國立成功大學

113學年度碩士班招生考試試題

編　號：267

系　所：臨床藥學與藥物科技研究所

科　目：有機化學

日　期：0202

節　次：第 1 節

備　註：不可使用計算機

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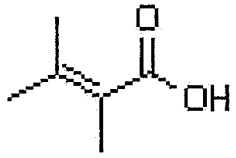
系　　所：臨床藥學與藥物科技研究所

考試科目：有機化學　　考試日期：0202，節次：1

※ 考生請注意：本試題不可使用計算機。　請於答案卷(卡)作答，於本試題紙上作答者，不予計分。

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

(1) Which of the following condensed formulas correctly represents the line-angle structure shown below?



A) $CH(CH_3)_2CH(CH_3)CO_2H$

B) $C_2(CH_3)_3CO_2H$

C) $(CH_3)_2CC(CH_3)CO_2H$

D) $C(CH_3)_2C(CH_3)CH_2CO_2H$

(2) A sample of compound X is subjected to elemental analysis and the following percentages by weight are found: 39.97% C, 6.73% H, and 53.30% O. The molecular weight of X is 90. What is the empirical formula of X?

A) C_6HO_8

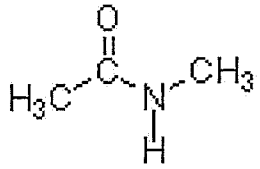
B) $C_2H_4O_2$

C) $C_4H_{10}O_2$

D) $C_3H_6O_3$

E) CH_2O

(3) In the structure below, the sigma bond of the carbonyl is formed from the overlap of a(n) _____ atomic orbital of carbon and a(n) _____ atomic orbital of oxygen.



A) *sp*, sp^2

B) sp^3, sp^2

C) sp^2, sp^2

D) p, p

(4) How many secondary (2°) carbons are found in 5-ethyl-3,3,4-trimethylheptane?

A) 1

B) 4

C) 2

D) 3

E) 6

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(5) Which of the following is <u>not</u> a possible termination step in the free radical chlorination of methane?

A) $\cdot CH_3 + Cl_2 \rightarrow CH_3Cl + Cl\cdot$

B) $\cdot CH_3 + Cl\cdot \rightarrow CH_3Cl$

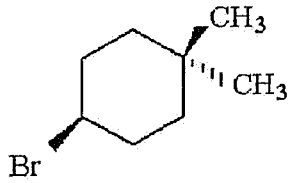
C) $\cdot CH_3 + \cdot CH_3 \rightarrow CH_3CH_3$

D) $\cdot CH_3$ + wall → CH_3-wall

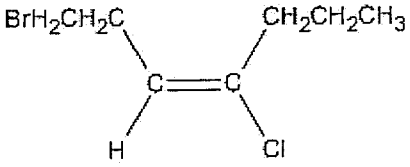
E) $Cl\cdot$ + wall → Cl-wall

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

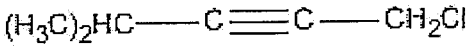
(1)



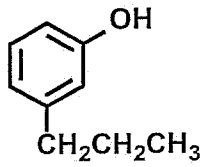
(2)



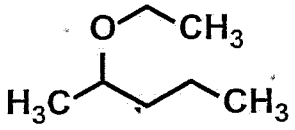
(3)



(4)

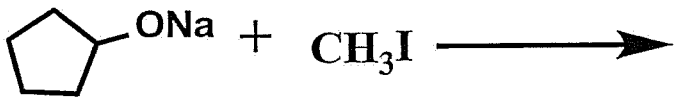


(5)

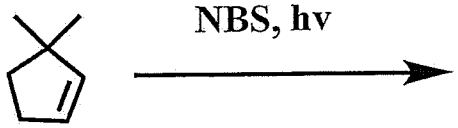


3. Complete the following reactions. (each 2%, total 10%)

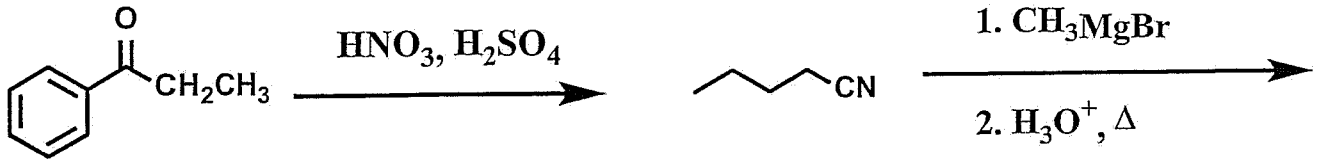
(1)



(2)

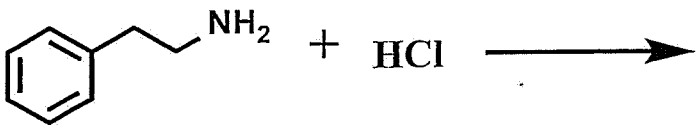


(3)



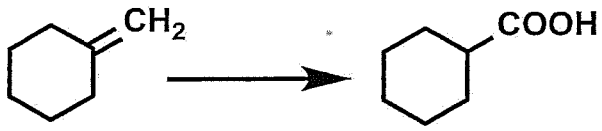
(4)

(5)

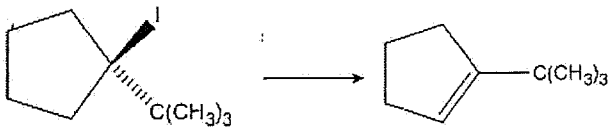


4. Complete the following multiple-step transformation. (each 5%, total 20%)

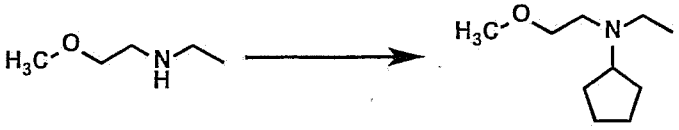
(1)



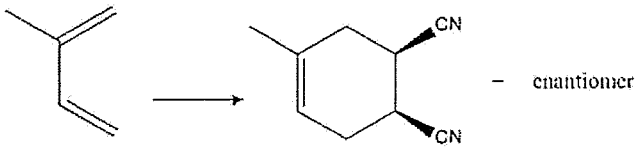
(2)



(3)

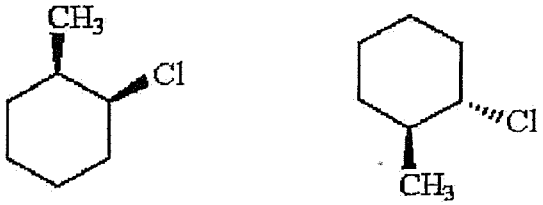


(4)

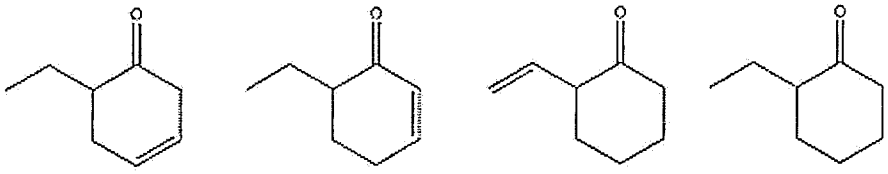


– enantiomer

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

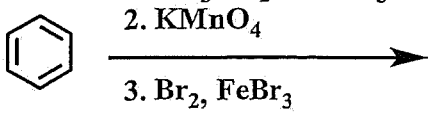


6. Which of the following compounds has the lowest carbonyl stretching frequency? (5%)



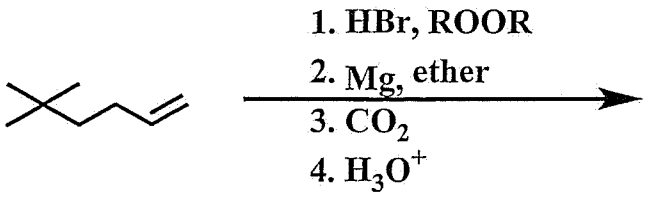
7. Compound I has a molecular formula of C_7H_{16}. In ^{13}C NMR, compound I gave 3 peaks and in ^1H NMR it also gave 3 peaks, a doublet, a triplet and a multiplet. Provide a structure for compound I. (5%)

8. Provide the major organic product(s) of the reaction shown below. (5%)



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

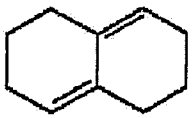
10. Provide the major organic product of the reaction shown below. (5%)



11. Draw the Newman projection of the highest energy conformation that results from rotation about the C2-C3 bond of 2-methylbutane. (5%)

12. Provide a structure for the major substitution and major elimination product resulting from the reaction below. (5%)

13. Provide the structure of the major product which results from 1,4-addition of Br_2 to the diene shown below. (5%)



14. Explain while this reaction won't proceed as it is written in the forward direction. (5%)