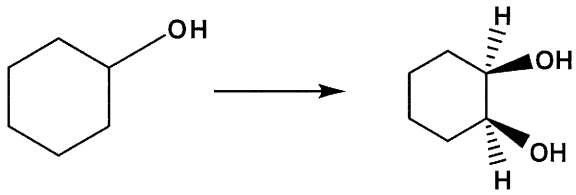
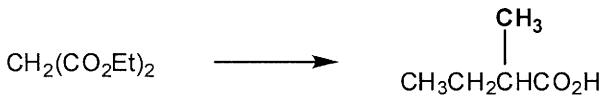
(B)



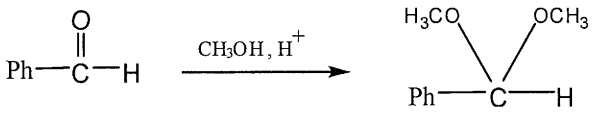
(C)



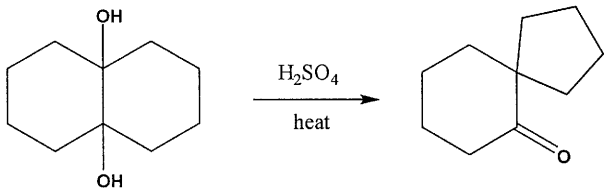
(D) *trans*-2-nonene → *cis*-2-nonene

11. Provide a detailed, stepwise mechanism for the following reaction. (8 points)

(A)



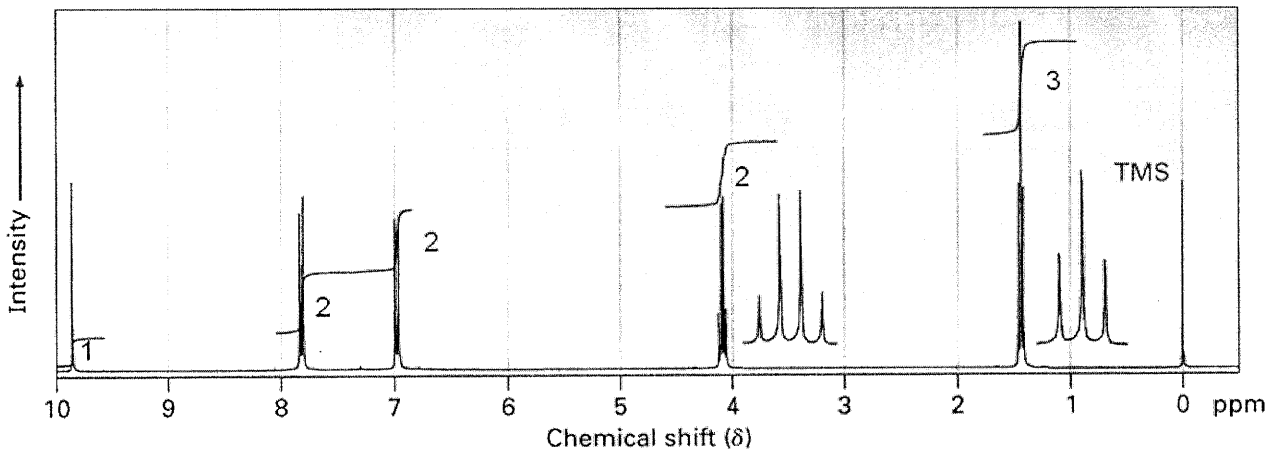
(B)



12. Propose a structure for the following compound whose ^{1}H NMR and IR spectra is shown. (10 points)

$C_9H_{10}O_2$

IR: 1500, 1600, 1695, 2700 , 2800, 3080 cm^{-1}



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