

(醫化在職)

一、選擇題 (36 pt)

1. Which is the major product of the following reactions?



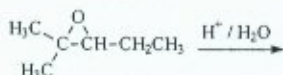
- a) para chlorobenzoic acid b) meta chlorobenzoic acid
 c) a mixture of para and meta chlorobenzoic acid d) a mixture of ortho and para chlorobenzoic acid

2. Which statements are true for an E1 reaction?

- I) The rate limiting step of the reaction involves only the alkyl halide.
 II) The rate limiting step of the reaction involves the alkyl halide and the base.
 III) There is an intermediate carbocation.
 IV) The order of reactivity is $1^\circ > 2^\circ > 3^\circ$.

- a) I, III b) II c) I, III, IV d) II, IV

3. Which is the major product of the following reaction?



- a) 3-pentanol b) 4-methyl-3,4-pentanediol c) 2-pentanol d) 2-methyl-2,3-pentanediol

4. Which compounds contain stereocenters? a) I, II b) III, IV c) I, III d) II, IV

- (I) 2-methylpentane (II) chlorocyclohexane (III) 3-methyl-2-butanol (IV) 2-hydroxypropanoic acid

5. Arrange the bonds in increasing order of ionic character (least first).

- C-C Na-O C-N O-H C-O
 I II III IV V

- a) III, I, IV, II, V b) V, III, I, II, IV c) I, III, V, IV, II d) I, III, II, IV, V

6. In which of the following alkanes are carbons not tetrahedral?

- a) cyclopropane b) propane c) ethane d) cyclohexane

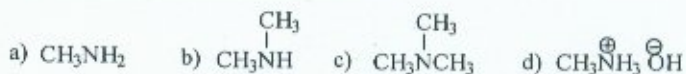
7. How many trans isomers are there for an alkene with the formula, $\text{C}_4\text{H}_7\text{Cl}$?

- a) 2 b) 3 c) 6 d) 8

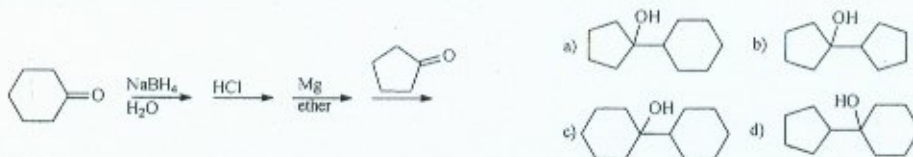
8. Which statement does not describe a transition state?

- a) Possesses a definite geometry b) Maximum on the potential energy diagram
 c) Structure can be determined experimentally d) Can not be isolated

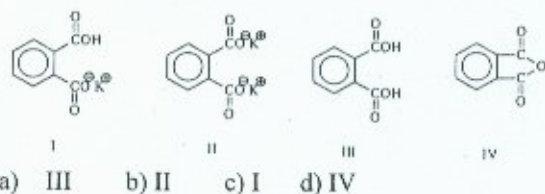
9. Which compound is the strongest base?



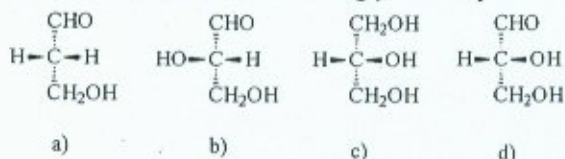
10. Which is the major product of the following reaction?



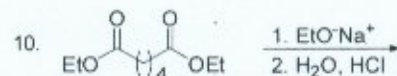
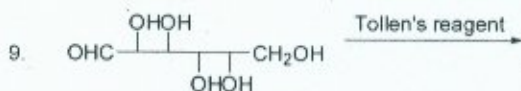
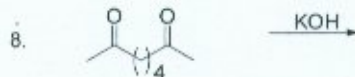
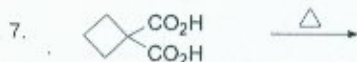
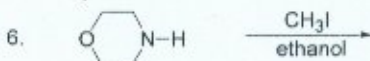
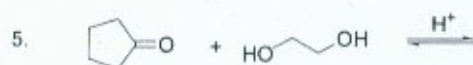
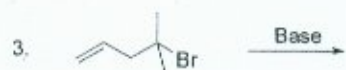
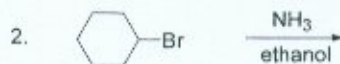
11. Which compound is the most soluble in water?



12. Which is the correct structure for D-glyceraldehyde?



二、完成下列反應 (30 pt)

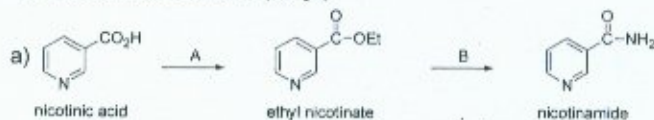


三、Assign priorities to the groups in each set. (Increase to decrease) (4 pt)

(1) a) $-\text{CH}_3$ b) $-\text{CH}_2\text{SH}$ c) $-\text{NH}_2$ d) $-\text{COOH}$

(2) a) $-\text{CH}_2\text{CH}=\text{CH}_2$ b) $-\underset{\text{H}}{\text{C}}=\text{CH}_2$ c) $-\text{CH}_2\text{CH}_3$ d) $-\text{CH}_2\text{COOH}$

四、Show how to convert? (10 pt)



b) cyclohexene to cyclohexanone in two steps

五、2-Phenyl-2-butanol can be synthesized by three different combinations of a Grignard reagent and a ketone. Show each combination. (12 pt)

六、Propose a structure and assign each ^1H -NMR peaks for compound R, which molecular formula $\text{C}_{12}\text{H}_{16}\text{O}$. Following are its ^1H -NMR and ^{13}C -NMR spectra: (8 pt)

