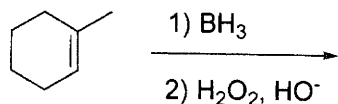


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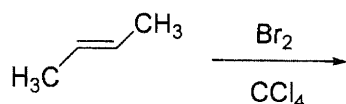
系所組：化學系碩士班甲組

1. Predict the major product(s) for each of the following reactions: (20 points)

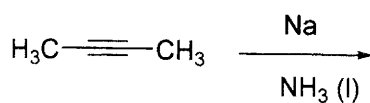
(a)



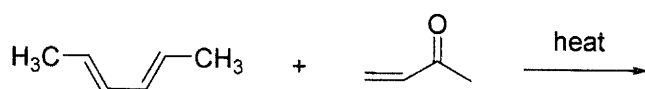
(b)



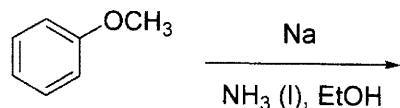
(c)



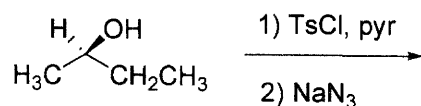
(d)



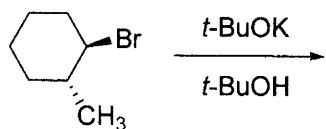
(e)



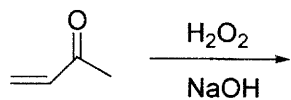
(f)



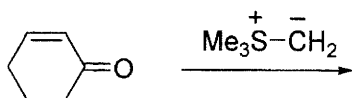
(g)



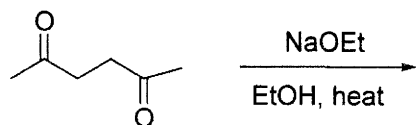
(h)



(i)



(j)



※ 注意：1. 考生須在「彌封答案卷」上作答。

2. 本試題紙空白部分可當稿紙使用。

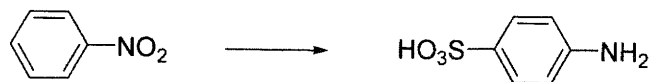
3. 考生於作答時可否使用計算機、法典、字典或其他資料或工具，以簡章之規定為準。

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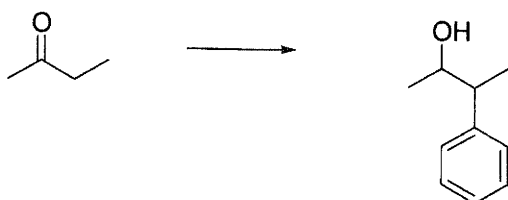
系所組：化學系碩士班甲組

2. Complete the following transformations. Provide the reagents used and the intermediate products obtained. (15 points)

(a)



(b)

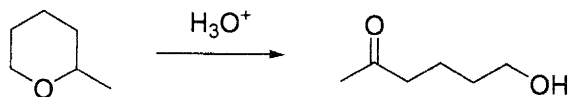


(c)

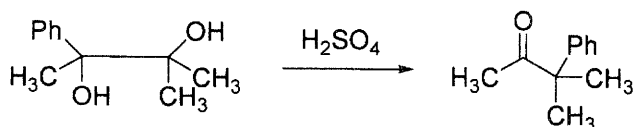


3. Provide a reasonable mechanism for each of the following reactions. Indicate clearly the electron movement. (15 points)

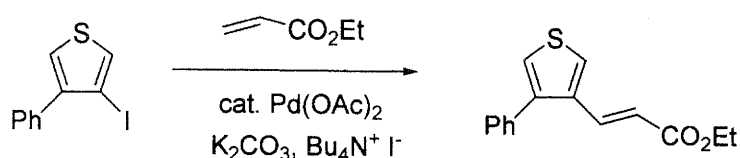
(a)



(b)



(c)



4. Please define the following terms (可用中文回答). (22 %)

- |                                  |                             |
|----------------------------------|-----------------------------|
| (a) Resolution (of enantiomers). | (b) Endo rule               |
| (c) Diastereotopic protons       | (d) 1,3-Diaxial interaction |
| (e) Resonance                    | (f) Enantiomeric pure       |
| (g) Enolate                      | (h) pKa                     |
| (i) Racemization                 | (j) Syn addition            |
| (k) Stereogenic center           |                             |

※ 注意：1. 考生須在「彌封答案卷」上作答。

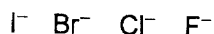
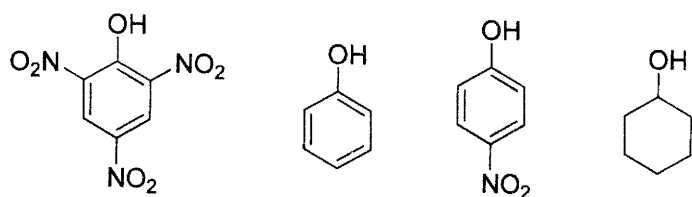
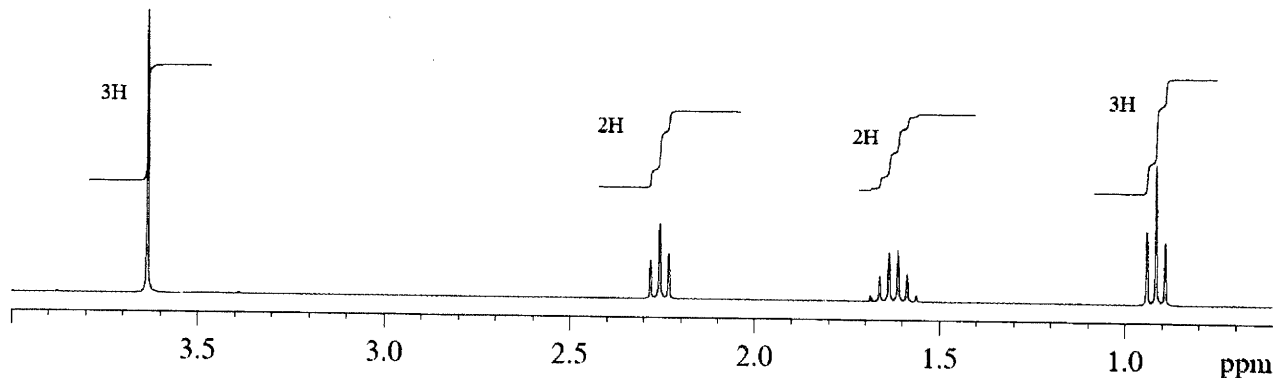
2. 本試題紙空白部分可當稿紙使用。

3. 考生於作答時可否使用計算機、法典、字典或其他資料或工具，以簡章之規定為準。

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5. Please answer the following questions.

(a) Rank the following anions in order of increasing **nucleophilicity** and explain your answer (4%)(b) Rank the following compounds in order of increasing **pKa** and explain your answers. (4%)6. An unknown compound, with the formula  $\text{C}_5\text{H}_{10}\text{O}_2$ , whose spectrum ( $^1\text{H}$  NMR) is shown below. Please determine the structure. (10%)

7. (a) Please draw the molecular orbitals of **1,3-butadiene** and **ethylene**, then show their **HOMO** and **LUMO**. (8%)
- (b) Using **Woodward-Hoffmann rules** (symmetry of molecular orbital), show that the [4+2] Diels-Alder reaction is thermally allowed. (2%)

※ 注意：1. 考生須在「彌封答案卷」上作答。

2. 本試題紙空白部分可當稿紙使用。

3. 考生於作答時可否使用計算機、法典、字典或其他資料或工具，以簡章之規定為準。