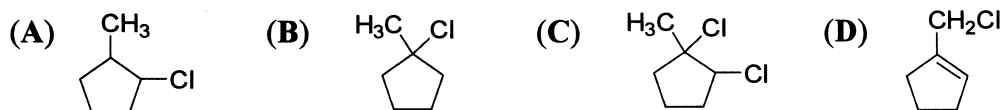
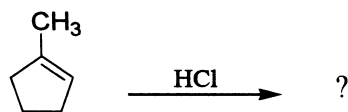
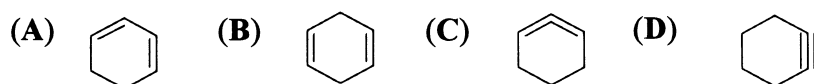


一、單選題 (30 pts, 3 pts/each)

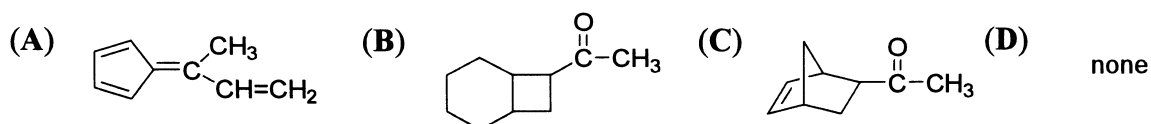
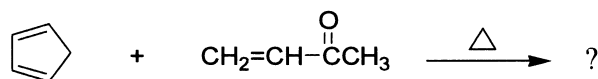
1. What would be the major product of the following reaction ?



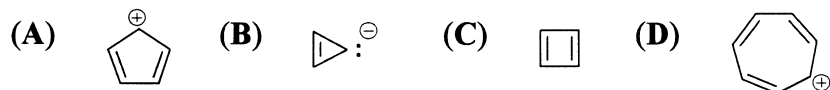
2. Which of the following compounds would be the most stable ?



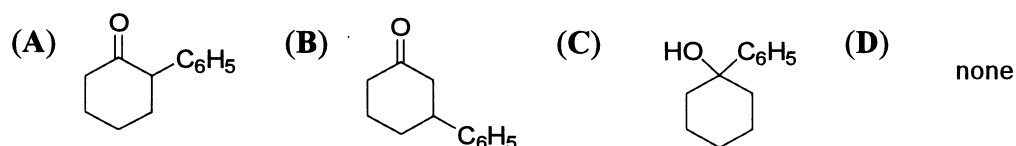
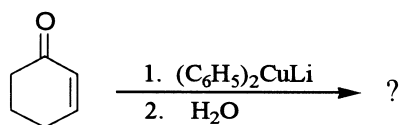
3. What would be the product of the following reaction ?



4. Which of the following would you expect to be aromatic ?



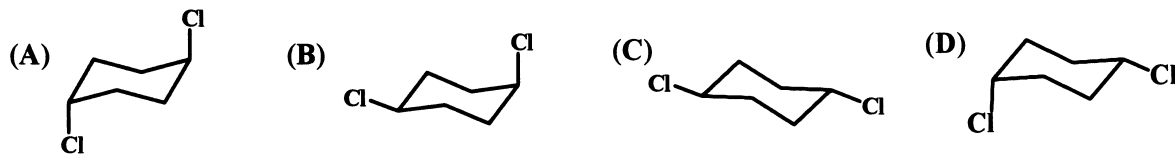
5. What is the product of the reaction below ?



6. Which fluoride has the most polar bond(s)?

- (A) CF_4 (B) F-F (C) NF_3 (D) LiF

7. Which structure represents the most stable conformation of *trans*-1,4-dichlorocyclohexane?



8. Which is the strongest base?

- (A) CH_3NH_2 (B) CH_4 (C) CH_3F (D) CH_3OH

9. Arrange the nucleophiles in order of increasing reactivity (least first)?

I^- (I), NH_3 (II), H_2O (III), OH^- (IV)

- (A) I, II, III, IV (B) II, III, IV, I (C) III, II, I, IV (D) III, II, IV, I

10. Arrange the leaving groups in order of increasing leaving group ability (least first)?

CH_3CO_2^- (I), Cl^- (II), CH_3O^- (III), NH_2^- (IV)

- (A) III, IV, I, II (B) II, III, IV, I (C) IV, III, I, II (D) IV, III, II, I

二、非選擇題

1. Arrange the following alcohols in order of increasing boiling point:

$(\text{CH}_3)_3\text{COH}$, $\text{CH}_3(\text{CH}_2)_4\text{OH}$, $(\text{CH}_3)_3\text{CCH}_2\text{OH}$, and $(\text{CH}_3)_2\text{CHCH}_2\text{CH}_2\text{OH}$. (3 pts)

2. Arrange the following compounds in order of increasing acidity: acetone, ethyl acetoacetate, ethyl acetate, and ethanol. (3 pts)

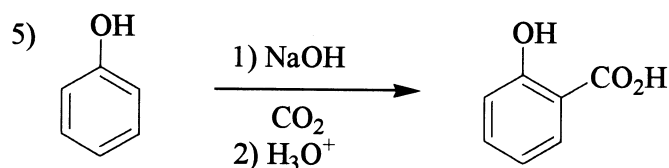
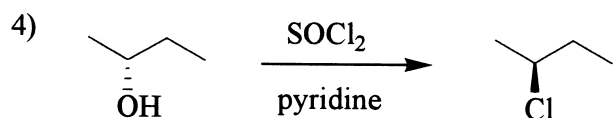
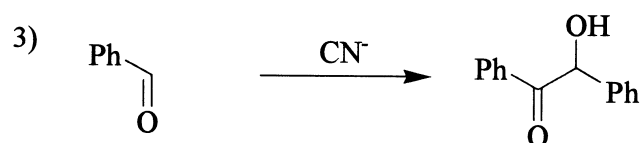
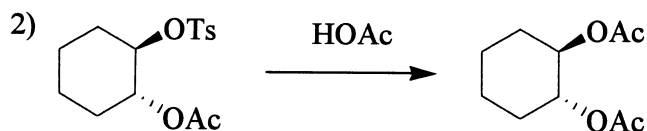
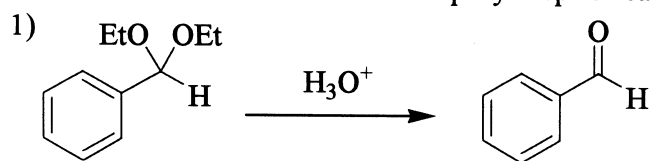
3. Describe the composition of the Jones reagent. (3 pts)

4. Draw all the stereoisomers of 2,3,4-tribromopentane. (4 pts)

5. When optically pure (*R*)-2-bromobutane is heated with water, 2-butanol is the product. The reaction forms twice as much as (*S*)-2-butanol as (*R*)-2-butanol. Calculate the e.e. and the specific rotation expected for the product. (*S*)-2-butanol is $+15^\circ$. (4 pts)

6. Draw the ^1H NMR spectrum for isobutyl acetate. Present the peaks with correct splitting patterns, and at the approximate chemical shift (± 0.5 ppm). Just above each peak, indicate the relative integration value of each type of hydrogen. (8 pts)

7. Write a reasonable mechanism step-by-step for each of the following reaction. (25 pts, 5 pts/each)



8. Draw condensed structural formulas for all compounds with the molecular formula C_4H_8O that contain a carbonyl group. (8 pts)

9. Draw a structural formula for each of the following compounds. (Note: Please give the correct stereochemistry, if necessary.) (12 pts)

1) (*Z*)-2-phenyl-2-butene

2) 2-isopropyl-5-methylphenol

3) *trans*-4-hydroxycyclohexancarbaldehyde

4) (*R*)-1-phenylethanamine