

國立成功大學  
110學年度碩士班招生考試試題

編 號：285

系 所：臨床藥學與藥物科技研究所

科 目：有機化學

日 期：0203

節 次：第 1 節

備 註：不可使用計算機

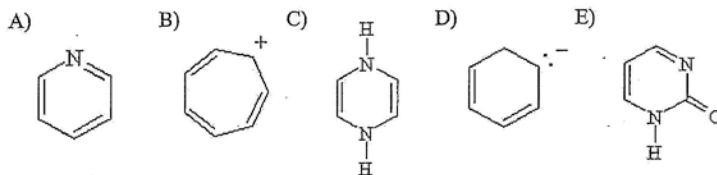
※ 考生請注意：本試題不可使用計算機。請於答案卷(卡)作答，於本試題紙上作答者，不予計分。

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

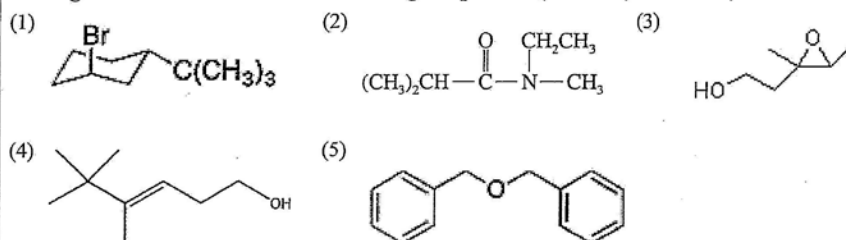
- (1) Consider the equilibrium shown below. When one looks at the equilibrium where  $X = \text{CH}_3$  and the one where  $X = \text{CH}(\text{CH}_3)_2$ , how do the values of the equilibrium constants (Ks) compare?



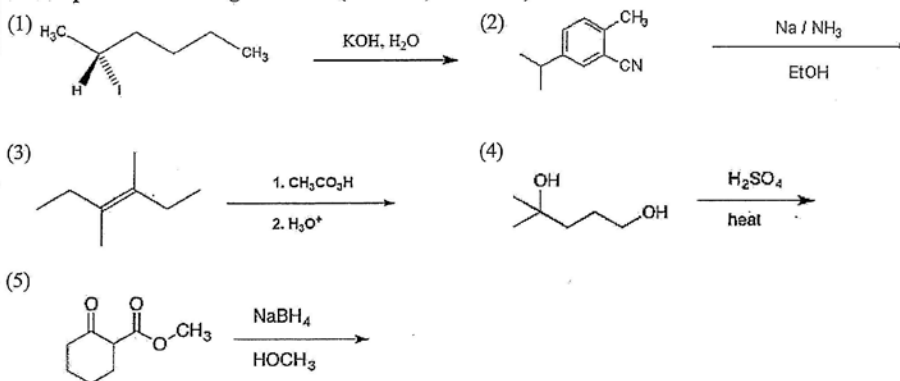
- A) The Ks are equal.  
 B) The K where  $X = \text{CH}_3$  is greater.  
 C) The K where  $X = \text{CH}(\text{CH}_3)_2$  is greater.  
 D) The Ks differ only slightly and are both less than 1.
- (2) When (R)-butan-2-ol is treated with TsCl in pyridine, the product formed is \_\_\_\_\_.
- A) a single enantiomer  
 B) a racemic mixture  
 C) a mixture of diastereomers  
 D) an achiral compound  
 E) none of the above
- (3) Which of the following compounds would contain characteristic IR stretches at 3300 and 2200  $\text{cm}^{-1}$ ?
- A)  $\text{CH}_3\text{CH}_2\text{CHO}$   
 B)  $\text{CH}_3\text{CH}=\text{CHCH}_2\text{OH}$   
 C)  $(\text{CH}_3)_2\text{CHCN}$   
 D)  $\text{CH}_3\text{CH}_2\text{CH}_2\text{C}\equiv\text{CH}$   
 E)  $\text{CH}_3\text{C}\equiv\text{CCH}_2\text{CH}_3$
- (4) Which of the following compounds is the most reactive dienophile in a Diels-Alder reaction with 1,3-butadiene?
- A)  $\text{CH}_2=\text{CHOCH}_3$   
 B)  $\text{CH}_2=\text{CHCHO}$   
 C)  $\text{CH}_3\text{CH}=\text{CHCH}_3$   
 D)  $(\text{CH}_3)_2\text{C}=\text{CH}_2$   
 E)  $\text{CH}_2=\text{CH}_2$
- (5) Which of the following structures, if flat, would be classified as antiaromatic?



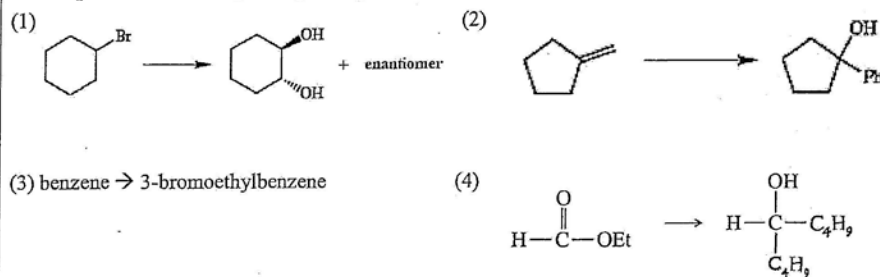
2. Assign the IUPAC names for the following compounds. (each 2%, total 10 %)



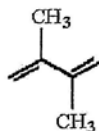
3. Complete the following reactions. (each 2%, total 10%)



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



5. Draw the structure of the major product which results when the diene shown is treated with HBr at  $-80\text{ }^{\circ}\text{C}$  and  $40\text{ }^{\circ}\text{C}$ , respectively. (5%)

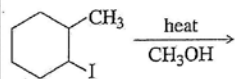


6. Draw the pi molecular orbitals of 1,3,5-hexatriene and benzene. (5%)

7. Draw the Fischer projection of (2*R*,4*R*)-2,4-dibromopentane. (5%)

8. Draw the mechanism of the hydrolysis of acid chlorides. (5%)

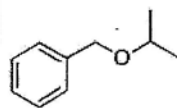
9. Predict the mechanisms and all possible products of the following reaction. (5%)



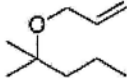
10. Provide a detailed, stepwise mechanism for the reaction of benzene with  $\text{Br}_2$  and  $\text{FeBr}_3$ . Make sure to include the activating reaction between  $\text{Br}_2$  and  $\text{FeBr}_3$  in your mechanism. (5%)

11. Draw the most stable conformation of *trans*-1,2-dimethylcyclohexane. (5%)

12. Propose fragmentations to account for the peaks  $m/z = 59$ ,  $73$ , and  $107$  in the Mass Spectrometry of the ether below. (5%)



13. How do you synthesize the ether below using a Williamson Ether synthesis? (5%)



14. Which of the structures shown below is consistent with the  $^{13}\text{C}$  NMR (off resonance splitting for each peak is shown as a table within the figure) and  $^1\text{H}$  NMR spectra? (formula =  $\text{C}_9\text{H}_{11}\text{OBr}$ ) (5%)

