

科目：有機化學(2002)

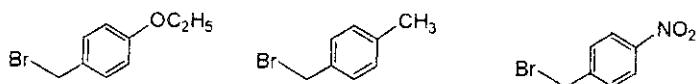
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1. Answer the following questions and give a brief explanation for your answer.

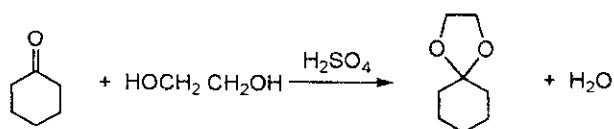
(a) Which of the following compounds is the most unstable one? (2%)

cyclopropenone, cyclopentadienone, cycloheptatrienone

(b) Which of the following compounds is the easiest one to react through  $S_N1$  mechanism? (2%)



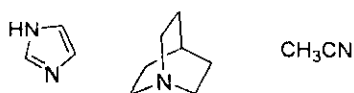
2. Provide a stepwise reaction mechanism for the following transformation. (4%)



3. Provide a sequence of simple chemical tests that would allow one to distinguish one of the following compounds from the others. (4%)



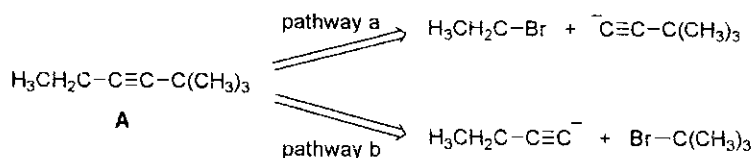
4. Arrange the following nitrogen containing compounds in an order of increasing basicity, and give a brief explanation of your arrangement. (2%)



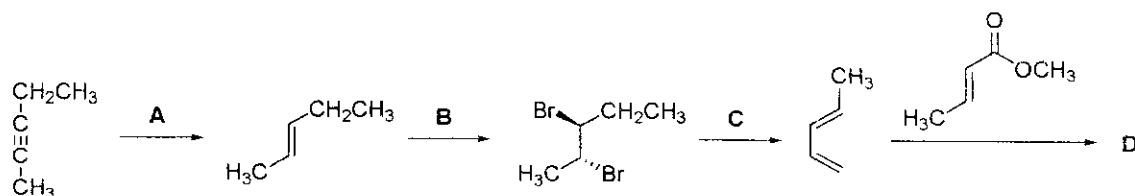
5. Draw the most stable conformation in Newman projection for 1,2-ethanediol. (1%)

6. Draw the chemical structure for (2R,3S)-2-bromo-3-pentanol in Fisher projection. (1%)

7. Which pathway is favorable for the synthesis of compound A? Give a brief explanation of your prediction. (2%)



8. Give the structures of reagents (A, B, C) and the product (D) for the following transformation. (6%)

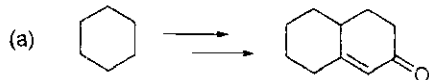


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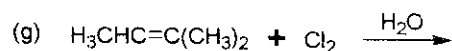
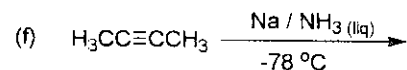
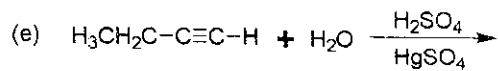
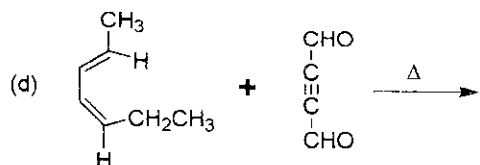
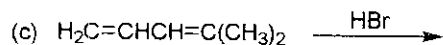
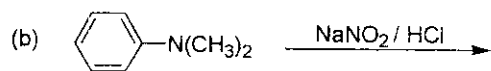
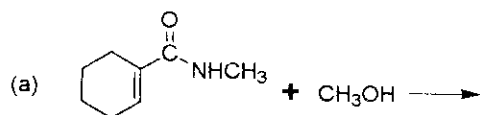
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參考用

9. Provide a synthetic scheme for each of the following compounds from the readily available starting materials. (8%)



10. Give the expected major product(s) with the right stereochemistry specification(s) (if applicable) for the following reactions: (12%)



11. A mass spectrum shows significant peaks at  $m/z = 87, 115, 140$  and  $143$ . Which of the following compounds is responsible for that mass spectrum: 4,7-dimethyl-1-octanol, 2,6-dimethyl-4-octanol, or 2,2,4-trimethyl-4-heptanol? (3%)

12. Identify the compound from the following  $^1\text{H}$  NMR data and molecular formula: (3%)



1.15 ppm (3H) triplet; 1.25 ppm (3H) triplet; 2.33 ppm (2H) quartet;

4.13 ppm (2H) quartet.