

國立臺灣科技大學  
113學年度碩士班招生  
試題

系所組別：0410材料科學與工程系碩士班甲組  
科目：有機化學

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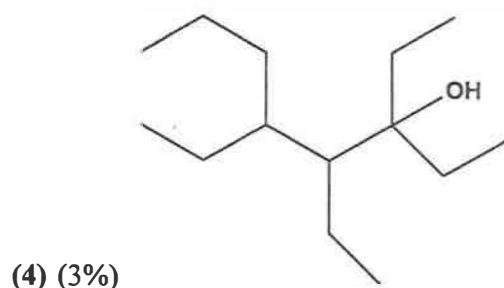
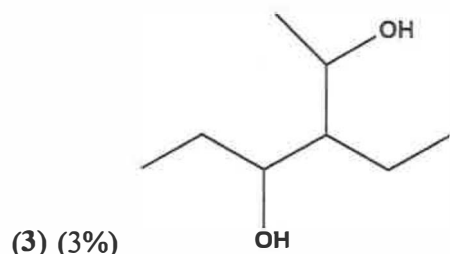
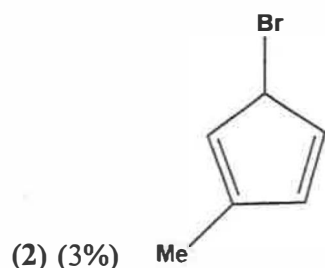
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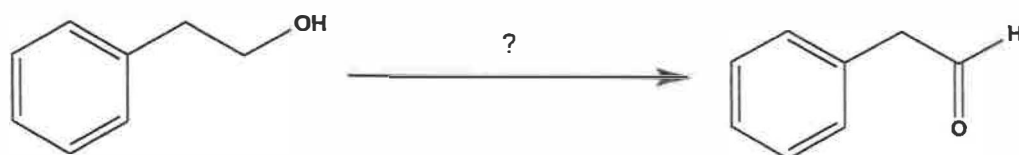
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(總分為 100 分；所有試題務必於答案卷內頁依序作答)

1. (Total 12%) Give a systematic (IUPAC) name for each compound.

(1) (3%)  $\text{CH}_2=\text{CHCH}_2\text{CH}_2\text{CH}_2\text{CH}_3$ 

2. (5%) Which reagent could be used to perform the following reaction?



- (A) NaOCl/TEMPO  
 (B) Swern Oxidation  
 (C) DMP reagent  
 (D) All reagents will work

3. (5%) Which compound would be expected to show intense IR absorption at 3363, 3185, and 1660  $\text{cm}^{-1}$ ?

- (A)  $\text{CH}_3\text{CH}_2\text{CH}_2\text{OH}$   
 (B)  $(\text{CH}_3)_2\text{CHNH}_2$   
 (C)  $\text{CH}_3\text{CH}_2\text{CONH}_2$   
 (D) but-1-ene



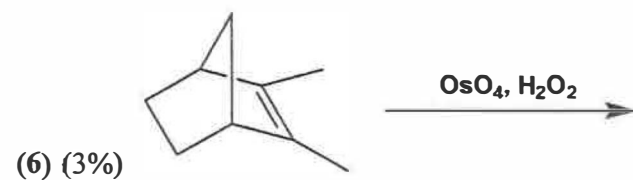
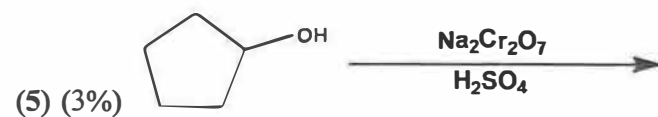
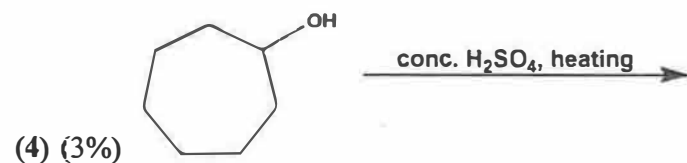
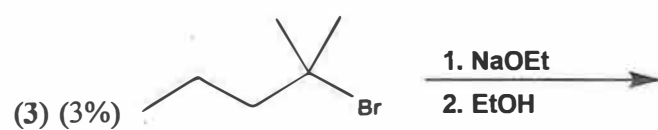
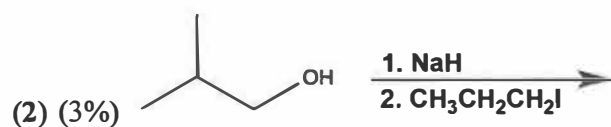
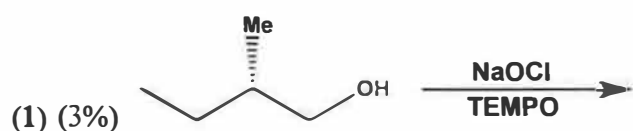
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(總分為 100 分；所有試題務必於答案卷內頁依序作答)

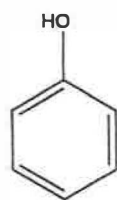
4. (Total 18%) Draw the major organic products you would expect to isolate from the following reactions.



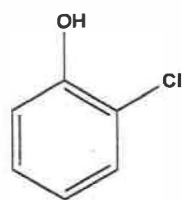
5. (Total 10%)

(1) (5%) Rank the following bonds in order of increasing stretching frequency ( $\text{cm}^{-1}$ ) in IR spectroscopy:(A)  $\text{C-H} < \text{C-O} < \text{C=O} < \text{C}\equiv\text{C}$ (B)  $\text{C}\equiv\text{C} < \text{C-O} < \text{C=O} < \text{C-H}$ (C)  $\text{C-O} < \text{C=O} < \text{C}\equiv\text{C} < \text{C-H}$ (D)  $\text{C-O} < \text{C=O} < \text{C-H} < \text{C}\equiv\text{C}$ 

(2) (5%) Rank the following three phenols in order of acidity (most acidic = first, least acidic = last).



A



B



C

(A)  $\text{C} > \text{A} > \text{B}$ (B)  $\text{A} > \text{B} > \text{C}$ (C)  $\text{C} > \text{B} > \text{A}$ (D)  $\text{B} > \text{C} > \text{A}$ 

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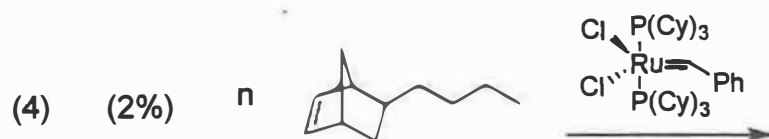
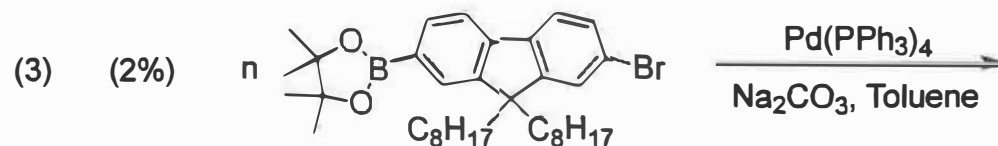
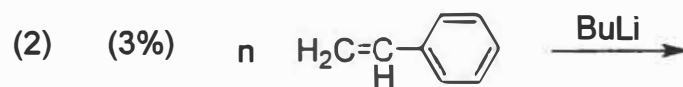
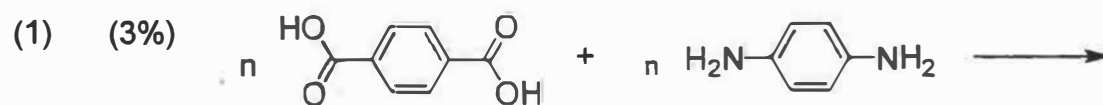
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6. (5%) Treatment of *p*-bromotoluene with NaOH solution at 300°C under high pressure yields a mixture of two products, but treatment of *m*-bromotoluene with NaOH solution at 300°C under high pressure yields a mixture of three products. Explain.

7. (5%) In general, aldehydes are more reactive than ketones in nucleophilic addition reactions. Explain.

8. (10%) Identify the chemical structures of polymers in the following reactions.




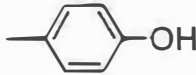

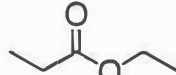
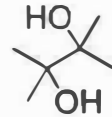

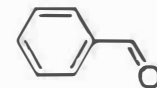

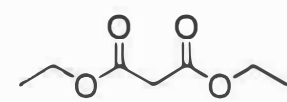
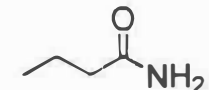
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9. (30%) Predict the major products in the following reactions.

- (1) (3%)   $\xrightarrow[\text{AlCl}_3]{\text{tert-butyl-Cl}}$
- (2) (3%)   $\xrightarrow[\text{H}_2\text{SO}_4]{\text{HNO}_3}$
- (3) (3%)   $\xrightarrow[\text{NH}_3 (\text{l}), \text{CH}_3\text{OH}]{\text{Na}}$
- (4) (3%)   $\xrightarrow[2. \text{H}_3\text{O}^+]{1. 2 \text{ CH}_3\text{MgBr}}$
- (5) (3%)   $\xrightarrow[100^\circ\text{C}]{\text{H}_2\text{SO}_4}$
- (6) (3%)   $\xrightarrow[2. \text{NaOH} (\text{l})]{1. \text{Cl}_2, \text{H}_2\text{O}}$
- (7) (3%)   $\xrightarrow[\text{THF}]{\text{Ph}_3\text{P}=\text{CHCH}_3}$
- (8) (3%)   $\xrightarrow{\text{NaOH} (\text{l})}$
- (9) (3%)   $\xrightarrow[3. \text{H}_3\text{O}^+, \text{heat}]{2. \text{ethyl-Br}, 1. \text{NaOEt, EtOH}}$
- (10) (3%)   $\xrightarrow[\text{H}_2\text{O}]{\text{NaOH, Br}_2}$

