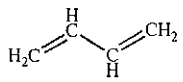
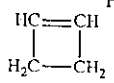
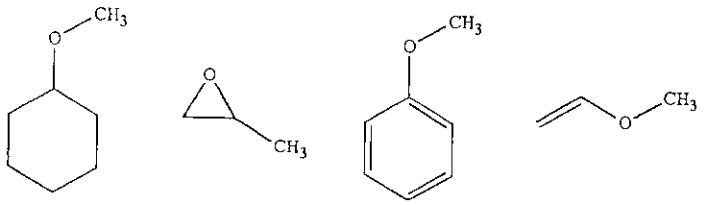
科目：有機化學(2002)　　校系所組：中大化學學系　交大應用化學系甲組　清大化學系

參考用

Multiple Choice (沒有倒扣)

Identify the choice that best completes the statement or answers the question.

1. Which of the following is an ionic bond? (3 %)
   a. Fluorine–Fluorine
   b. Carbon–Hydrogen
   c. Lithium–Oxygen
   d. Carbon–Nitrogen
2. Which of the following compounds has only 1° and 3° carbon atoms? (3 %)
   a. hexane
   b. 2-methylpentane
   c. 3-methylpentane
   d. 2,3-dimethylbutane
3. An accurate description of the structure of benzene is: (3 %)
   a. The π bonds are quickly moving around the ring.
   b. There are two distinct structures that are in equilibrium.
   c. All the carbon–carbon bonds are equal in length.
   d. There are distinct single and double bonds.
   e. Some bonds are longer than others.
4. What is the preferred stereochemistry of the E2 elimination? (3 %)
   a. inversion
   b. retention
   c. antiperiplanar
   d. synperiplanar
   e. gauche
5. Which of the following compounds gives an infrared spectrum with peaks at 3300 cm^{-1} (sharp peak) and 2150 cm^{-1} (sharp peak)? (3 %)
   a. $CH_3CH_2C{\equiv}CH$
   b. $CH_3C{\equiv}CCH_3$
   c. 
   d. 
6. Which of the following are ethers? (3 %)



1　　2　　3　　4

   a. only 1 and 2
   b. only 1 and 4
   c. only 1, 2 and 3
   d. all are ethers

注意：背面有試題

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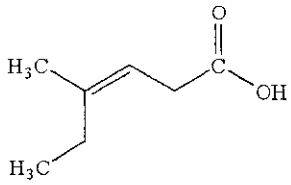
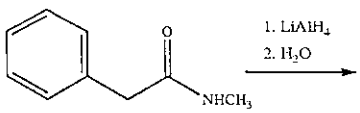
7. What is the IUPAC name of the following compound? (3 %)

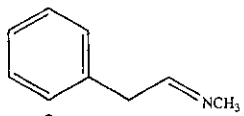


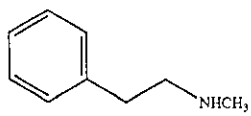
a. (*E*)-4-ethylpent-3-enoic acid
b. (*Z*)-4-ethylpent-3-enoic acid
c. (*E*)-4-methylhex-3-enoic acid
d. (*Z*)-4-methylhex-3-enoic acid

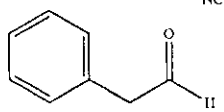
8. Which of the following is the correct order of *decreasing* acid strength (more acidic > less acidic)? (3 %)
a. $ICH_2COOH > ClCH_2COOH > FCH_2COOH$
b. $Cl_2CHCOOH > ClCH_2COOH > CH_3COOH$
c. $BrCH_2COOH > FCH_2COOH > ClCH_2COOH$
d. $CH_3COOH > FCH_2COOH > CH_3CH_2OH$

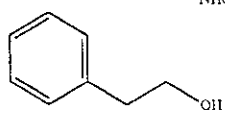
9. What is the major organic product obtained from the following reaction? (3 %)



a.


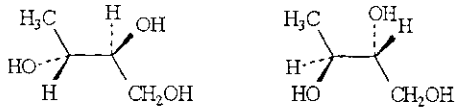
c.


b.


d.


Matching

Label each pair of stereoisomers below as: (3 %)
a. enantiomers
b. diastereomers
c. identical

10.


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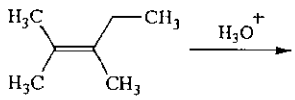
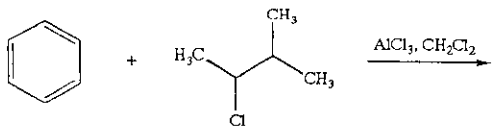
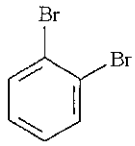
11. Draw the mechanism and predict the two alcohol addition products obtained by reaction of the following alkene with aqueous acid. (3 %)



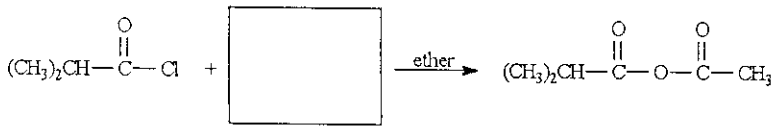
12. Draw the mechanism and predict the major product of the following reaction: (3 %)



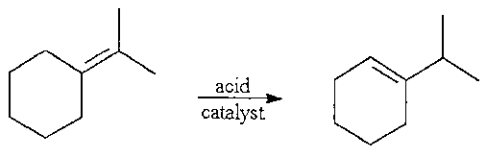
13. For each of the compounds below, tell how many signals you would expect the molecule to have in its normal, broadband decoupled ^{13}C NMR spectra. (3 %)



14. Provide the missing structure(s) or reagent(s) for each reaction or sequences of reactions. Show all relevant stereochemistry. (3 %)



15. Classify the reaction below: (3 %)
a. addition
b. elimination
c. substitution
d. rearrangement



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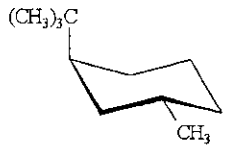
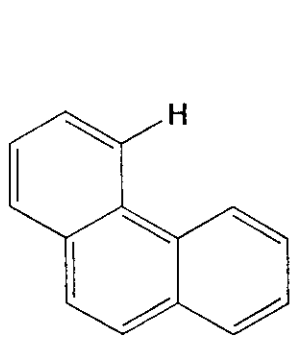
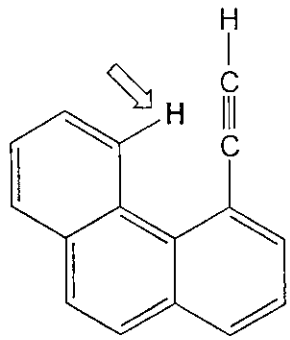
16. For each substituted cyclohexane, draw its ring-flip isomer. Circle the *most* stable conformation. (3 %)



17. The following example of the neighbouring group effect is provided by the acetylene-substituted phenanthrene. The indicated proton suffers a shift of 1.7 ppm compared to the corresponding proton in phenanthrene itself. Can you account for any observed differences? (10 %)

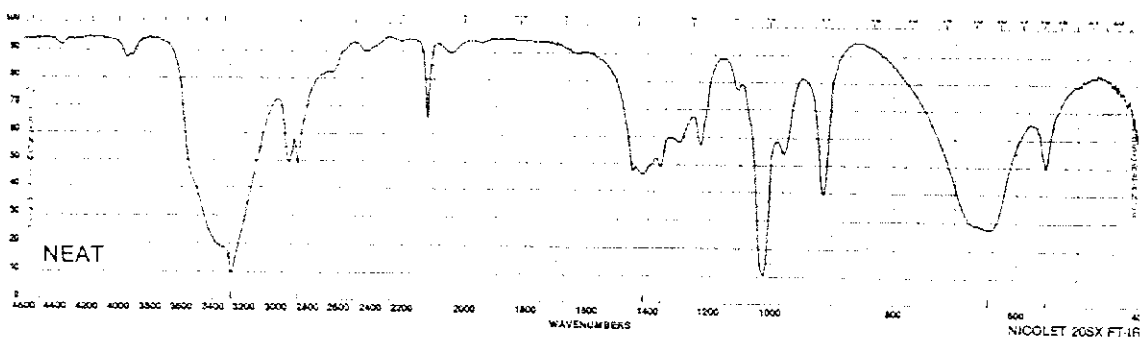


8.65 ppm



10.35 ppm

18. The compoubnd whose IR spectrum appears below hase a highest EI mass spectrum m/z at 56 amu and a ^{1}H NMR with just three peaks (δ 2.5 *t*, J=2 Hz; δ 3.1 *bs*; δ 4.25 *d*, J=2 Hz). Given this information, propose a structure. (15 %)



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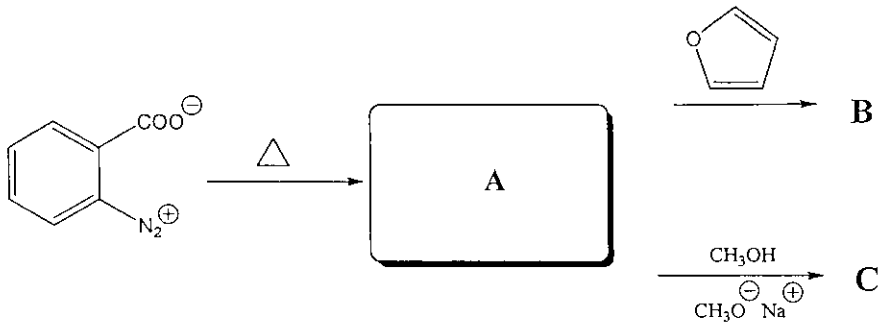
19. A useful benzyne precursor is benzenediazonium-2-carboxylate, a molecule readily formed from anthranilic acid. Provide arrow formalisms for the formation of the following products A, B and C. Write the mechanism for your predication. (15 %)



20. Radical inhibitors are often added to foods to retard radical reactions causing spoilage. Figure below shows a few typical radical inhibitors. Should you think a bit about how they might function in intercepting radicals? (12 %)