

## 國立臺北科技大學 112 學年度碩士班招生考試

系所組別：3700 分子科學與工程系有機高分子碩士班

## 第一節 有機化學 試題

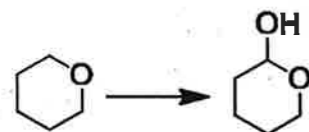
第 1 頁 共 2 頁

**注意事項：**

1. 本試題共二題，每題 50 分，共 100 分。
2. 不必抄題，作答時請將試題題號及答案依照順序寫在答案卷上。
3. 全部答案均須在答案卷之答案欄內作答，否則不予計分。

第一大題 選擇題 (共 10 小題，共計 50 分)

- 1) [ ] Which of the following is an **incorrect** description of benzene?
- A) The molecule is planar.
  - B) The molecule is aromatic.
  - C) The molecule can be drawn as a resonance hybrid of two Kekule structures.
  - D) The molecule is a 6-membered ring that contains alternating single and double carbon-carbon bonds.
- 2) [ ] Which of the following represents a propagation step in the monochlorination of methylene chloride ( $\text{CH}_2\text{Cl}_2$ )?
- A)  $\text{CHCl}_3 + \text{Cl} \longrightarrow \cdot\text{CCl}_3 + \text{HCl}$
  - B)  $\cdot\text{CHCl}_2 + \text{Cl}_2 \longrightarrow \text{CHCl}_3 + \cdot\text{Cl}$
  - C)  $\cdot\text{CH}_2\text{Cl} + \text{Cl}_2 \longrightarrow \text{CH}_2\text{Cl}_2 + \cdot\text{Cl}$
  - D)  $\cdot\text{CHCl}_2 + \cdot\text{Cl} \longrightarrow \text{CHCl}_3$
- 3) [ ] For the following transformation how many H atoms are added or lost?



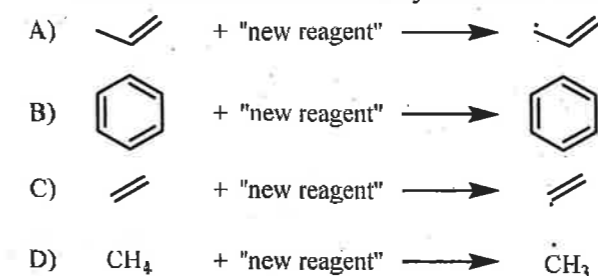
- A) Added one
  - B) Added two
  - C) Lost one
  - D) Lost two
  - E) No change
- 4) [ ] The bonding pattern of oxygen with a formal charge of  $-1$  could be described as:

- A) One lone pair of electrons and three single bonds.
- B) Two lone pairs of electrons and two single bonds.
- C) Three lone pairs of electrons, and one single bond.
- D) One lone pair of electrons, one single, and one double bond
- E) Zero lone pairs, and two single and one double bond

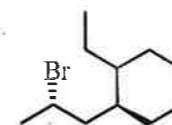
5) [ ] A Brønsted-Lowry acid is defined as a \_\_\_\_\_ and a Brønsted-Lowry base is defined as a \_\_\_\_\_.

- A) proton acceptor, proton donor.
- B) proton donor, proton donor.
- C) proton acceptor, proton acceptor.
- D) proton donor, proton acceptor.
- E) None of these.

6) [ ] You work in a research laboratory and have developed a new reagent that cleaves C-H bonds homolytically. Unfortunately, this reagent can achieve only one of the transformations shown below. In light of bond dissociation energies, which transformation is most likely to be achieved?



7) [ ] What is the IUPAC name for the following compound?



- A) 2-Bromo-4-pentylhexane
- B) (2S,4S)-2-Bromo-4,5-diethylheptane
- C) 3,4-Diethyl-6-bromoheptane
- D) 2-Bromo-4-methylhexane

8) [ ] Addition reactions of alkenes are characterized by:

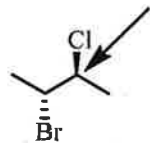
- A) formation of a  $\pi$  bond
- B) addition of two groups across a double bond
- C) breaking of a  $\pi$  bond
- D) B and C

注意：背面尚有試題

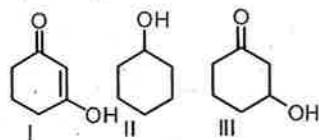
- 9) [ ] Which of the following statements is true about propyne,  $\text{H}-\text{C}\equiv\text{C}-\text{CH}_3$ ?
- It contains a total of three sigma bonds.
  - It contains a total of three pi bonds.
  - The  $\text{H}-\text{C}\equiv\text{C}$  bond angle is about  $109.5^\circ$ .
  - The  $\text{C}\equiv\text{C}-\text{C}$  bond angle is  $180^\circ$ .
- 10) [ ] For the transformation shown, select the most appropriate reagent(s) to effect the change.
- HBr
  - $\text{Br}_2/h\nu$
  - $\text{Br}_2$
  - HBr/ROOR

第二大題 簡答題 (共 5 小題, 共計 50 分)

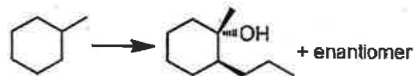
- 1) Draw a Newman projection of the following compound as viewed down the indicated bond in the conformation show. (3 pts)



- 2) Draw all the isomers with molecular formula  $\text{C}_4\text{H}_8$ . (12 pts)
- 3) Which one of the following alcohols is most acidic? And, describe the reason. (5 pts)



- 4) Provide a stepwise synthesis for the following. (10 pts)



- 5) For the following pair of compounds, the expected stretching absorption of the  $\text{C}=\text{O}$  bond is  $1685\text{ cm}^{-1}$  &  $1655\text{ cm}^{-1}$  respectively. Explain using both words and structural drawings. (20 pts)

