

東吳大學 104 學年度轉學生(含進修學士班轉學生)招生考試試題

第 1 頁, 共 3 頁

系級	化學系三年級	考試時間	100 分鐘
科目	有機化學	本科總分	100 分

說明: 共十題, 每題各佔十分

1.

Rank the compounds in each group in order of increasing acidity.

- $\text{CH}_3\text{CH}_2\text{CH}_3$, $\text{CH}_3\text{CH}_2\text{OH}$, $\text{CH}_3\text{CH}_2\text{NH}_2$
- BrCH_2COOH , $\text{CH}_3\text{CH}_2\text{COOH}$, $\text{CH}_3\text{CH}_2\text{CH}_2\text{OH}$
- $\text{CH}_3\text{CH}_2\text{NH}_2$, $(\text{CH}_3)_3\text{N}$, $\text{CH}_3\text{CH}_2\text{OH}$

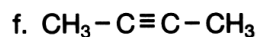
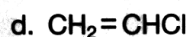
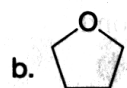
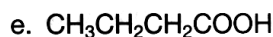
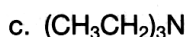
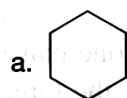
2.

Draw a chair conformation of cyclohexane with one CH_3CH_2 group and one CH_3 group that fits each description:

- A 1,1-disubstituted cyclohexane with an axial CH_3CH_2 group
- A cis-1,2-disubstituted cyclohexane with an axial CH_3 group
- A trans-1,3-disubstituted cyclohexane with an equatorial CH_3 group
- A trans-1,4-disubstituted cyclohexane with an equatorial CH_3CH_2 group

3.

What types of intermolecular forces are present in each compound?



4.

Give the structure corresponding to each IUPAC name.

- 1,2-dimethylcyclobutane
- 1,1,2-trimethylcyclopropane
- 4-ethyl-1,2-dimethylcyclohexane
- 1-sec-butyl-3-isopropylcyclopentane
- 1,1,2,3,4-pentamethylcycloheptane

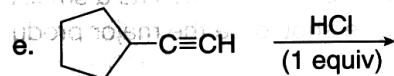
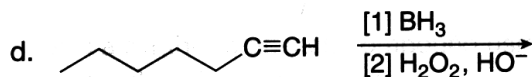
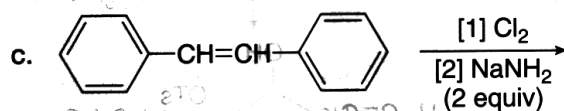
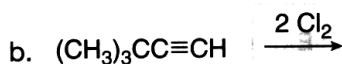
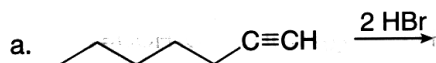
5.

What product is formed when $\text{CH}_3\text{OCH}_2\text{CH}_2\text{C}\equiv\text{CCH}_2\text{CH}(\text{CH}_3)_2$ is treated with each reagent: (a) H_2 (excess), Pd-C; (b) H_2 (1 equiv), Lindlar catalyst; (c) H_2 (excess), Lindlar catalyst; (d) Na, NH_3 ?

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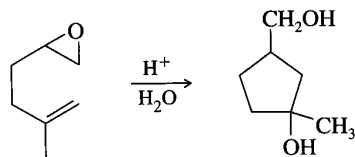
6.

Draw the organic products formed in each reaction.



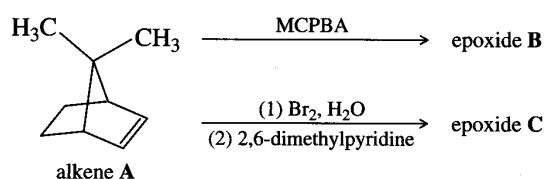
7.

The following reaction resembles the acid-catalyzed cyclization of squalene oxide. Propose a mechanism for this reaction.



8.

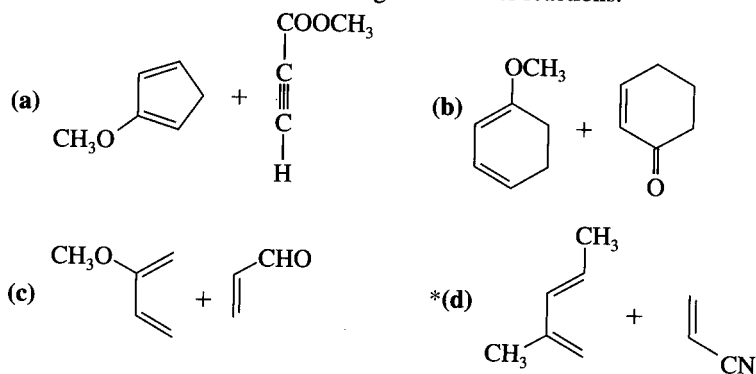
A new graduate student was studying the insecticidal properties of a series of polycyclic epoxides. He epoxidized alkene **A** using two different methods. First he used MCPBA, which gave an excellent yield of an epoxide that he labeled **B**. Then he treated alkene **A** with bromine water to form the bromohydrin, followed by 2,6-dimethylpyridine (see page 646) to form an epoxide in fair yield. To his surprise, the second method produced an epoxide (**C**) with different physical and chemical properties from the first. In particular, **C** reacts with strong nucleophiles much faster than **B**. Propose structures for **B** and **C**, and propose mechanisms to show why different products are formed. Explain why **C** reacts so much faster with strong nucleophiles.



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9.

Predict the products of the following Diels-Alder reactions.



10.

What reagents are needed to convert phenylacetonitrile ($C_6H_5CH_2CN$) to each compound:

(a) $C_6H_5CH_2COCH_3$; (b) $C_6H_5CH_2COC(CH_3)_3$; (c) $C_6H_5CH_2CHO$; (d) $C_6H_5CH_2COOH$?