

國立成功大學

114學年度碩士班招生考試試題

編 號：197

系 所：臨床藥學與藥物科技研究所

科 目：有機化學

日 期：0211

節 次：第 1 節

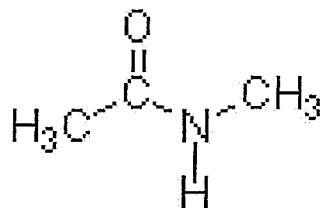
注 意：1.不可使用計算機
2.請於答案卷(卡)作答，於
試題上作答，不予計分。

1. Multiple-Choice Questions (each 2%, total 10 %)

(1) A carbon-hydrogen bond in ethane (CH_3CH_3) is best described a _____.

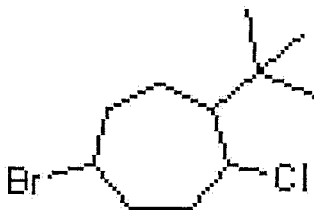
- A) highly polar
- B) essentially nonpolar
- C) ionic
- D) a multiple bond
- E) resonance stabilized

(2) Based on the structure below, what is the value for the H-N- CH_3 bond angle?



- A) 60 degrees
- B) 90 degrees
- C) 109 degrees
- D) 120 degrees

(3) Identify the correct IUPAC name for the structure shown below.

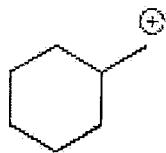


- A) 1-tert-butyl-2-chloro-5-bromocycloheptane
- B) 5-bromo-1-tert-butyl-2-chlorocycloheptane
- C) 1-bromo-4-chloro-5-tertbutylcycloheptane
- D) 1-bromo-4-tert-butyl-5-chlorocycloheptane
- E) 1-tert-butyl-4-bromo-7-chlorocycloheptane

(4) Rank the following carbocations in order of stability. (The most stable is first.)



I



II



III

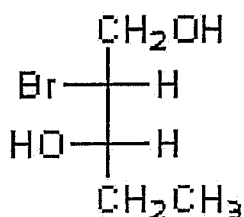
- A) I > III > II
- B) II > I > III
- C) III > I > II
- D) I > II > III

(5) If a mixture contains 75% of one compound and 25% of its enantiomer, what is the e.e. of the mixture?

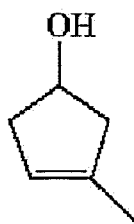
- A) 100
- B) 75
- C) 50
- D) 25
- E) 3

2. Assign the IUPAC names for the following compounds. (each 2%, total 10 %)

(1)



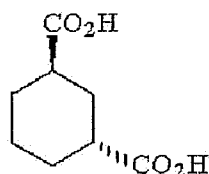
(2)



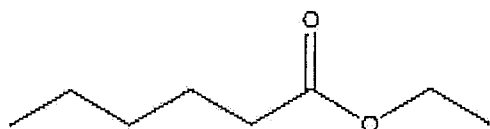
(3)



(4)

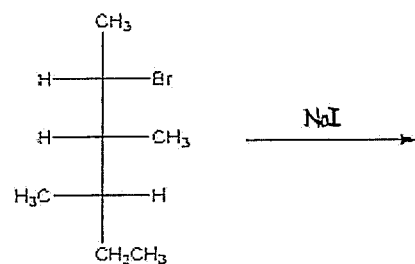


(5)

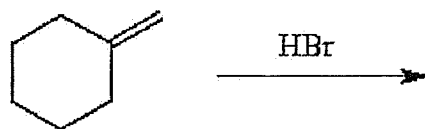


3. Complete the following reactions. (each 2%, total 10%)

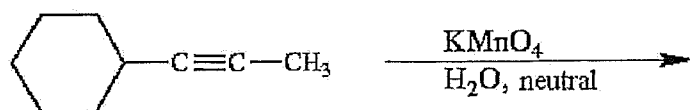
(1)



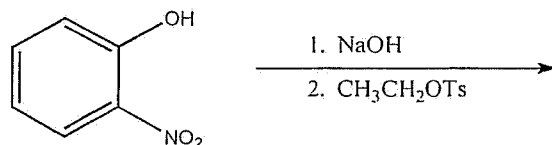
(2)



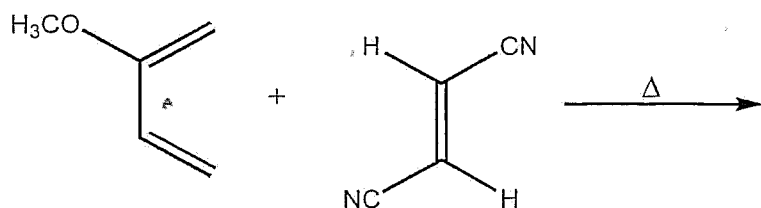
(3)



(4)



(5)



4. Complete the following multiple-step transformation. (each 5%, total 20%)

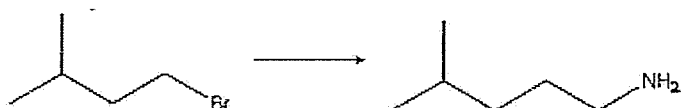
(1)



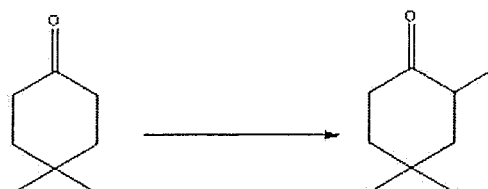
(2)



(3)



(4)



5. Provide a structure that is consistent with the data below. (5%)

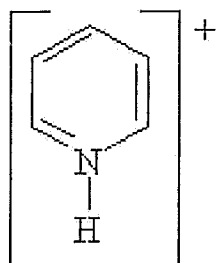
$C_7H_{14}O_2$

IR (cm^{-1}): 2950, 1740

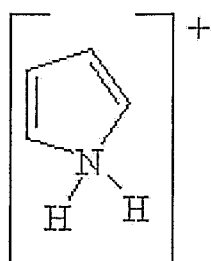
1H NMR (d): 2.3 (2H, q), 1.0 (3H, t), 0.9 (9H, s)

^{13}C NMR (d): 185 (s), 78 (s), 29 (t), 14 (q), 12 (q)

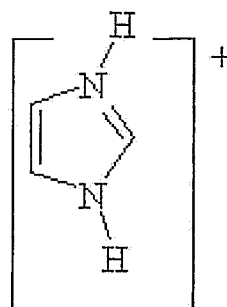
6. Rank the following in order of increasing pK_a (from lowest to highest pK_a). (5%)



1

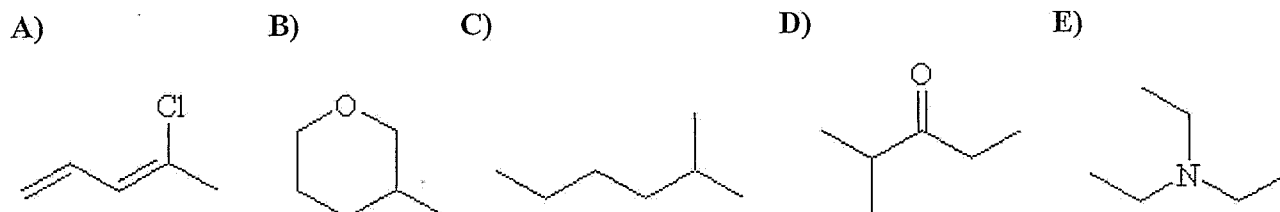
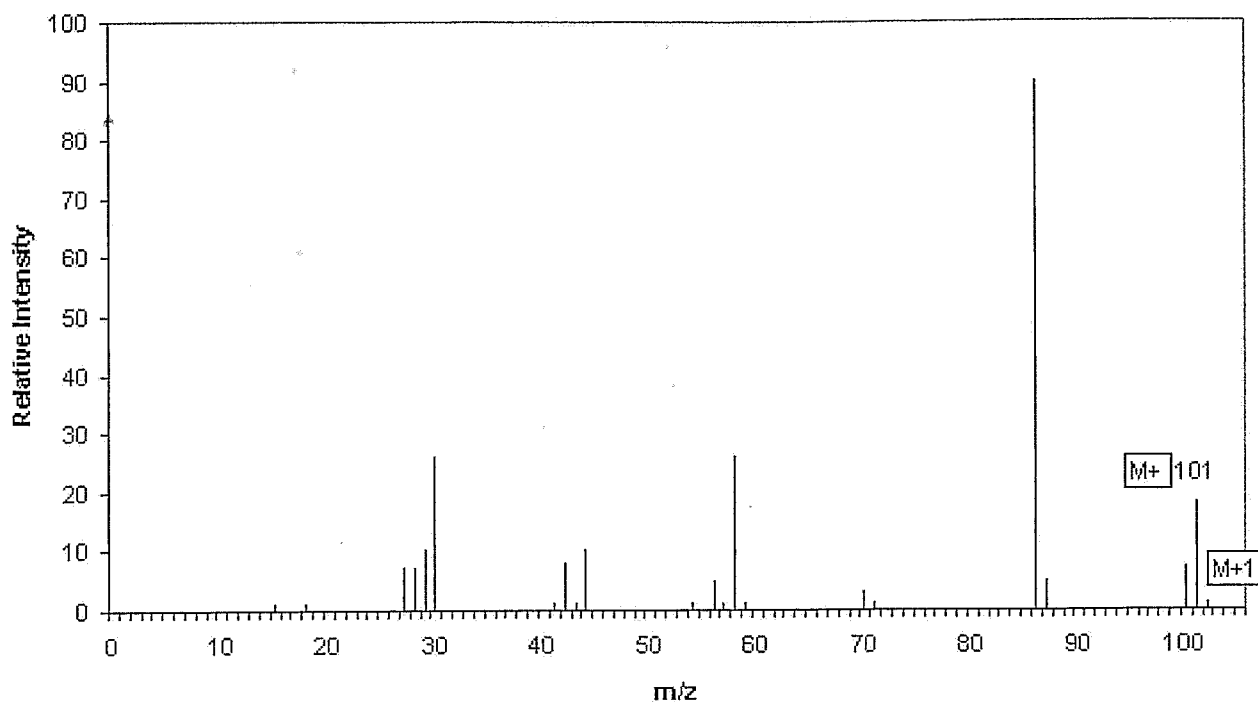


2



3

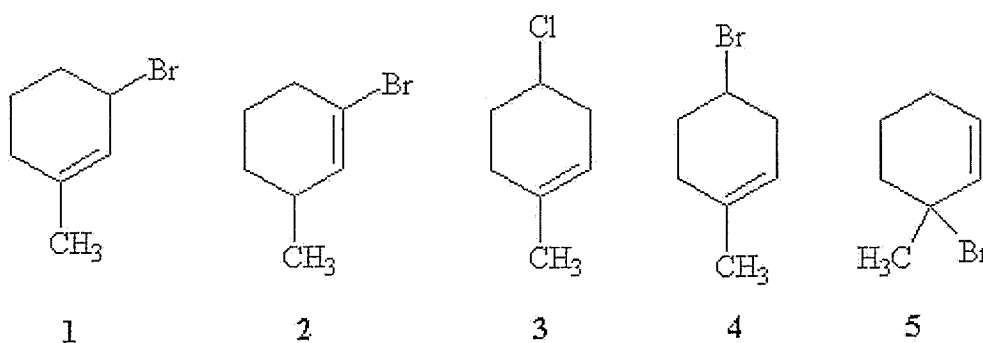
7. Which of the following structures is consistent with the mass spectrum shown below? (5%)



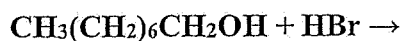
8. Provide a detailed, stepwise mechanism for the reaction of acetyl chloride with *n*-propylamine. (5%)

9. Draw the Newman projection of the *anti* conformation of butane. (5%)

10. Rank the following molecules in order of increasing relative rate of S_N1 solvolysis with methanol and heat (slowest to fastest reacting). (5%)



11. Predict the major product of the reaction below and provide a stepwise mechanism which accounts for its formation. (5%)



12. Consider the possible thermal [4+4] cycloaddition of two molecules of 1,3-butadiene to generate cycloocta-1,5-diene. Show the HOMO/LUMO interaction which would result, and use this interaction to predict whether the proposed cycloaddition could occur. (5%)

13. Which of the molecules below has the higher boiling point? Briefly explain your choice. (5%)

$\text{CH}_3\text{CH}_2\text{CH}_2\text{OH}$ or $\text{CH}_3\text{CH}_2\text{OCH}_3$

14. Which of the following terms best describes the pair of compounds shown: enantiomers, diastereomers, or the same compound? (5%)

