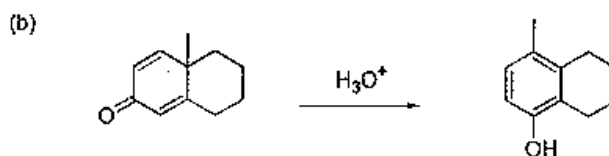
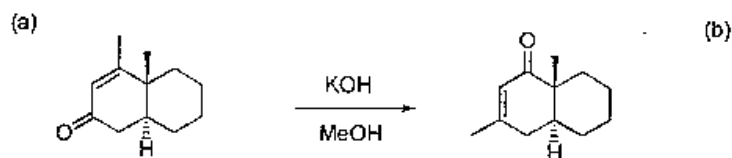


# 國立中央大學八十八學年度碩士班研究生入學試題卷

所別： 化學研究所 不分組 科目： 有機化學 共 2 頁 第 1 頁

1. Draw a complete mechanism for the following reactions by using Curved-arrow formalism and intermediates. (20% and 10% for each)



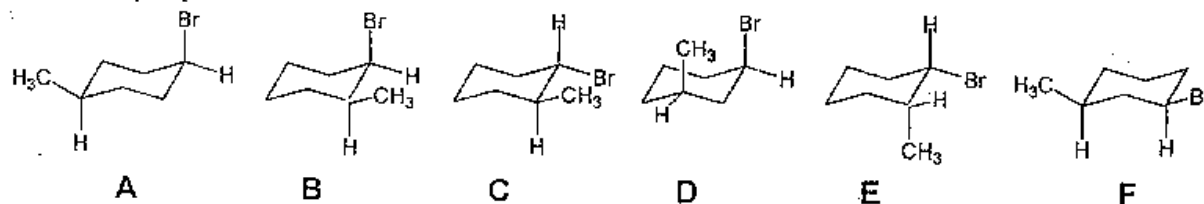
2. Propose a structure for a compound that has the following spectra. (10%)

$^1\text{H NMR}$ :  $\delta$  1.28 (3H, t,  $J = 7$  Hz), 3.91 (2H, q,  $J = 7$  Hz), 5.0 (1H, d,  $J = 4$  Hz), 6.49 (1H, d,  $J = 4$  Hz).

IR: 3100, 1644(s), 1104, 1166, 694(s)  $\text{cm}^{-1}$ ; no IR absorption in the range 700-1100 or above 3100  $\text{cm}^{-1}$ .

Mass spectrum:  $m/z = 152, 150$  (equal intensity, double molecular ion).

3. Look carefully at the compounds shown below and use the letters of compounds to answer the following questions. There might be more than one answer per question.



a) Which of the compounds are enantiomers? (4%)

b) Which of the compounds are diastereomers? (4%)

c) Which of the compound(s) are constitutional isomers of B? (4%)

d) Which of the compounds are conformers? (4%)

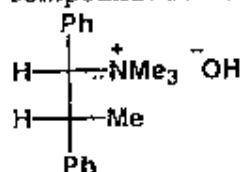
e) Which of the compounds are achiral? (4%)

4. Provide an explanation for the following observations.

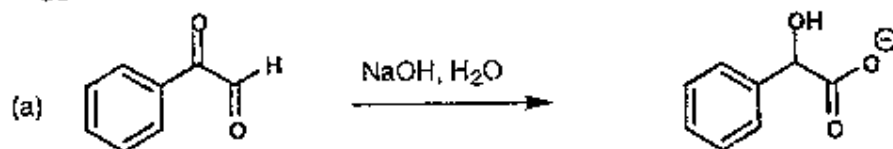
(a) Friedel-Crafts acylation with  $\text{RCOCl}/\text{AlCl}_3$  becomes very slow if only a catalytic amount of  $\text{AlCl}_3$  is used. **More than one equivalent** must be used to drive the reaction forward and to obtain good yields of product. (4pts)

(b) Sodium borohydride is used to reduce cyclohexanone to cyclohexanol. However, sodium hydride can not be used. (4pts)

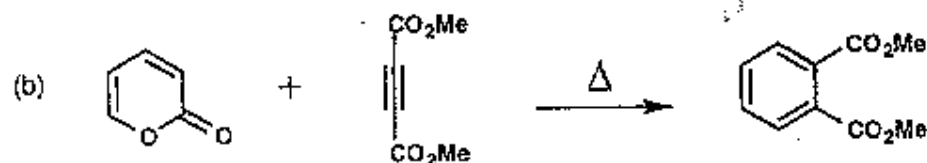
5. What product (including stereochemistry) is expected from the Hofmann elimination of the following compound? Please explain your reason. (8 pts)



6. Suggest a mechanism for the each of the following reactions.



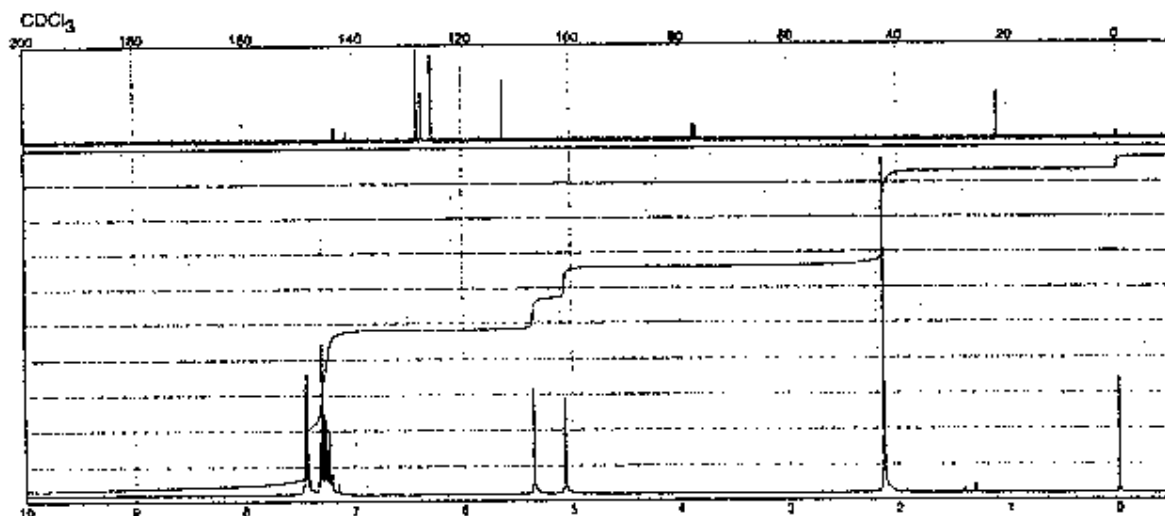
(8 pts)



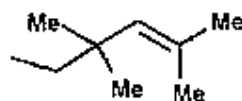
(8 pts)



7. Compound A,  $\text{C}_9\text{H}_{10}$ , is prepared by a Wittig reaction. Identify the structure of compound A from its  $^{13}\text{C}$  and  $^1\text{H}$  NMR spectra given below. (4 pts) Please write the equation for the preparation of compound A by a Wittig reaction and propose a mechanism for the formation of this product. (6 pts)



8. Outline a synthesis of the following compound from the indicated starting material and any other reagents. (8 pts)



from

4-methyl-3-penten-2-one