

# 淡江大學 104 學年度日間部轉學生招生考試試題

34-1

系別：化學學系三年級

科目：有機化學

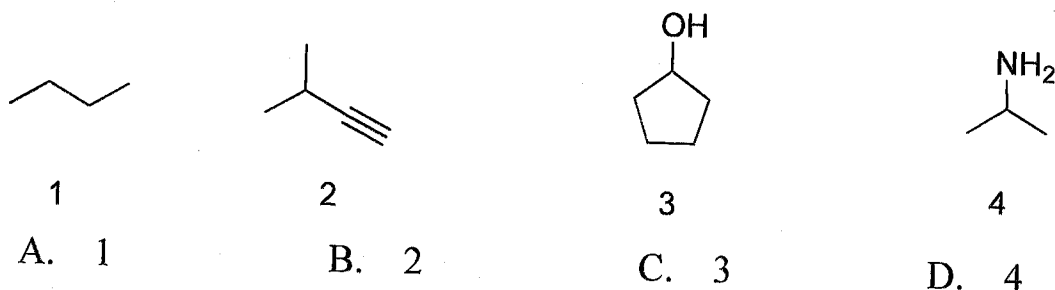
PI

考試日期：7月26日(星期日) 第3節

本試題共 五大題， 6 頁

## I. Multiple choice (40 pts, 2 pts each)

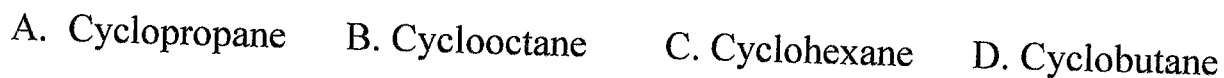
1. Which of the following structures contains an amine?



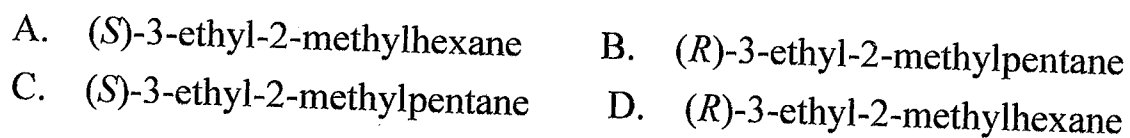
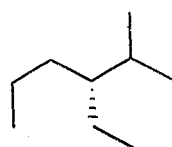
2. Which of the following compounds is the most acidic?



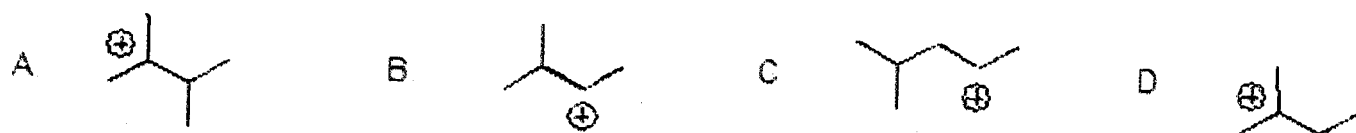
3. Which of the following cycloalkanes has the least angle strain?



4. Which of the following is the correct IUPAC name for the following structure?



5. Which of the following cations is likely to undergo rearrangement?



本試題雙面印刷

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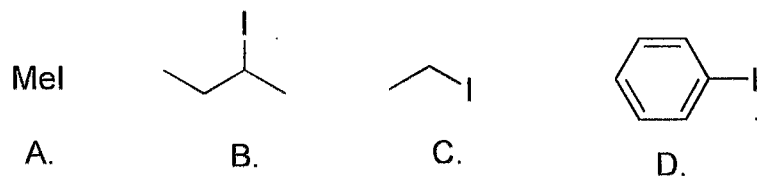
科目：有機化學

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考試日期：7月26日(星期日) 第3節

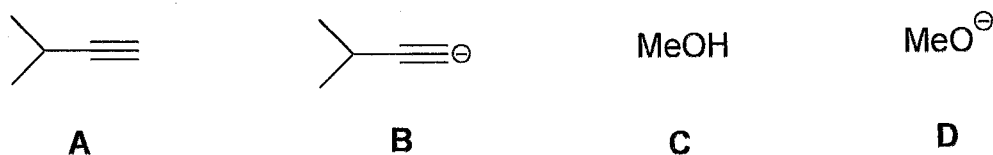
本試題共五大題，6 頁

6. Rank the following substrates from most to least reactive in an  $S_N2$  reaction.

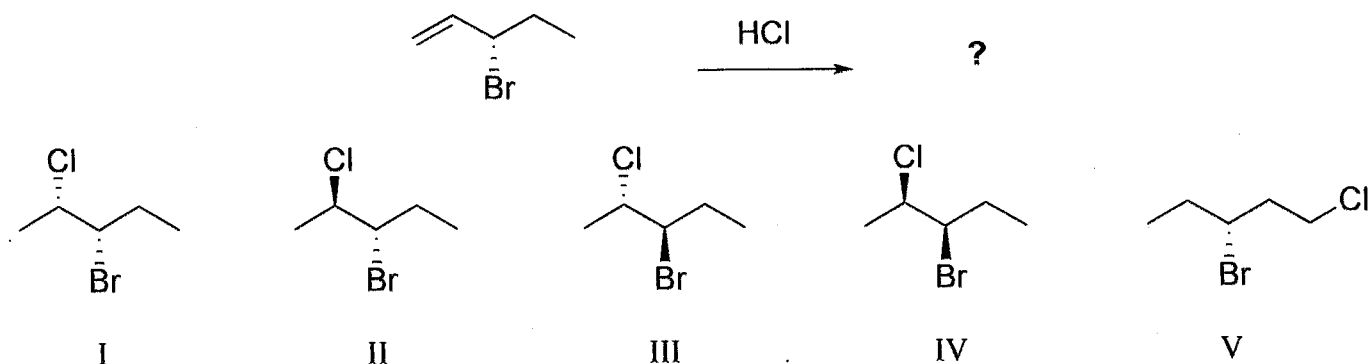


- A. A>C>B>D      B. D>C>B>A      C. A>B>C>D      D. D>A>B>C

7. Which of the following is the strongest nucleophile?

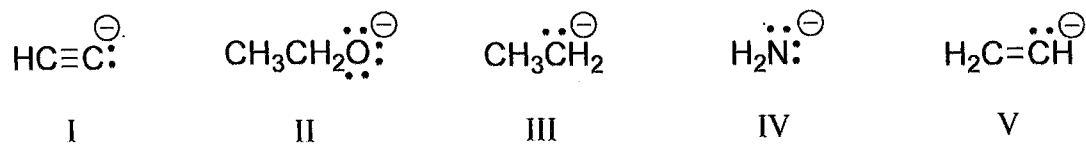


8. The expected major product(s) of HCl addition to the alkene shown would be:



- A. I and II      B. II and III      C. I and IV      D. V

9. Rank the following bases, with the strongest base first, then by decreasing basicity.



- A. III > I > V > II > IV      B. III > IV > II > V > I  
 C. V > I > III > II > IV      D. III > V > IV > I > II

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P3

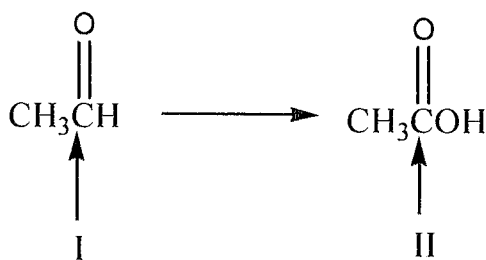
系別：化學學系三年級

科目：有機化學

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本試題共 五 大題， 6 頁

10. What is the oxidation state of the carbon atoms I and II in the following reaction?

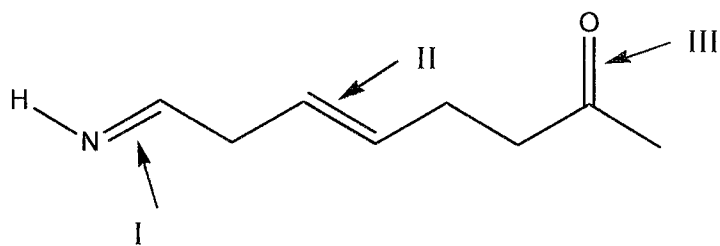


- A. I. +1, II. +2    B. I. +2, II. +2    C. I. +1, II. +3    D. I. +3, II. +2

11. Which one of the following compounds will have the highest boiling point?

- A.  $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2\text{CH}_3$     B.  $\text{CH}_3\text{CH}_2\text{CH}_2\text{CH}_2\text{OH}$   
C.  $\text{CH}_3\text{CH}_2\text{CH}_2\text{OCH}_3$     D.  $\text{CH}_3\text{CH}_2\text{OCH}_2\text{CHOH}$

12. Rank the indicated bonds in decreasing (highest to lowest) order of wavenumber.



- A. III>II>I    B. I>II>III    C. II>I>III    D. III>I>II

13. Carboxylic acids show a very broad absorption for the OH compared to alcohols, because they can form a \_\_\_\_\_.

- A. polymer    B. dimer    C. trimer    D. tetramer

14. Which of the following is true about the number of signals in a  $^1\text{H}$  NMR spectrum?

- A. it indicates the number of neighboring protons  
B. it indicates the electronic environment of neighboring protons  
C. it indicates the number of different kinds of protons  
D. it indicates the electronic environment of absorbing protons

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34.5 P4

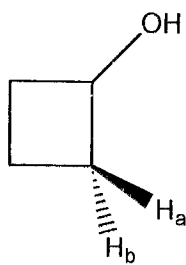
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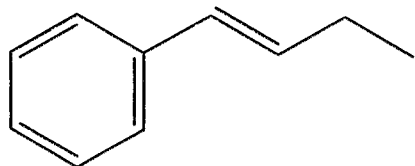
本試題共 五 大題， 6 頁

15. Protons  $H_a$  and  $H_b$  in the following compound are \_\_\_\_\_.



- A. homotopic    B. enantiotopic    C. diastereotopic    D. mesotopic

16. How many signals would you expect to find in the  $^1H$  NMR spectrum of the following compound?



- A. 9    B. 8    C. 7    D. 6

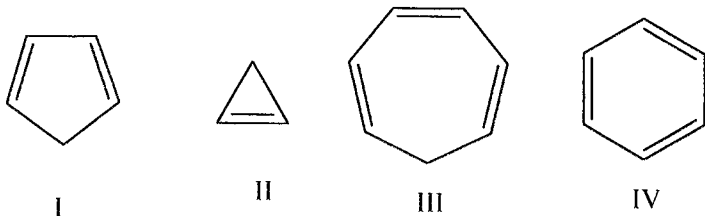
17. Presence of which of the following protons is confirmed by  $D_2O$  exchange?

- A. OH    B. C-H    C.  $NH_2$     D. A & C

18. How many electrons does the HOMO of 1,3-pentadiene have in its excited state?

- A. 1    B. 2    C. 3    D. 4

19. Which one of the following compounds is most acidic?



- A. I    B. II    C. III    D. IV

20. Predict the major product for the reaction between benzene and 2-chlorobutane in the presence of  $AlCl_3$ .

- A. chlorobenzene    B. *sec*-butylbenzene    C. ethylbenzene    D. isopropylbenzene

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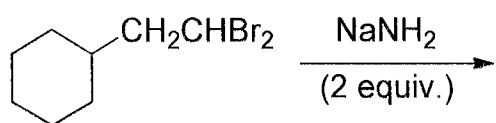
34.6 P5

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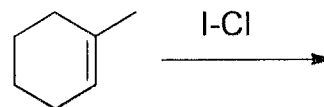
本試題共 五大題，6 頁

II. Provide the major product of each following reactions and indicate the **stereochemistry** if necessary. (30 pts, 2 pts each).

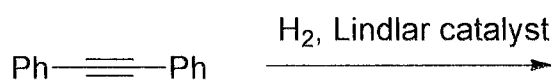
(a)



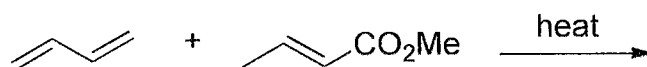
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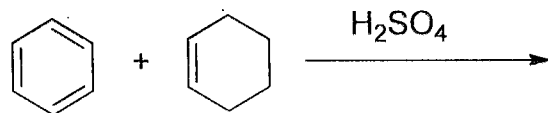
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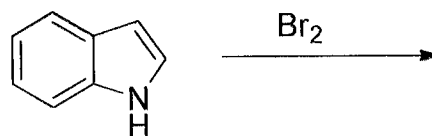
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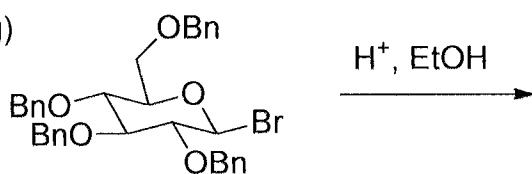
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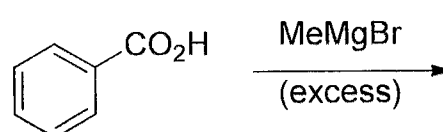
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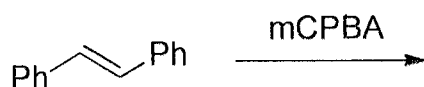
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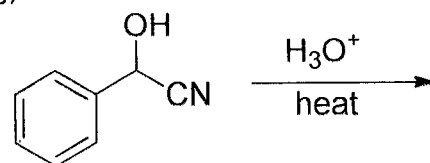
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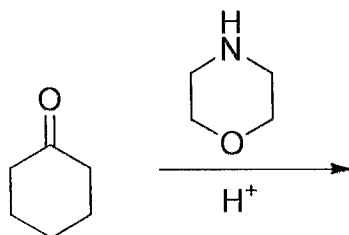
(i)



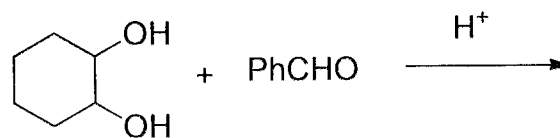
(j)



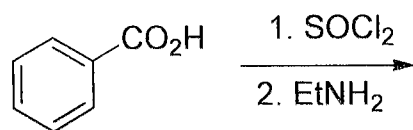
(l)



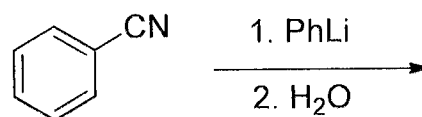
(m)



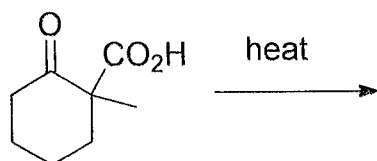
(n)



(o)



(p)



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34.17 P6

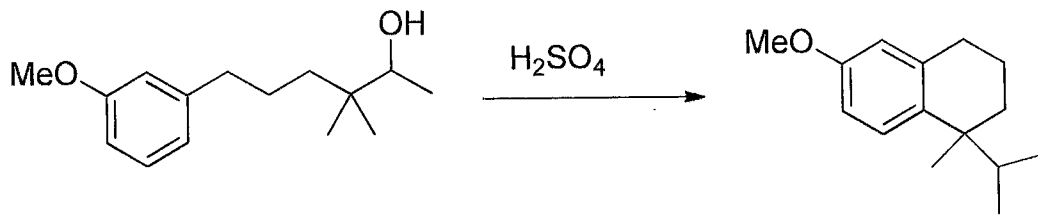
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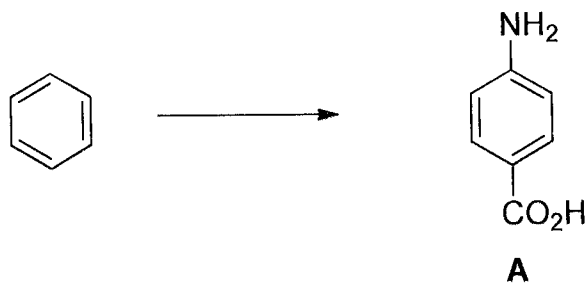
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III. Draw a stepwise, detailed mechanism for the following transformation. (10 pt)



IV. Synthesis the following compound A from benzene and any other organic or inorganic reagents. Show in detailed transformation. (10 pt)



V. Draw the most stable chair conformation of the following compound A. While compound A was treated with a strong base to undergo E2 elimination. What is the resulting major product? Explain. (10 pt)

