

國立暨南國際大學九十二學年度碩士班研究生入學考試試題

第 1 節有機化學 適用：(應化所 441)

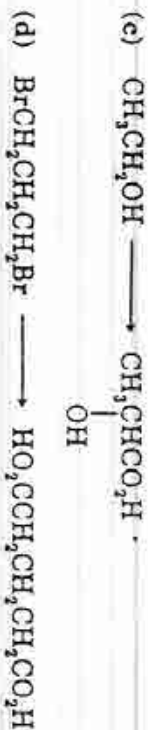
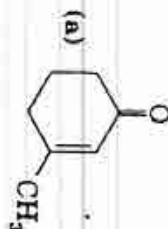
(本試題共 2 頁，第 1 頁)

考生注意：1. 依次序作答，只要標明題號，不必抄題。

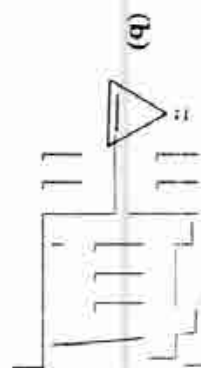
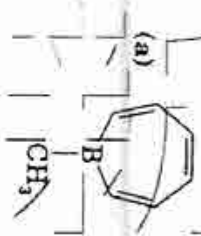
2. 答案必須寫在答案卷上，否則不予計分，並限以藍黑色筆作答。

3. 試題隨卷繳回。(餘請詳閱試場規則)

1) Using flow equations, show how the following conversions can be carried out. (30%)



2) Would you expect the following structures to be aromatic? Explain. (10%)



3) 4-Chloro-1-phenyl-1-butanone was heated with 1,2-ethanediol, *p*-toluenesulfonic acid, and benzene. The product A was heated with potassium phthalimide in dimethylformamide to yield B in 57% overall yield. Finally, B was heated with KOH in ethanol to yield C ($\text{C}_{10}\text{H}_{11}\text{N}$). What are the structures of A, B, and C? (10%)

4) The ^1H NMR spectrum of an alcohol ($\text{C}_5\text{H}_{12}\text{O}$) shows the following absorption: one singlet (relative area 1); two doublets (areas 3 and 6); and two multiplets (areas both 1). When treated with HBr, the alcohol yields an alkyl bromide ($\text{C}_5\text{H}_{11}\text{Br}$). Its NMR spectrum shows only a singlet (area 6); a triplet (area 3); and a quartet (area 2). What are the structures of the alcohol and the alkyl bromide? (10%)

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第 1 節有機化學 適用：(應化所 441)

(本試題共 2 頁，第 2 頁)

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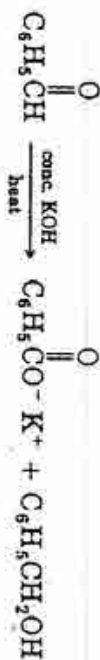
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3. 試題隨卷繳回。(餘詳詳閱試場規則)

5) Give the structure of the expected rearranged halide from each of the following reactions: (10%)



6) An aldehyde with no α hydrogen cannot undergo an aldol condensation when treated with aqueous base. However, if such an aldehyde is heated with concentrated NaOH or KOH solution, the aldehyde is converted to a 1:1 mixture of carboxylate and alcohol (Cannizzaro reaction). Suggest a mechanism for the following Cannizzaro reaction. (Hint: Consider a hydride transfer as part of the mechanism.) (10%)



7) The treatment of cyclopentylmethylamine with nitrous acid resulted in a 76% yield of cyclohexanol. Another alcohol and three alkenes were also present in the product mixture. (10%)

(a) Give a plausible mechanism for the formation of cyclohexanol.



(b) What are the likely structures of the other products?

8) In otherwise similar compounds, which one of each of the following pairs of partial structures would give stronger infrared absorption, and why? (10%)

