

國立臺北科技大學九十七學年度碩士班招生考試

系所組別：3711 3712 3713 有機高分子研究所甲組

第一節 有機化學 試題

填准考證號碼

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第一頁 共一頁

注意事項：

1. 本試題共 6 題，配分共 100 分。
2. 請標明大題、子題編號作答，不必抄題。
3. 全部答案均須在答案卷之答案欄內作答，否則不予計分。

1. Propose structures in the light of the following spectra: (每小題 5 分，共 15 分)

- (a) $C_9H_{13}N$; 1H NMR δ 2.2 (s, 3H), 2.8 (s, 6H), 6.6 (d, 2H), 7.0 (d, 2H).
- (b) $C_7H_{12}O_4$; IR $1735cm^{-1}$; 1H NMR δ 1.2 (t, 6H), 3.3 (s, 2H), 4.2 (q, 4H).
- (c) $C_5H_7NO_2$; IR $2250, 1735 cm^{-1}$; 1H NMR δ 1.3 (t, 3H), 3.5 (s, 2H), 4.2 (q, 2H).

2. $PhCH_3$ reacts with Br_2 and Fe to give a mixture of three monobromo products. With Br_2 in light, only one compound, a fourth monobromo isomer, is isolated. What is the fourth product? Write a mechanism to explain the formation of the fourth isomer. (第一個答案 3 分，第二個答案 7 分，共 10 分)

3. Please answer the following questions for the reaction of 1 mole HBr with 1 mole 1,3,5-hexatriene. (每小題 5 分，共 10 分)

- (a) Which product will predominate if the reaction is under kinetic control? Why?
- (b) Which product will predominate if the reaction is under thermodynamic control? Why?

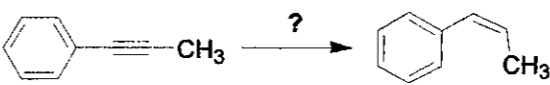
4. How would you synthesize the following products starting with 1-bromobutane. (每小題 5 分，共 15 分)

- (a) 1-Pentanol
- (b) 1-Hexanol
- (c) Pentanoic acid (The use of oxidant such as CrO_3 , $K_2Cr_2O_7$, and $KMnO_4$ is not allowed.)

5. Account for each of the following observations. (每小題 5 分，共 25 分)

- (a) Attempted Fischer esterification of 2,4,6-trimethylbenzoic acid with methanol and HCl is unsuccessful. No ester is obtained, and the acid is recovered unchanged.
- (b) Although *p*-hydroxybenzoic acid is less acidic than benzoic acid, salicylic (*o*-hydroxybenzoic) acid ($K_a = 105 \times 10^{-5}$) is 15 times more acidic than benzoic acid.
- (c) Why we can't isolate individual enantiomers of $NH(CH_3)(CH_2CH_3)$?
- (d) Bromination of butane under light gives 1-bromobutane (2%) and 2-bromobutane (98%). Calculate the ratio of reactivity for secondary carbon to primary carbon in this reaction.
- (e) The reaction rate of $CH_3(CH_2)_3Br$ with NaCN in dimethyl sulfoxide (DMSO) is faster than that in ethanol. Why?

6. Give suitable reagents to accomplish the following reactions. (每小題 5 分，共 25 分)

- (a) 
- (b) $H_3CH_2CC\equiv CH \xrightarrow{?} CH_3CH_2CH_2CHO$
- (c) $CH_3CH_2C(OH)(CH_3)_2 \xrightarrow{?} CH_3CH_2C(Br)(CH_3)_2$
- (d) $H_3CH_2CC\equiv CCH_2CH_3 \xrightarrow{?} H_3CH_2C(D)=C(D)CH_2CH_3$
- (e) 