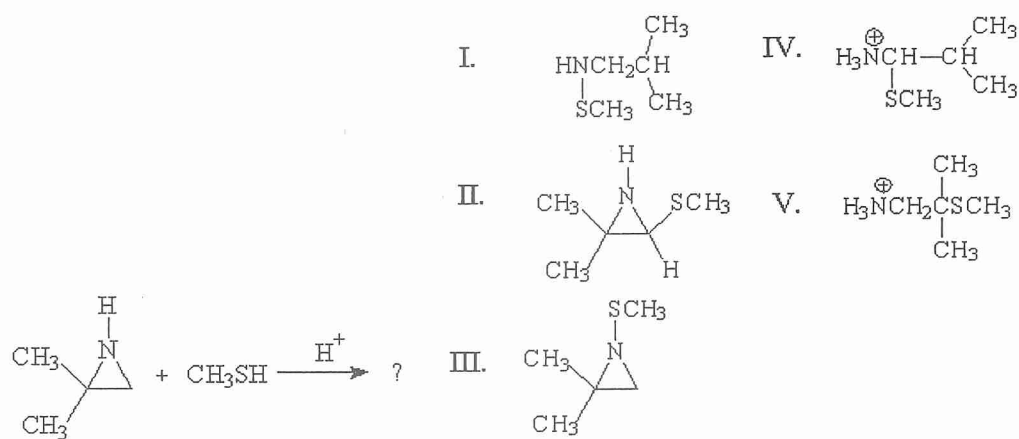


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※請在答案卷內作答

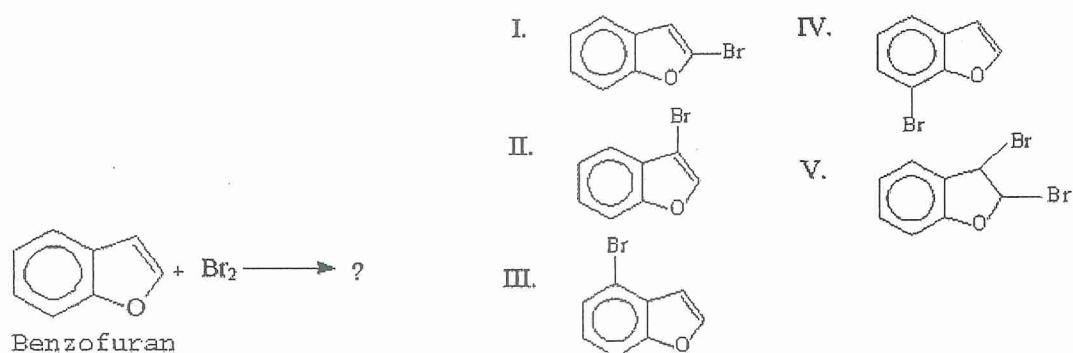
I. Choose the correct answer (2% for each, total 40%)

1. What is the major product of the following reaction?



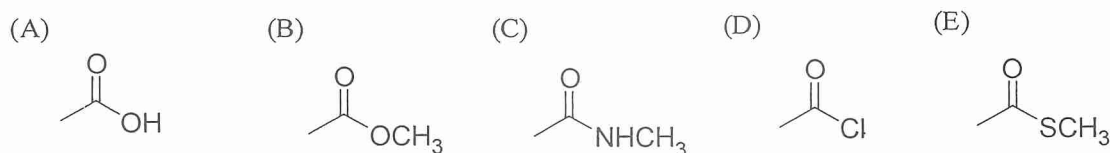
(A) I (B) II (C) III (D) IV (E) V

2. What is the major product of the following reaction?

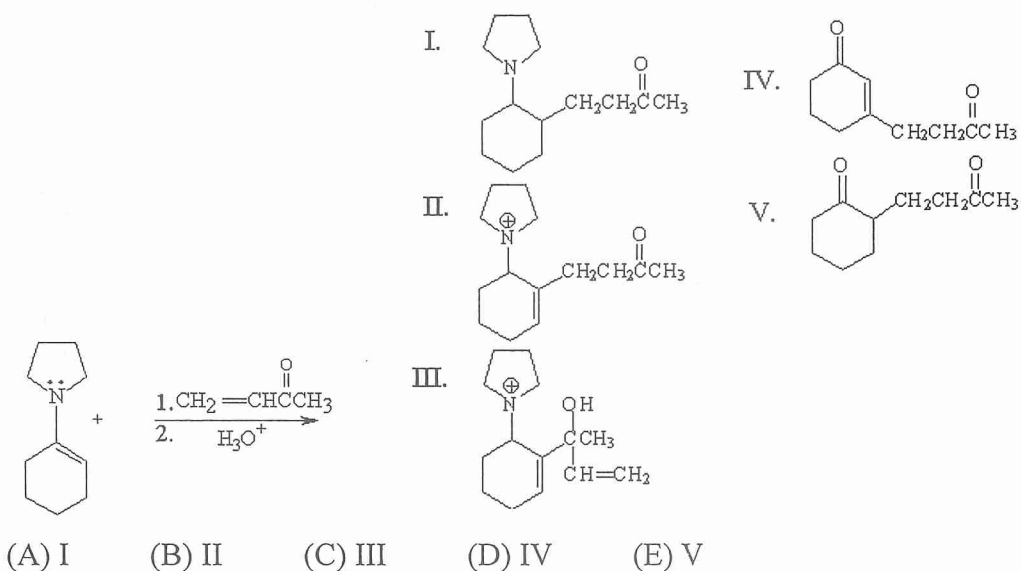


(A) I (B) II (C) III (D) IV (E) V

3. Which of the following carbonyl compounds can be reduced by $\text{H}_2/\text{Raney Ni}$?



4. What is the major organic product from the following reaction?



(A) I (B) II (C) III (D) IV (E) V

參考用

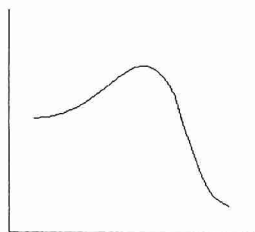
注意：背面有試題

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※請在答案卷內作答

5. Which reaction coordinate diagram best represents the reaction that occurs when NaNH_2 reacts with CH_3COCl to form acetamide?

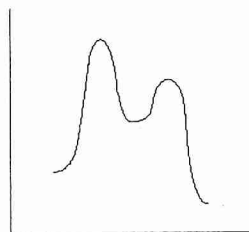
(A)



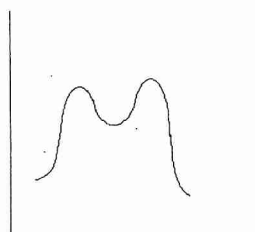
(B)



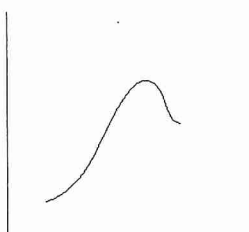
(C)



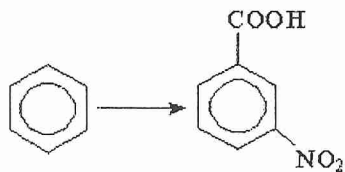
(D)



(E)



6. Which is the best method for carrying out the following reaction?



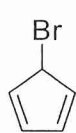
- (A) $+\text{COOH}$; $\text{HNO}_3/\text{H}_2\text{SO}_4$
 (B) $\text{CH}_3\text{Cl}/\text{AlCl}_3$; KMnO_4/H^+ , heat; $\text{HNO}_3/\text{H}_2\text{SO}_4$
 (C) $\text{CH}_3\text{Cl}/\text{AlCl}_3$; $\text{HNO}_3/\text{H}_2\text{SO}_4$; KMnO_4/H^+ , heat
 (D) $\text{HNO}_3/\text{H}_2\text{SO}_4$; $\text{CH}_3\text{Cl}/\text{AlCl}_3$; KMnO_4/H^+ , heat
 (E) $\text{HNO}_3/\text{H}_2\text{SO}_4$; $+\text{COOH}$

7. Which of the following undergoes solvolysis in water more rapidly?

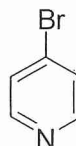
(A)



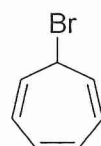
(B)



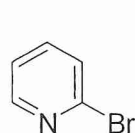
(C)



(D)

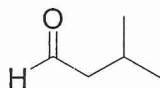


(E)

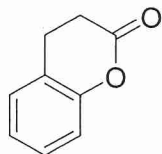


8. Which of the following compounds has a triplet at δ 9.8 ppm in its ^1H NMR spectrum?

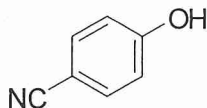
(A)



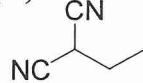
(B)



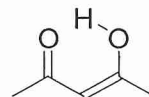
(C)



(D)



(E)



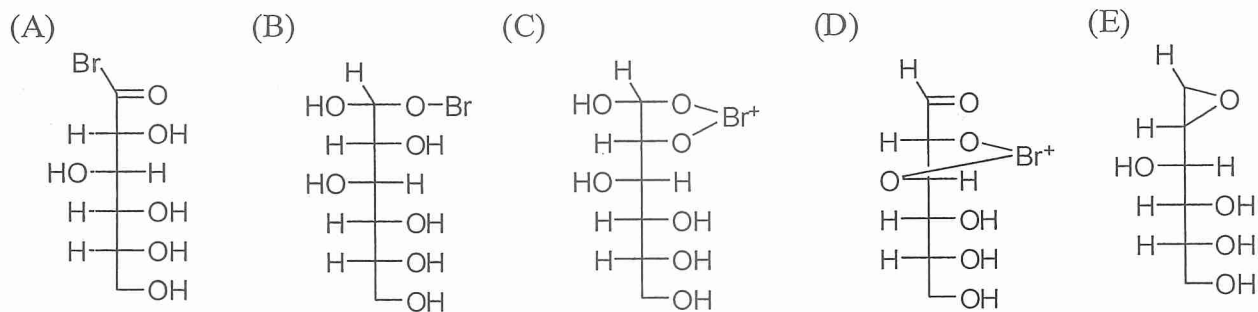
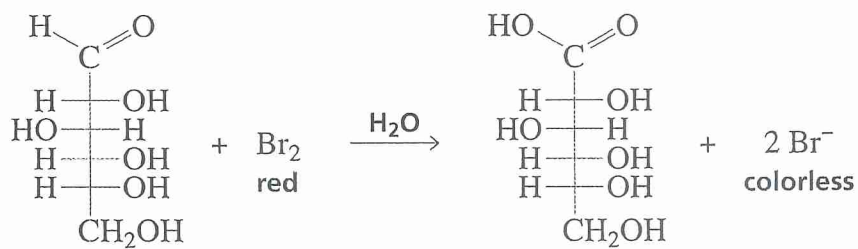
參考用

注意：背面有試題

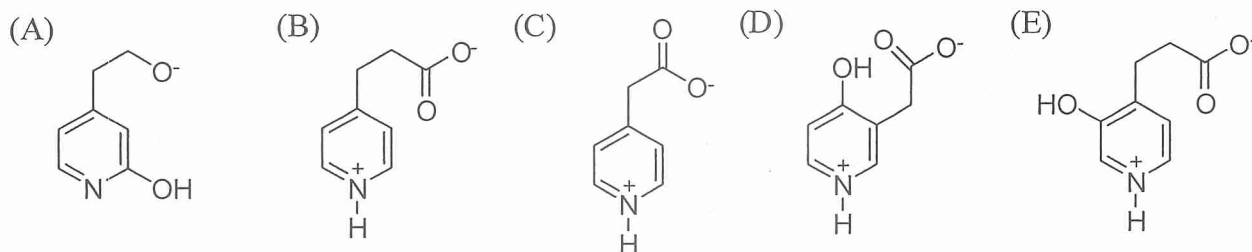
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※請在答案卷內作答

9. What is the intermediate for the following oxidation?

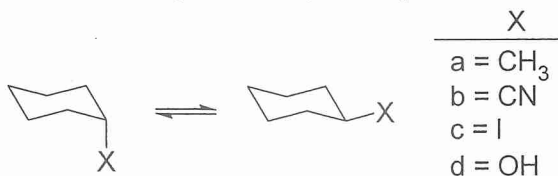


10. Which compound is more easily decarboxylated?



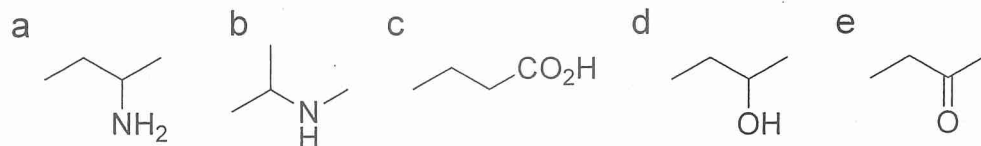
11. Order the K_{eq} s of the following compounds from the largest one to the smallest one.

$$K_{eq} = \frac{[\text{X at equatorial position}]}{[\text{X at axial position}]}$$



(A) $a > d > c > b$ (B) $a > d > b > c$ (C) $a > b > d > c$ (D) $a > c > d > b$ (E) $d > a > b > c$

12. List the following compounds from highest boiling point to lowest boiling point.



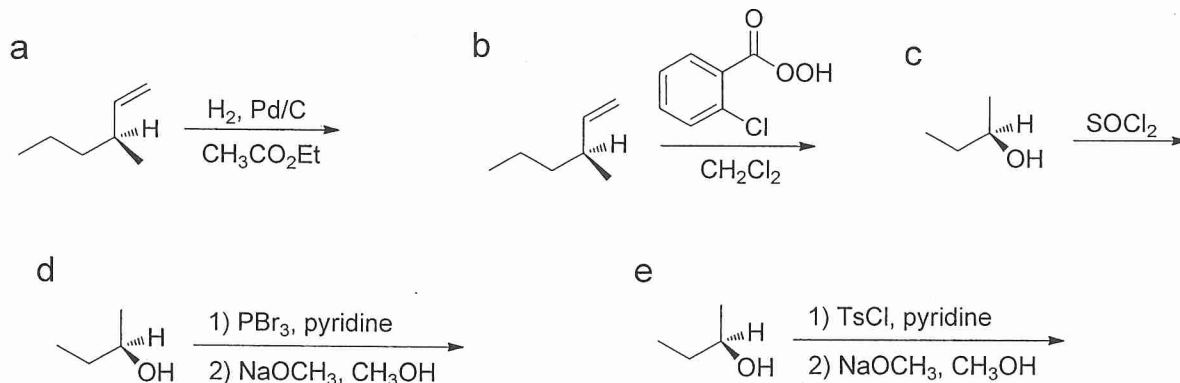
(A) $c > a > d > b > e$ (B) $a > c > d > e > b$ (C) $c > a > e > d > b$
 (D) $a > d > c > b > e$ (E) $c > d > a > b > e$

注意：背面有試題

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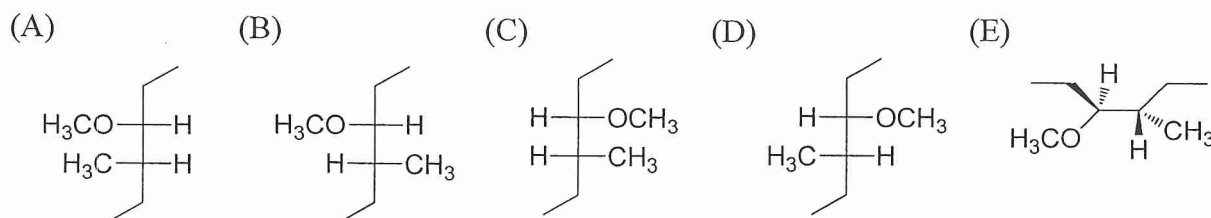
※請在答案卷內作答

13. In the following reactions, the product of which **does not** show the same configuration as reactant.

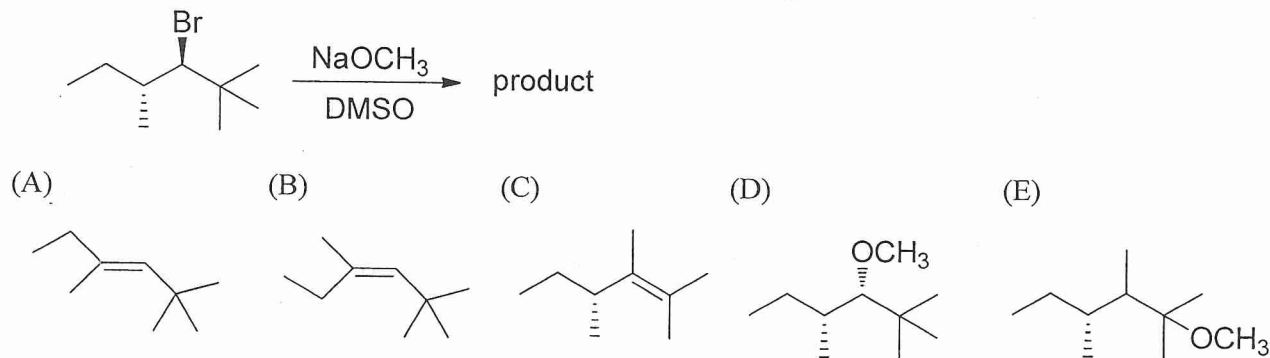


- (A) a, b, d (B) a, d (C) d, e (D) a, d, e (E) b, d

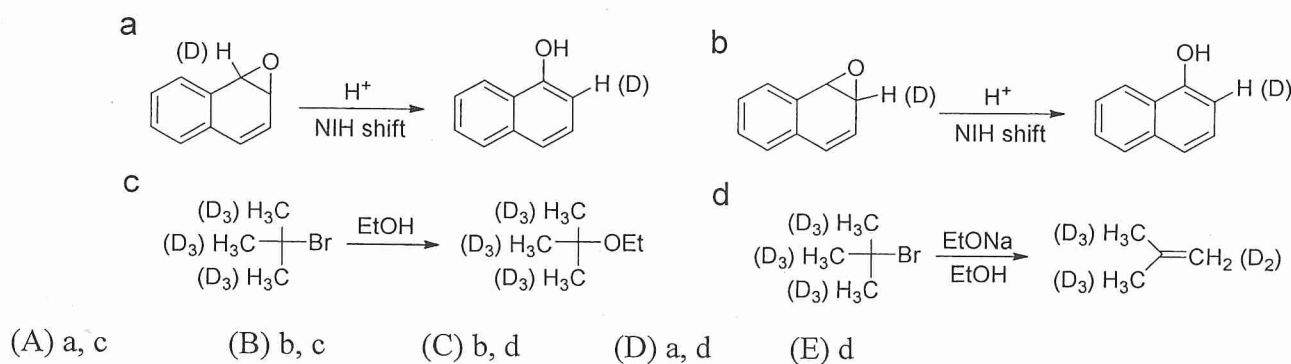
14. The product of S_N2 reaction of (3*S*,4*S*)-3-bromo-4-methylhexane with CH_3O^- is



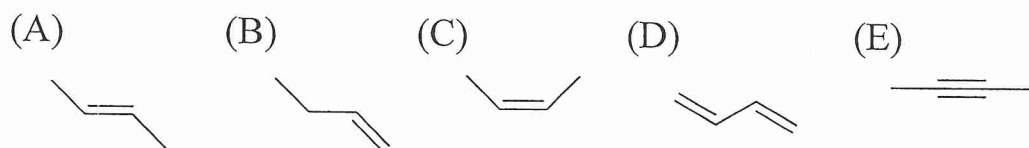
15. Which is the **most possible** reaction product of the following reaction?



16. Which reaction will give $k_H/k_D > 1$ (showing isotope effect)? (k : rate constant)



17. Which of the following compound reacts the **fastest** with HBr?



注意：背面有試題

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※請在答案卷內作答

18. When 3,3-dimethyl-1-butene is respectively treated with the following reagents, which reagent set will give the same product?

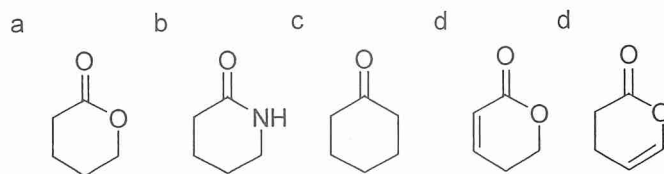
- a. 1) $\text{Hg}(\text{OAc})_2, \text{H}_2\text{O}/\text{THF}$; 2) NaBH_4
- b. $\text{H}_2\text{O}, \text{H}_2\text{SO}_4(\text{cat})$
- c. 1) BH_3/THF ; 2) $\text{H}_2\text{O}_2, \text{NaOH}, \text{H}_2\text{O}$
- d. 1) $\text{H}_3\text{CCO}_3\text{H}$; 2) NaH then H^+
- e. 1) $\text{O}_3, \text{CH}_2\text{Cl}_2, -78^\circ\text{C}$; 2) Me_2S

- (A) a, b, d (B) d, e (C) a, d (D) a, c, d (E) b, d

19. Which of the following contributes to make ΔG° more negative?

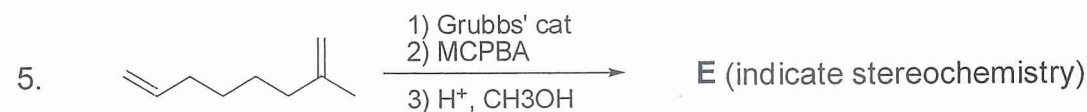
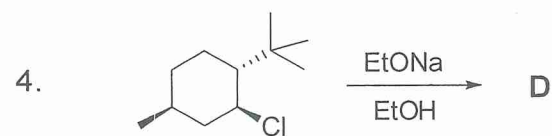
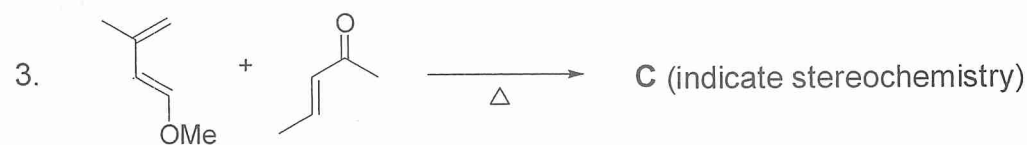
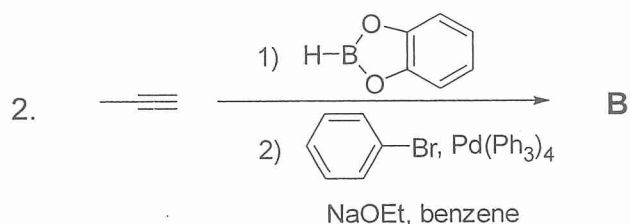
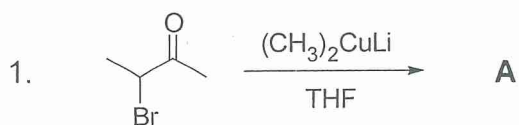
- (A) use of a catalyst
- (B) a more positive ΔH°
- (C) a more positive ΔS°
- (D) a larger rate constant
- (E) none of the above

20. Order the C=O stretching vibration of the following compounds from large wavenumber to small wavenumber



- (A) $a > c > d > e > b$ (B) $e > a > d > c > b$ (C) $a > b > d > c > e$
 (D) $e > c > b > a > d$ (E) $d > a > b > c > e$

II. Please provide the major products of the following reactions (3% for each answer, total 33%)



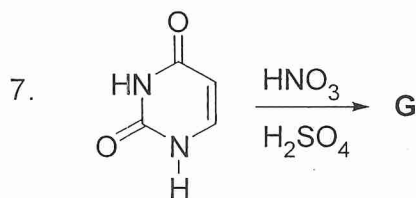
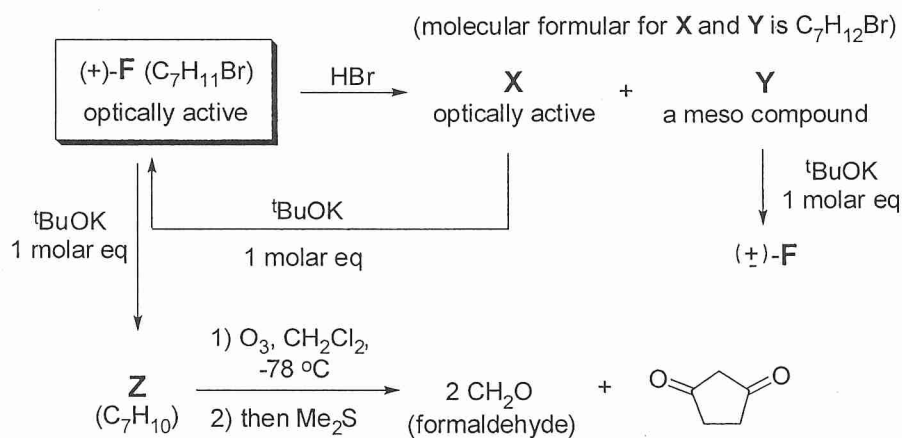
參考用

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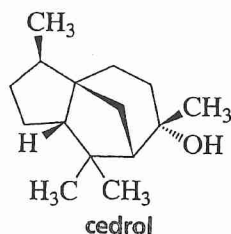
※請在答案卷內作答

6. Compound **F** is respectively treated with reagents and the resulting products are shown in the following. Please provide the stereo-structure of compound **F**.



8. (a) An unknown compound-**H** has the formula $C_8H_{10}OS$, and is known to contain a thiophene ring. The proton NMR spectrum of this compound is:
 d 0.98, triplet, 3H; d 1.74, sextet, 2H; d 2.80, triplet, 2H; d 7.04, multiplet, 1H; d 7.55, multiplet, 2H.
 What is the structure of this unknown **H**?
 (b) How can the unknown **H** be prepared from thiophene?

9. Cedrol-**I** is a terpene that is isolated from essential oils. (a) What class of terpene is it? (b) Mark off the isoprene units in **I**.



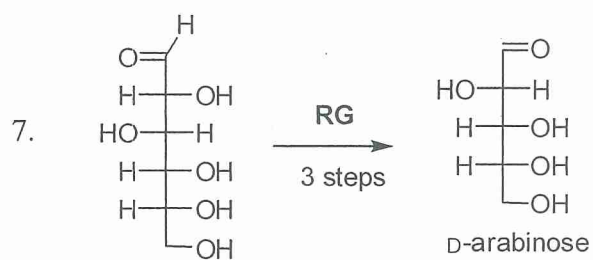
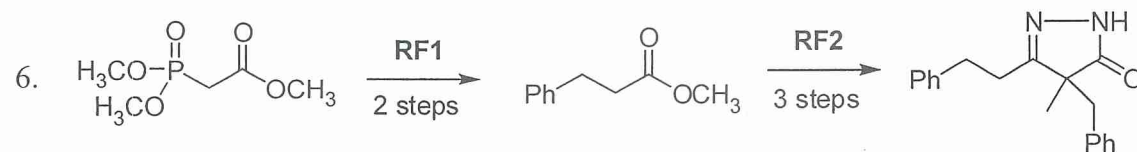
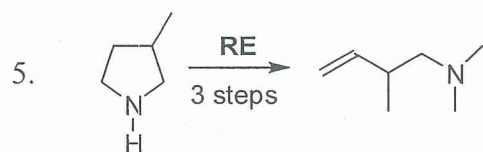
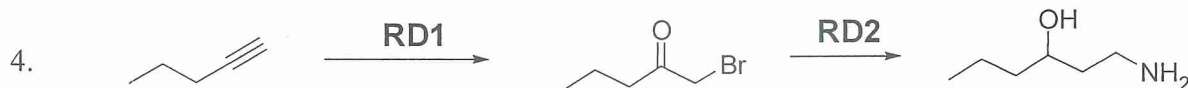
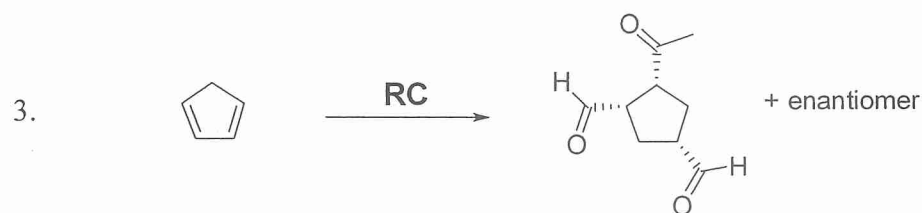
10. A decapeptide-**J** undergoes partial hydrolysis to give peptides whose amino acids are shown below. Reaction of the decapeptide with Edman's reagent releases PTH-leu. What is the sequence of the decapeptide-**J**?
- (1) Pro, Ser (5) Glu, Ser, Val, Pro
 (2) Gly, Gly (6) Glu, Pro, Gly
 (3) Met, Ala, Leu (7) Met, Leu
 (4) Gly, Ala (8) His, Val

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III. Please provide a suitable reagent or a set of reagents for the following transformations (3% for each answer, total 27%)



參考用

