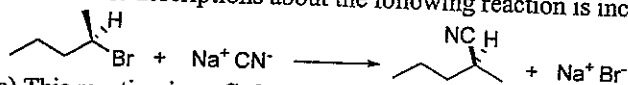


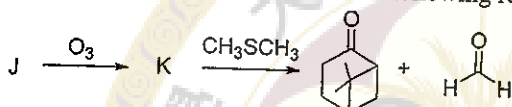
第一部分：單選題（每題 4 分，共 60 分）※ 注意：請於試卷內之「選擇題作答區」依序作答。
Multiple Choices: There is one appropriate answer in each of the following questions.

- (1) Which of the descriptions about the following reaction is incorrect?



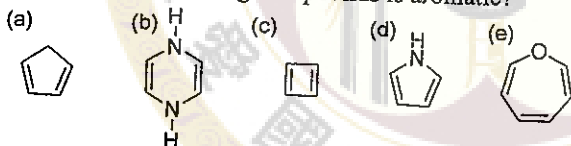
- (a) This reaction is an S_N2 reaction.
 (b) CN^- is a nucleophile.
 (c) The configuration of the 2-bromopentane is (R)-.
 (d) Inversion of configuration occurs at the 2-position.
 (e) The reaction is a first order reaction.

- (2) Which of the descriptions about the following reaction is incorrect?

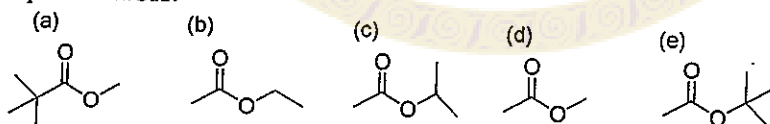


- (a) This reaction is called ozonolysis.
 (b) The intermediate compound K is called ozonide.
 (c) CH_3SCH_3 is an oxidizing agent to oxidize K.
 (d) O_3 is an oxidizing agent to oxidize J
 (e) The structure of compound J is

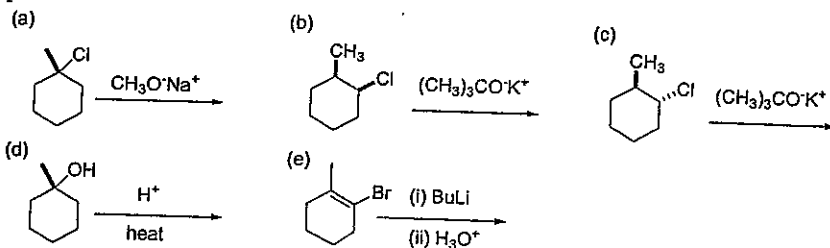
- (3) Which of the following compounds is aromatic?



- (4) Which of the alkyl acetates shown below shows the highest reactivity in hydrolysis by aqueous NaOH?

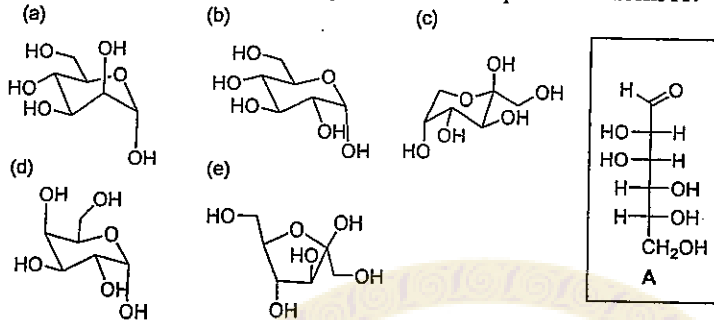


- (5) Which of the following reactions does not give 1-methylcyclohexene as one of the major products?

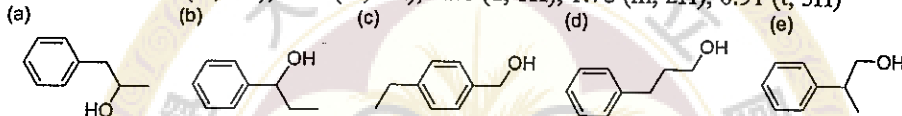


見背面

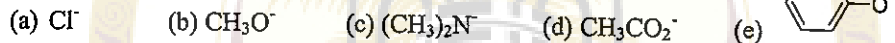
- (6) Which of the following carbohydrates has the open-chain form A?



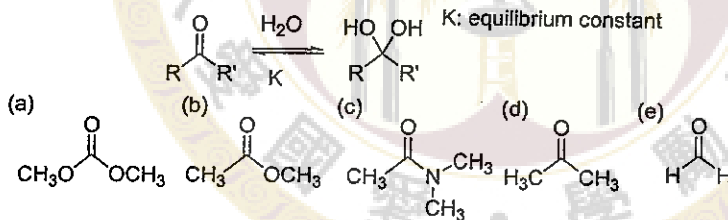
- (7) Which of the following alcohol shows the ^1H NMR spectral data below?
 ^1H NMR: δ 7.31(m, 5H), 4.55 (m, 1H), 2.26 (d, 1H), 1.78 (m, 2H), 0.91 (t, 3H)



- (8) Which of the following groups show the highest leaving ability in $\text{S}_{\text{N}}2$ reactions?

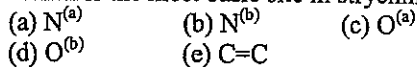


- (9) In the following hydrate formation reaction, which compound gives the largest equilibrium constant?

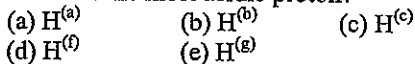


Questions (10) to (15) are about strychnine, a toxic alkaloid.

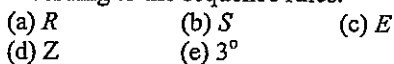
- (10) Which is the most basic site in strychnine?



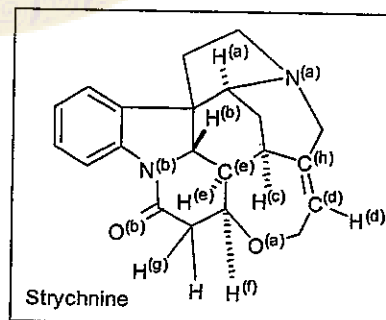
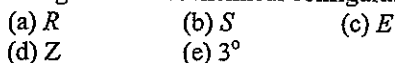
- (11) Which is the most acidic proton?



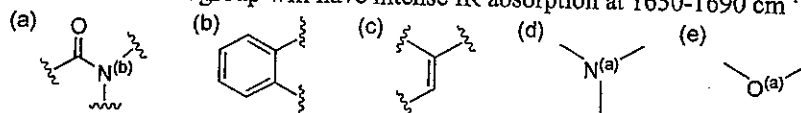
- (12) Assign stereochemical configuration to $\text{C}^{(e)}$ according to the sequence rules.



- (13) Assign the stereochemical configuration to alkene $\text{C}^{(d)}-\text{C}^{(h)}$.



(14) Which functional group will have intense IR absorption at 1650-1690 cm^{-1} ?



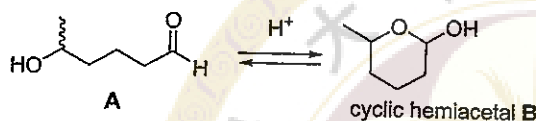
(15) How many chirality carbon centers can be identified in strychnine?

- (a) 3 (b) 4 (c) 5
(d) 6 (e) 7

第二部分：問答題 (共 40 分)

Problem 1. (16 pts)

(a) Propose reaction mechanisms for the following reactions. (5 pts)

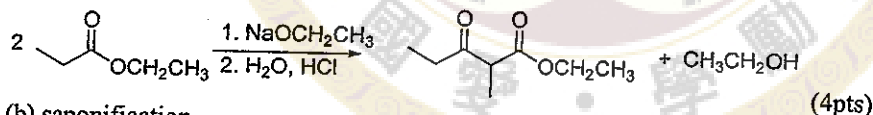


- (b) Give an IUPAC name for A (3 pts)
(c) How many stereoisomers are possible for A? (2 pts)
(d) How many stereoisomers are possible for the cyclic hemiacetal B? (2 pts)
(e) Draw all possible structural formula for B below. Their stereochemistry has to be clearly illustrated. (4 pts)

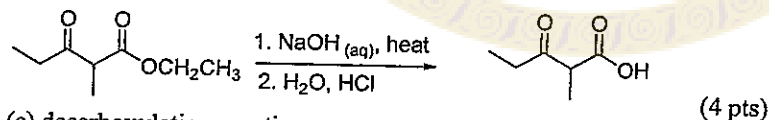
Problem 2. (12pts)

Propose reaction mechanisms for the following reaction sequence of Claisen condensation, saponification, and decarboxylation reaction.

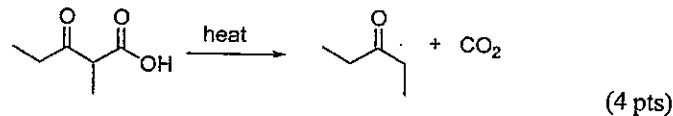
(a) Claisen condensation



(b) saponification



(c) decarboxylation reaction



Problem 3. (12pts)

Predict the structures of A, B, C, and D. The molecular weight (g mol^{-1}) of A, B, C, and D are 120.15, 165.16, 135.16, and 145.15 respectively.

