

## 國立臺北科技大學 109 學年度碩士班招生考試

系所組別：3710 分子科學與工程系有機高分子碩士班甲組

## 第一節 有機化學 試題

第 1 頁 共 2 頁

**注意事項：**

1. 本試題共二大題，共 100 分。
2. 不必抄題，作答時請將試題題號及答案依照順序寫在答案卷上。
3. 全部答案均須在答案卷之答案欄內作答，否則不予計分。

## 一、選擇題 (單選題，每題 4 分，共 5 題，合計 20 分)

1. Dehydration of 1-butanol with concentrated sulfuric acid at 140 °C results in the formation of mainly trans-2-butene. According to these results, which of the following conclusions might be valid?

- (A) The reaction undergoes an E2-type elimination mechanism.  
 (B) The reaction follows a new mechanism involving the formation of a carbanion intermediate.  
 (C) The reaction undergoes an E1-type elimination mechanism in conjunction with a hydride shift.  
 (D) The reaction undergoes an E2-type elimination mechanism in conjunction with a methyl shift.  
 (E) The reaction undergoes an E1-type elimination mechanism with no shifting.

2. Which of the following alkyl halides reacts most rapidly via an  $S_N1$  solvolysis reaction in hot methanol?

- (A) 1-iodohexane.  
 (B) 1-fluorohexane.  
 (C) (*R*)-2-bromohexane  
 (D) iodocyclohexane  
 (E) 1-iodo -1-methylcyclohexane.

3. Consider the constitutional isomers 2-methylbut-1-ene, 2-methylbut-2-ene, and 3-methylbut-1-ene. When each of these alkenes is subjected to catalytic hydrogenation ( $H_2$ , Pt), a single product results. Which of the following best describes the structural relationship among these products?

- (A) The products are cis-trans isomers.  
 (B) The products are identical.  
 (C) The products are constitutional isomers.  
 (D) The products are enantiomers.  
 (E) The products are diastereomers.

4. Which of the following reagents can be used to convert cyclopentanol to cyclopentane?

- (A) TsCl, pyridine followed by  $LiAlH_4$ .  
 (B)  $Na_2Cr_2O_7$ ,  $H_2SO_4$ .  
 (C)  $NaBH_4$  followed by  $H_3O^+$ .  
 (D)  $H_2SO_4$ , heat followed by  $H_2$ , Pt.  
 (E) both A and D.

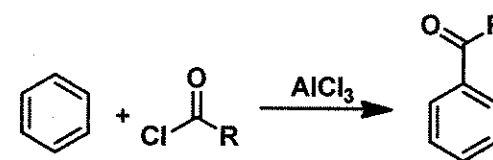
5. In the chromic acid oxidation of alcohols, the chromium is:

- (A) oxidized from  $Cr^{+3}$  to  $Cr^{+6}$ .  
 (B) reduced from  $Cr^{+6}$  to  $Cr^{+3}$ .  
 (C) oxidized from  $Cr^{+6}$  to  $Cr^{+3}$ .  
 (D) reduced from  $Cr^{+3}$  to  $Cr^{+6}$ .  
 (E) none of the above.

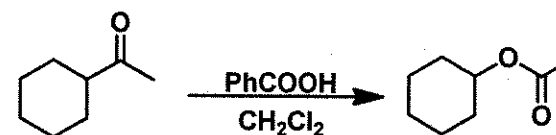
## 二、簡答題(每題 20 分，共 4 題，合計 80 分)

1. 請推導下列人名反應的作用機制。(每小題 10 分，共計 20 分)

(A) Friedel-Craft reaction. (10 分)

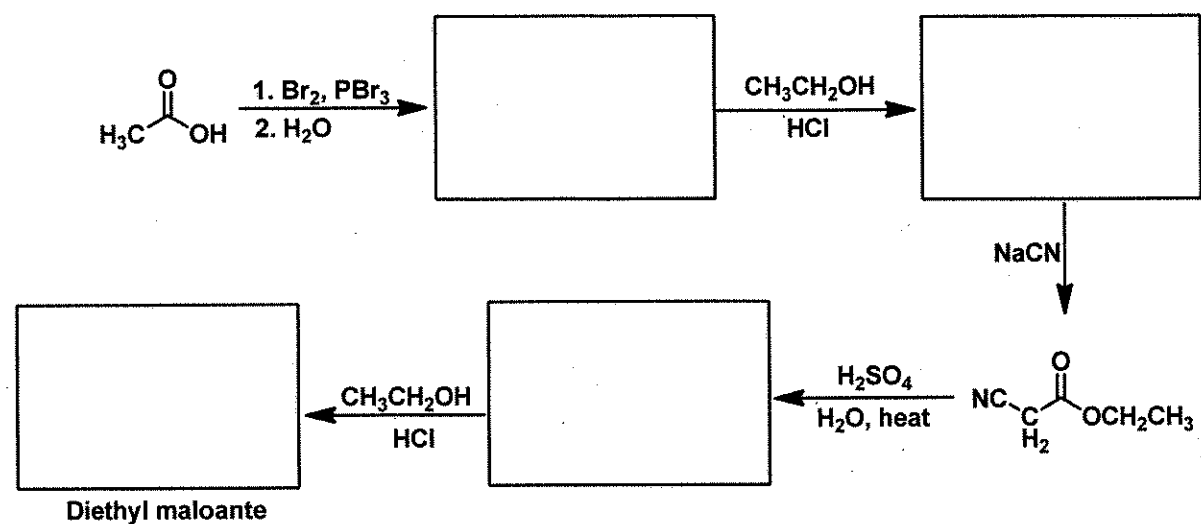


(B) Baeyer-Villiger oxidation. (10 分)

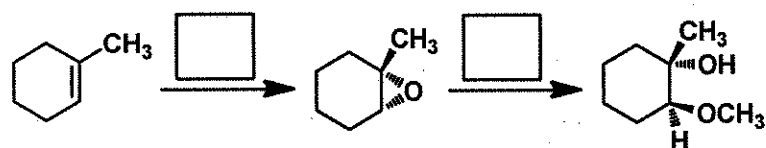
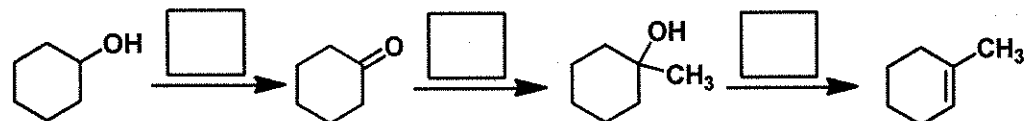


2. Diethyl malonate can be prepared by the following reaction sequence. Draw the structures of each of the missing intermediates in the boxes provided. (每個空格 5 分，共計 20 分)

注意：背面尚有試題



3. Choose the best reagent for carrying out the following reactions from the list below. Place the letter of the reagent(s) in the box over the reaction arrow. Use only one letter per box. (每個空格 4 分，共計 20 分)



- |  |   |
|--|---|
| A. NaH, then CH <sub>3</sub> I                                 | B. NaOCH <sub>3</sub> , CH <sub>3</sub> OH                                |
| C. <i>m</i> -ClC <sub>6</sub> H <sub>4</sub> CO <sub>3</sub> H | D. CH <sub>3</sub> MgBr in ether, then H <sub>3</sub> O <sup>+</sup>      |
| E. warm H <sub>2</sub> SO <sub>4</sub> /H <sub>2</sub> O       | F. Hg(O <sub>2</sub> CCF <sub>3</sub> ) <sub>2</sub> , CH <sub>3</sub> OH |
| G. H <sub>2</sub> /Pd  | H. PCC, CH <sub>2</sub> Cl <sub>2</sub>                                   |
| I. Cl <sub>2</sub> , H <sub>2</sub> O                          | J. LiAlH <sub>4</sub> in ether, then H <sub>3</sub> O <sup>+</sup>        |

4. Classify the following compounds below as aromatic, antiaromatic, or nonaromatic. (20 分)

