

國立中山大學 106 學年度碩士暨碩士專班招生考試試題

科目名稱：有機化學【海資系碩士班丙組】

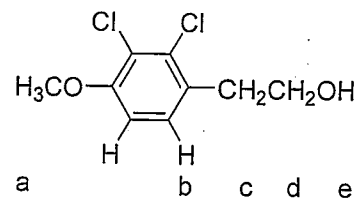
題號：452001

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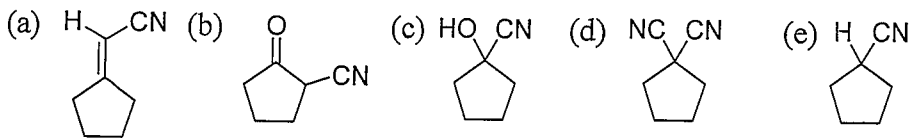
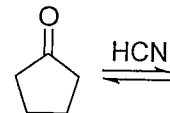
一、單選選擇題(45%, 3% for each)

1. Which of the protons indicated will be observed as a doublet in  $^1\text{H}$  NMR spectrum of the molecule shown as right?

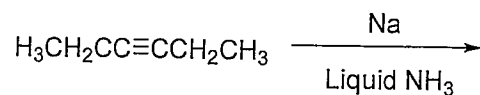


- (a) a (b) b (c) c (d) d (e) e

2. Which of the following substance is in equilibrium with cyclopentanone and HCN shown as right?

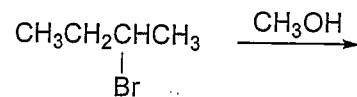


3. Which of the following is the major products of the reaction shown as right?



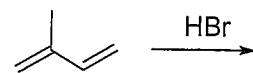
- (a)  $\text{H}_3\text{CH}_2\text{CH}_2\text{CH}_2\text{CC}\equiv\text{CNa}$   
 (b)  $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2\text{CH}_2\text{CH}_3$   
 (c)   
 (d)   
 (e)

4. The reaction of 2-bromobutane with methanol, as shown as right, yields which of the following as the major product?



- (a)  $\text{CH}_3\text{CH}_2\underset{\text{OH}}{\text{CH}}\text{CH}_3$  (b)  $\text{CH}_3\text{CH}_2\underset{\text{OCH}_3}{\text{CH}}\text{CH}_3$  (c)  $\text{CH}_3\text{CH}_2\underset{\text{OCH}_3}{\text{C}}(\text{OCH}_3)\text{CH}_3$   
 (d)  $\text{H}_3\text{CH}_2\text{CH}=\text{CH}_2$  (e)  $\text{H}_3\text{CC}\equiv\text{CCH}_3$

5. Which of the following is a 1,4-addition product of the reaction shown right?



- (a) (b) (c) (d)   
 (e)

6. How many bonds are there in acetylene, shown as right?



- (a) 1 (b) 2 (c) 3 (d) 4 (e) 5

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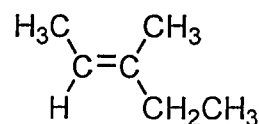
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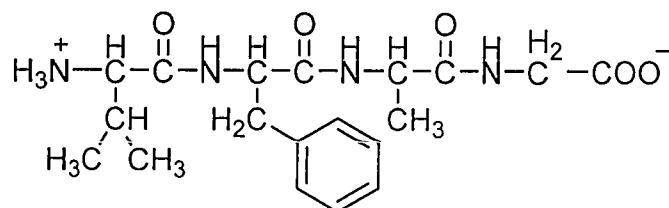
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7. What is the correct IUPAC name for compound shown right?



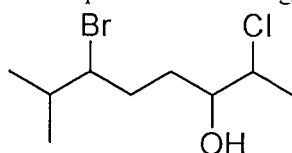
- (a) *trans*-3-methyl-3-pentene  
 (b) *cis*-2-ethyl-2-butene  
 (c) (*E*)-3-methyl-2-pentene  
 (d) (*Z*)-3-methyl-2-pentene  
 (e) (*Z*)-3-ethyl-2-butene

8. the total number of peptide bonds in the structure shown under is?



- (a) 1 (b) 2 (c) 3 (d) 4 (e) 5

9. How many stereoisomers possible for the compound shown right?

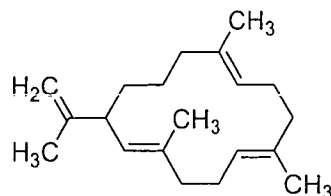


- (a) 3 (b) 4 (c) 6 (d) 8 (e) 10

10. Vitamin B12, an essential nutrient for humans, contains which of the following elements?

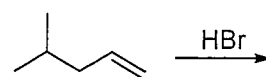
- (a) Cobalt  
 (b) Chromium  
 (c) Copper  
 (d) Zinc  
 (e) Iron

11. the species shown right is



- (a) a polyketide  
 (b) a peptide  
 (c) a diterpene  
 (d) a disaccharide  
 (e) an alkaloid

12. Which of the following is the major carbocation rearrangement product of the reaction shown right?



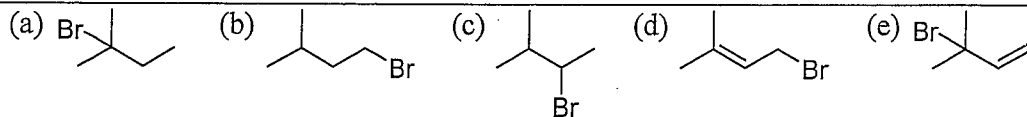
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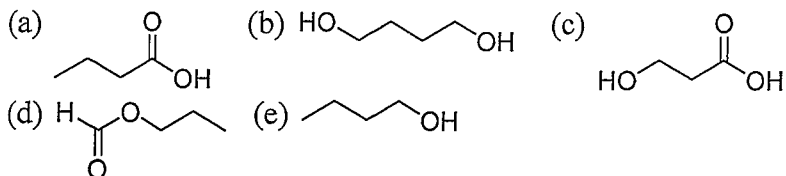
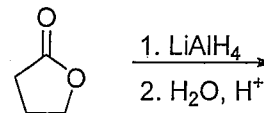
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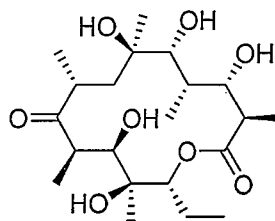


13. Which of the following is the major organic product of the reaction shown right?

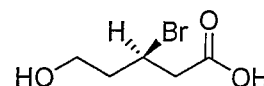


14. the species shown right is

- (a) an alkaloid
- (b) a peptide
- (c) a diterpene
- (d) a disaccharide
- (e) a polyketide



15. Oxidation of (*R*)-3-bromo-5-hydroxypentanoic acid, shown right, yields the corresponding 3-bromopentanedicarboxylic acid product that is



- (a) a mixture of two diastereomers in unequal amounts
- (b) a racemic mixture
- (c) a single pure enantiomer
- (d) a meso compound
- (e) an achiral compound

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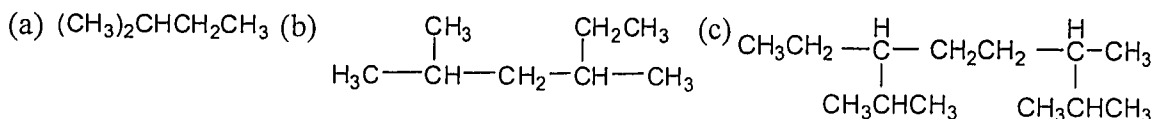
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二：問答題：(55%)

1. Provide IUPAC names for the following compounds. (9%, 3% for each)

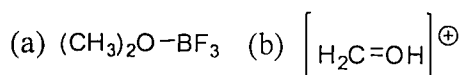


2. Provide a structure for each of the following compounds. (6%, 3% for each)

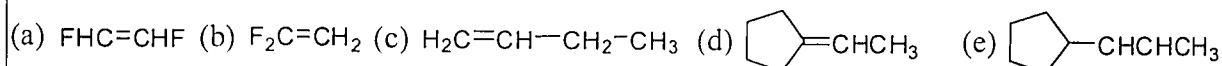
(a) 5-(1,2,2-trimethylpropyl)nonane

(b) 3,3-diethyl-4-(2,2-dimethylpropyl)octane

3. Draw Lewis structures for the following compounds and ions, showing appropriate formal charges. (6%, 3% for each)



4. Which of the following compounds show cis-trans isomerism? Draw the cis and trans isomers of those that do. (5%)



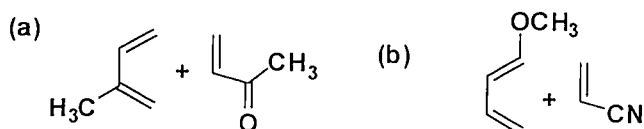
5. Explain the following terms (9%, 3% for each)

a. Geminal coupling

b. diamagnetic anisotropy

c. Claisen condensation

6. Predict the products of the following proposed Diels-Alder reactions and carefully explain the control of regioselectivity and stereoselectivity (10%, 5% for each)



7. **DETERMINE** and **EXPLAIN** the structure of the compound whose molecular formula is  $\text{C}_6\text{H}_4\text{Cl}_2\text{O}$  for which the mass, IR,  $^1\text{H}$  NMR, DQFCOSY and  $^{13}\text{C}$ /DEPT NMR spectra are given. (10%)

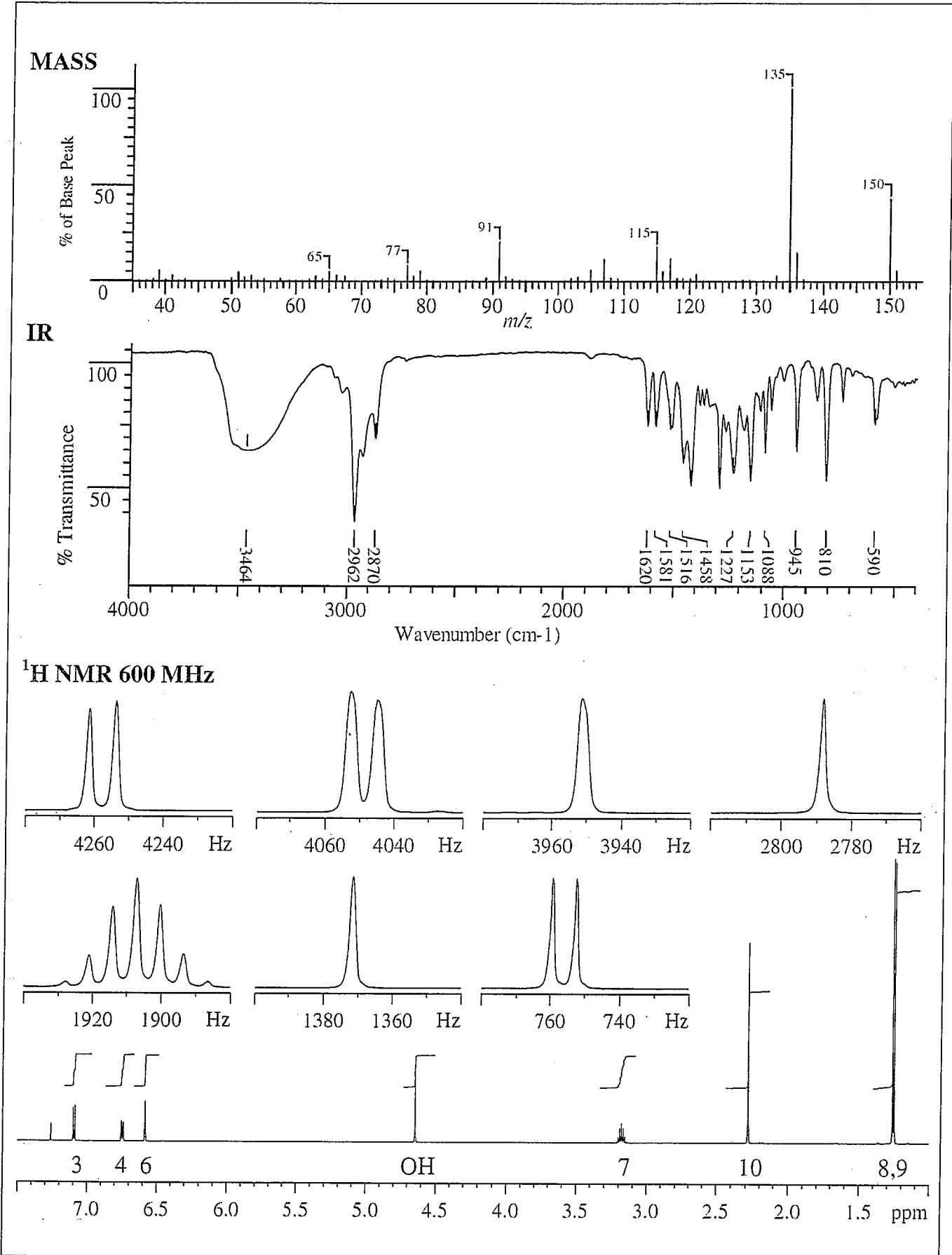
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