

國立臺北科技大學九十六學年度碩士班招生考試

系所組別：3620 生物科技研究所乙組

第二節 有機化學 試題

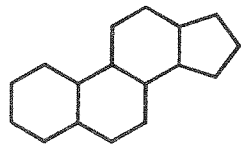
第一頁 共五頁

**注意事項：**

1. 本試題共 20 題，配分共 100 分。
2. 請標明大題、子題編號作答，不必抄題。
3. 全部答案均須在答案卷之答案欄內作答，否則不予計分。

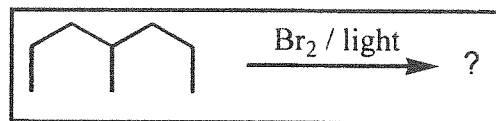
Part I. Please choose a best answer for the each following questions  
(3 points each; 75 points total)

1. All steroids are derivatives of the ring system shown. How many **tertiary hydrogens** are in this ring system?



- A) none                      B) 2                      C) 4  
D) 5                          E) 6

2. Predict the MAJOR Product of the following reaction:

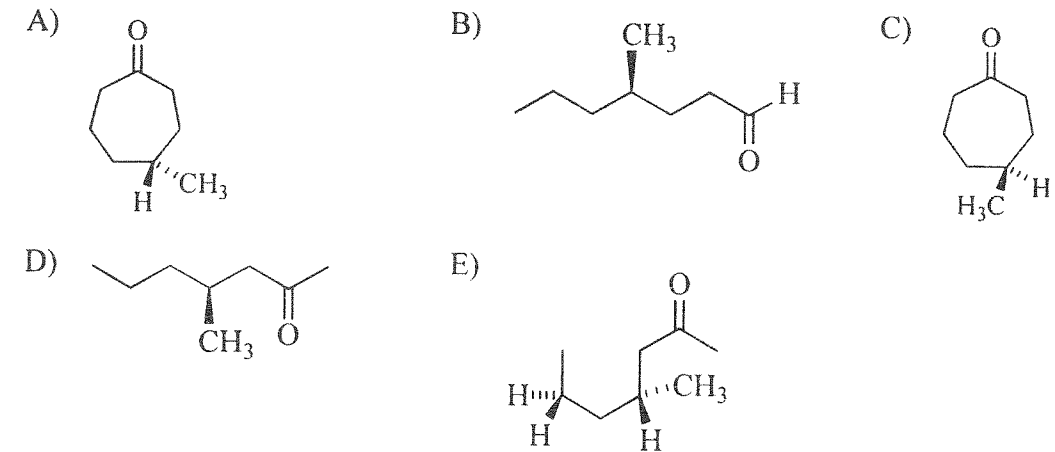


- A)      B)      C)   
D)      E)

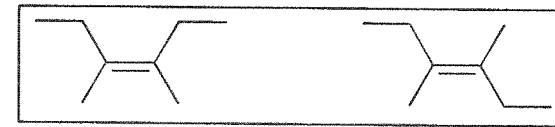
3. Which of the following disubstituted cyclohexanes could exist in a conformation which has both groups equatorial?

- A) *cis*-1,3-dimethylcyclohexane      B) *cis*-1,4-dimethylcyclohexane  
C) *trans*-1,3-dimethylcyclohexane      D) *cis*-1,2-dimethylcyclohexane  
E) all or none can have both groups equatorial.

4. What is the correct structure for (*R*)-4-methyl-2-heptanone?

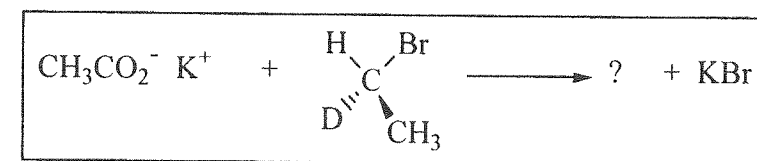


5. The following two molecules may be described as:



- A) constitutional isomers      B) diastereomers      C) enantiomers  
D) structural isomers      E) none of these

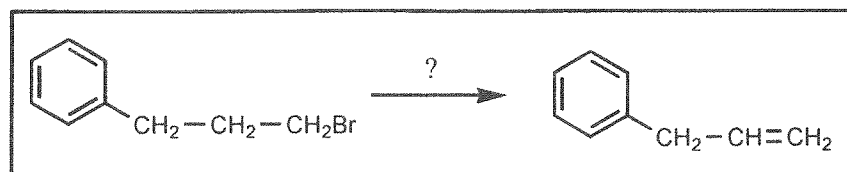
6. What would be the organic product of the following reaction?



- A)      B)      C)   
D) All of these      E) None of these

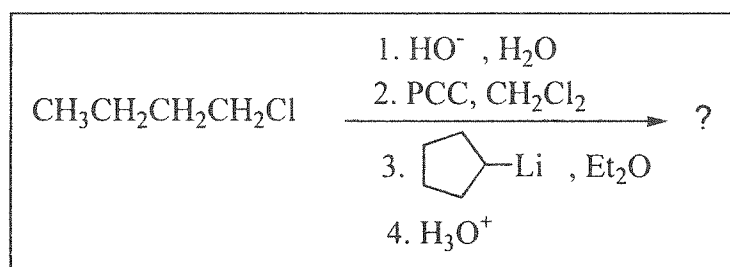
注意：背面尚有試題

7. Which of the bases below would be best to accomplish the following reaction?



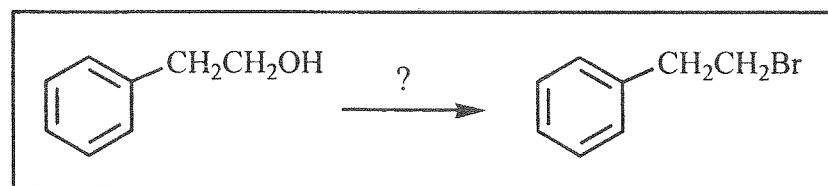
- A)  $\text{CH}_3\text{O}^- \text{Na}^+$       B)  $\text{CH}_3\text{CH}_2\text{O}^- \text{Na}^+$       C)  $(\text{CH}_3)_2\text{CHO}^- \text{Na}^+$   
 D)  $(\text{CH}_3)_3\text{CO}^- \text{Na}^+$       E)  $\text{Na}^+ \text{OH}^-$

8. What is the expected product of the following reaction?



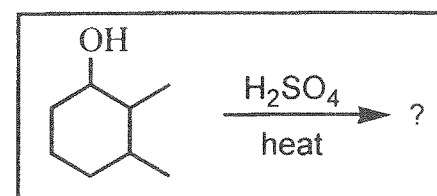
- A)      B)      C)   
 D)      E)

9. What reagent would best accomplish the following reaction?



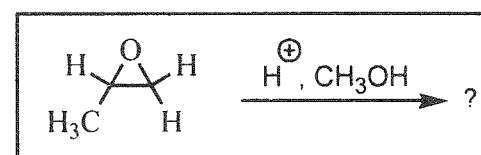
- A)  $\text{Br}_2$       B)  $\text{NaBr}$       C)  $\text{CH}_3\text{Br}$   
 D)  $\text{NH}_4^+ \text{Br}^-$       E)  $\text{PBr}_3$

10. What is the MAJOR product of the following reaction?



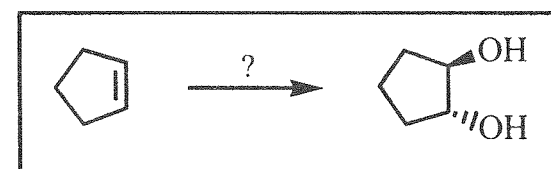
- A)      B)      C)   
 D)      E)

11. What is the MAJOR product of the following reaction?



- A)      B)      C)   
 D)      E)

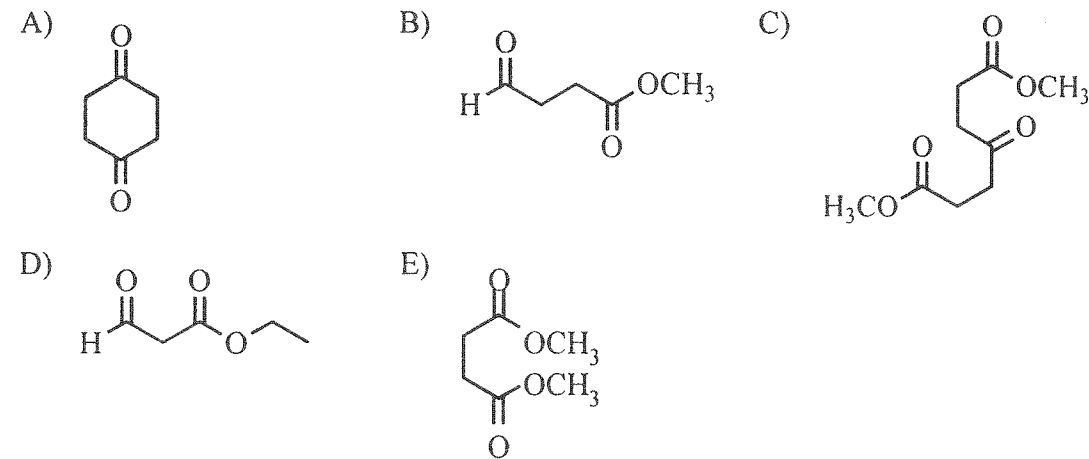
12. What reagents would be required to accomplish the following transformation?



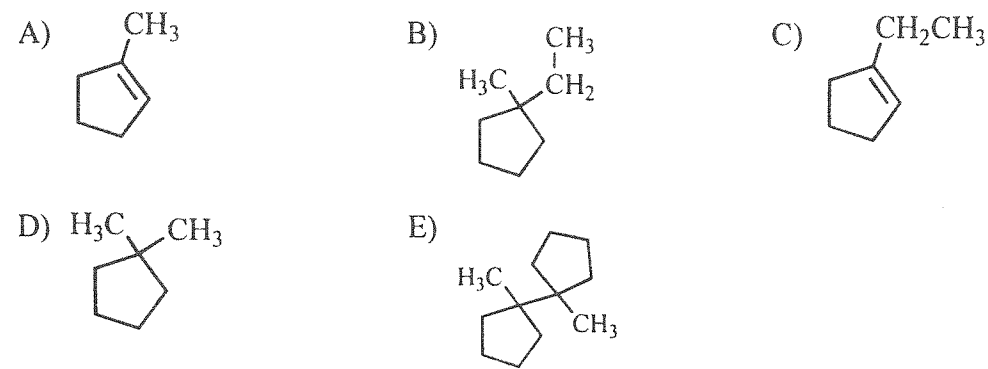
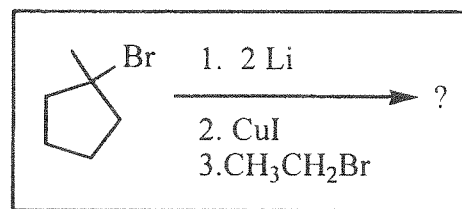
- A)  $\text{KMnO}_4, \text{OH}^-, \text{H}_2\text{O}$       B)  $\text{BH}_3$  then  $\text{H}_2\text{O}_2$       C)  $\text{CH}_3\text{CO}_3\text{H}$  then  $\text{H}_2\text{O}, \text{H}^+$   
 D)  $\text{OsO}_4, \text{tBuOOH}, \text{H}_2\text{O}$       E)  $\text{Br}_2, \text{H}_2\text{O}$

13. The following spectra data was most likely obtained from which compound?

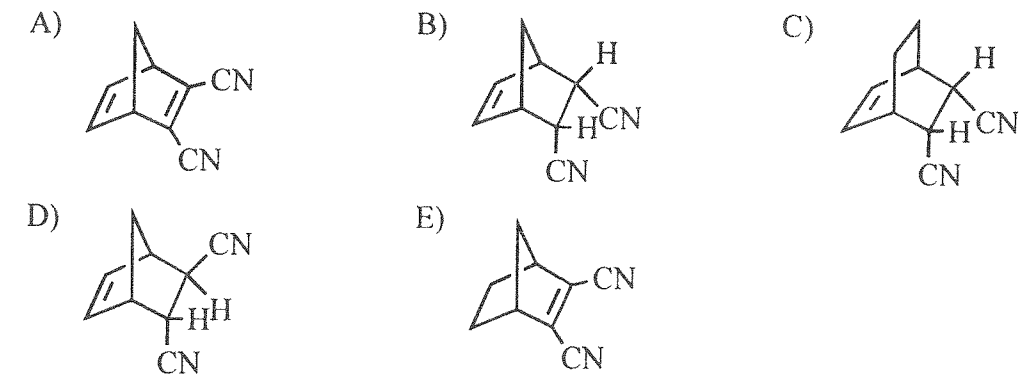
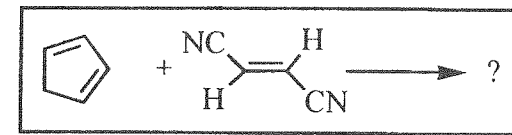
IR Bands (cm <sup>-1</sup> )	proton NMR	Carbon-13 NMR														
3000 1740 1695	<table border="1"> <thead> <tr> <th>Chemical shift (ppm)</th> <th>Multiplicity</th> </tr> </thead> <tbody> <tr> <td>3.85</td> <td>Singlet</td> </tr> <tr> <td>2.70</td> <td>Triplet</td> </tr> <tr> <td>2.25</td> <td>Triplet</td> </tr> </tbody> </table>	Chemical shift (ppm)	Multiplicity	3.85	Singlet	2.70	Triplet	2.25	Triplet	<table border="1"> <thead> <tr> <th>Chemical shift (ppm)</th> </tr> </thead> <tbody> <tr> <td>200</td> </tr> <tr> <td>170</td> </tr> <tr> <td>70</td> </tr> <tr> <td>35</td> </tr> <tr> <td>30</td> </tr> </tbody> </table>	Chemical shift (ppm)	200	170	70	35	30
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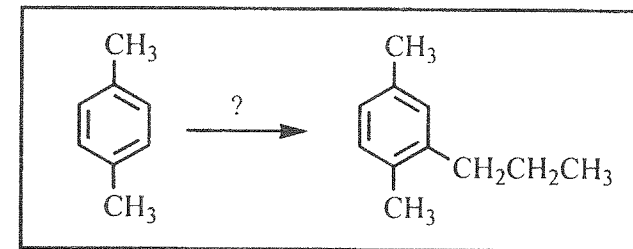
14. What would be the product of the following reactions?



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

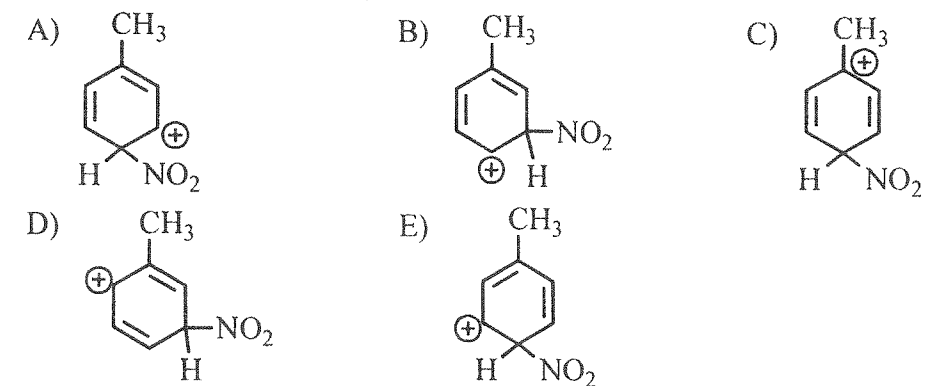


16. What reagent(s) would be required to accomplish the following reaction?

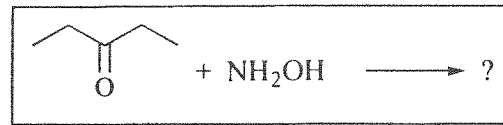


- A)  $\text{CH}_3\text{CH}_2\text{C}(=\text{O})\text{Cl}$ ,  $\text{AlCl}_3$   
 B)  $\text{CH}_3\text{CH}_2\text{CH}_2\text{Cl}$ ,  $\text{AlCl}_3$   
 C) reagents in A, followed by  $\text{H}_2\text{NNH}_2$ ,  $\text{KOH}$ , heat  
 D) reagents in B followed by zinc and  $\text{HCl}$   
 E)  $\text{CH}_3\text{CH}=\text{CH}_2$ ,  $\text{H}_2\text{SO}_4$

17. Which of the following resonance structures is the most stable?

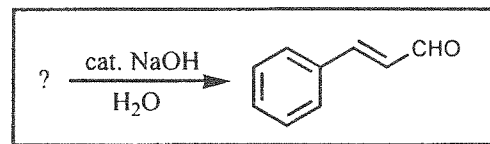


18. What product would you expect from the following reaction?



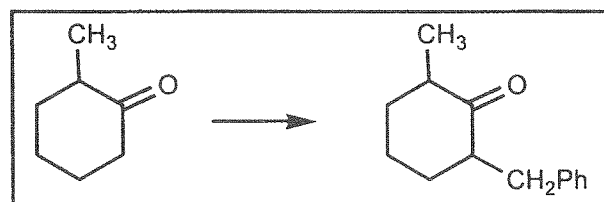
- A)
- B)
- C)
- D)
- E)

19. What reactants would be used to produce cinnamaldehyde?



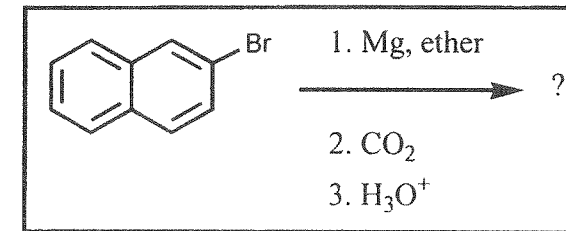
- A)
- B)
- C)
- D)
- E)

20. Which set of reagents would be needed for the following conversion?



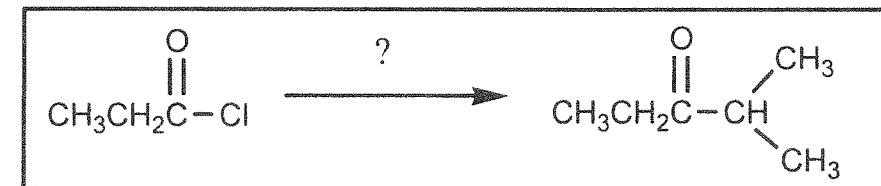
- A)  $\text{NaOCH}_2\text{CH}_3$ ,  $\text{CH}_3\text{I}$     B)  $\text{PhCH}_2\text{MgBr}$ , then  $\text{H}_3\text{O}^+$     C)  $\text{CH}_3\text{MgBr}$ , then  $\text{PhCH}_2\text{Br}$   
 D)  $\text{H}_3\text{O}^+$ , then  $\text{PhCH}_2\text{Br}$     E)  $\text{LDA}$ , then  $\text{PhCH}_2\text{Br}$

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



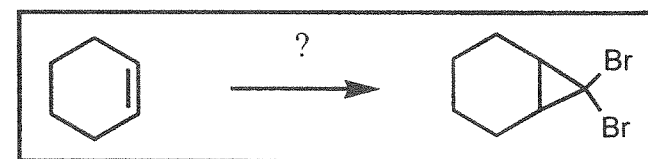
- A)
- B)
- C)
- D)
- E) None of these.

22. What reagent is needed to complete the reaction shown?



- A)  $((\text{CH}_3)_2\text{CH})_2\text{CuLi}$     B)  $\text{KCN}/\text{NaOH}$     C)  $\text{HOCH}(\text{CH}_3)_2$   
 D)  $\text{BrMgCH}(\text{CH}_3)_2$     E)  $(\text{CH}_3)_2\text{CHLi}$

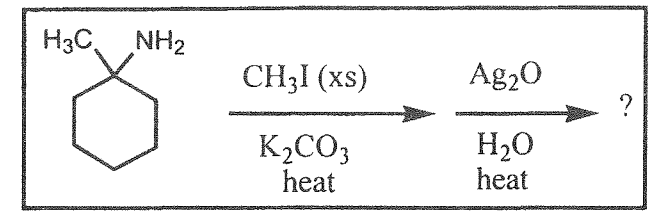
23. What reagent(s) would accomplish the following reaction?



- A)  $\text{CH}_2\text{Br}_2$ ,  $\text{Zn}(\text{Cu})$     B)  $\text{C}_6\text{H}_5\text{CO}_3\text{H}$ , then  $\text{HBr}$   
 C)  $\text{CHBr}_3$ ,  $\text{KOC}(\text{CH}_3)_3$     D)  $\text{CH}_3\text{MgBr}$ , then  $\text{Br}_2$  and  $\text{H}_2\text{O}$   
 E)  $\text{CH}_3\text{MgBr}$ ,  $\text{ZnBr}_2$

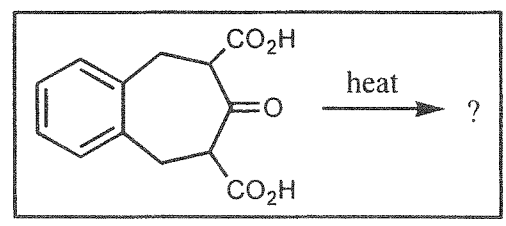
2-9

24. Which of the following products would you expect to result from the following reactions?



- A)
- B)
- C)
- D)
- E)

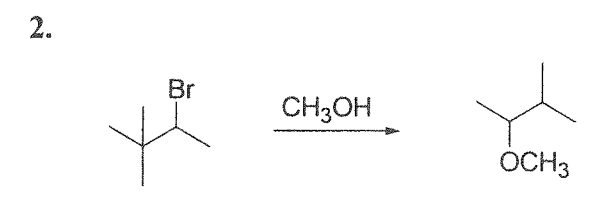
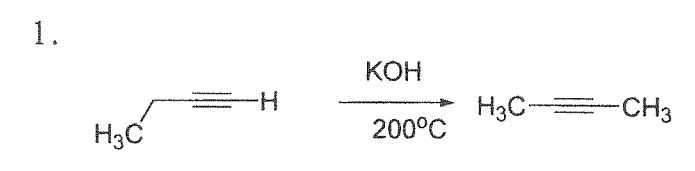
25. Predict the products of the following reaction.



- A)
- B)
- C)
- D)
- E) None of these.

3-10

Part II. Propose a mechanism for the following reaction using the curved arrow formalism. (5 points each, 10 points total)



Part III. How would you carry out the following transformation? More than one step may be necessary. Show all reagents and intermediate structures. (15 points)

