大同大學 100 學年度研究所碩士班入學考試試題

考試科目：有機化學　　所別：生物工程研究所　　

註：本次考試 不可以參考自己的書籍及筆記； 不可以使用字典； 不可以使用計算器。

1. Draw the most stable chair conformation of the following molecules, and estimate the amount of strain in each: (The steric strain caused by 1,3-diaxial interactions of CH_3—H, CH_3CH_2—H and Cl—H is 3.8, 4.0 and 1.0 kJ/mol.) (10%)

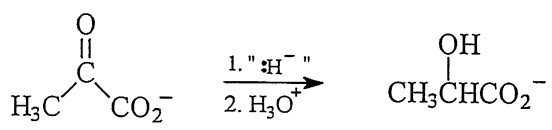
   (a) *trans*-1-Chloro-3-methylcyclohexane　　(b) *cis*-1-Chloro-4-ethylcyclohexane

2. What products would you expect from the bromination of 4,4-dimethylcyclohexene with NBS(*N*-bromosuccinimide)? Draw the radical intermediates and explain which product is the major. (10%)

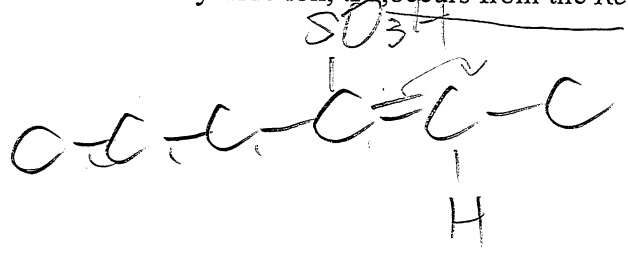
3. Predict the products from reaction of hex-2-yne with the following reagents: (10%)

   (a) 1 equiv HBr　　(b) 2 equiv Br_2　　(c) H_2O, H_2SO_4, $HgSO_4$　　(d) $KMnO_4$, H_3O^+　　(e) excess H_2, Pd/C

4. Lactic acid buildup in tired muscles results from reduction of pyruvate. If the addition of hydride ion, :H⁻, occurs from the *Re* face, what is the stereochemistry of the product? (10%)

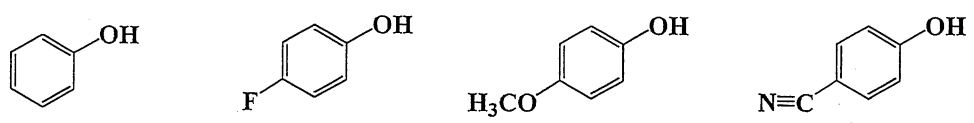


Pyruvate　　Lactate

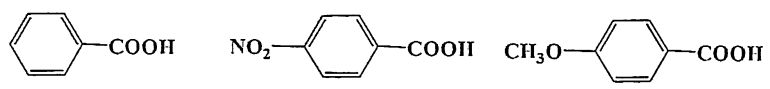


5. Rank the following substituted phenols in order of increasing acidity, and explain your answer. (10% ; 4/3/3)

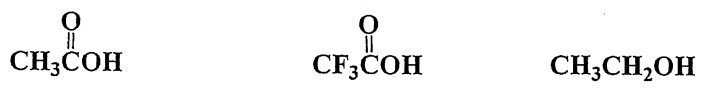
(a)



(b)



(c)

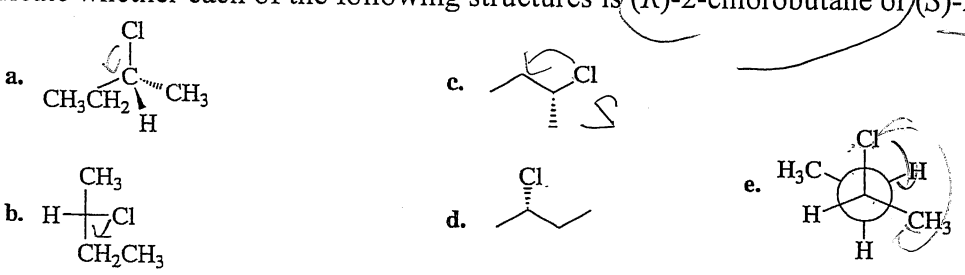


6. Which reactant in each of the following pairs is more nucleophilic. (10%)

   (a). $^-NH_2$ or NH_3　(b). H_2O or $CH_3CO_2^-$　(c). BF_3 or F^-

   (d). $(CH_3)_3P$ or $(CH_3)_3N$　(e). ^-I or ^-Cl

7. Indicate whether each of the following structures is (*R*)-2-chlorobutane or (*S*)-2-chlorobutane.(10%)



〈背面繼續〉

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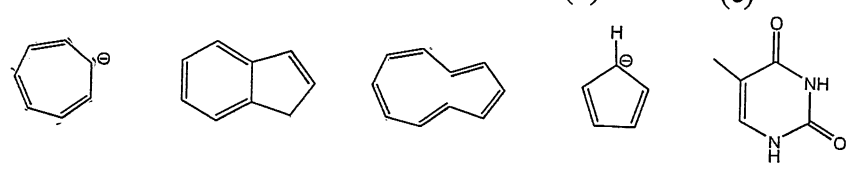
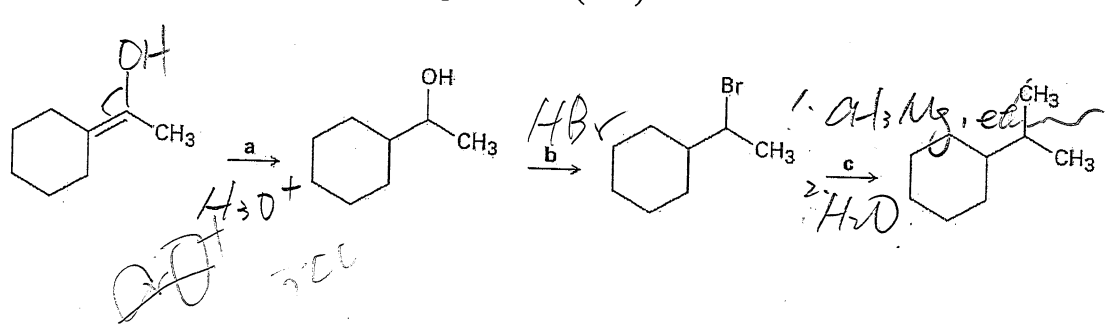
8. Identify the following compounds are aromatic or antiaromatic and give the appropriate reason for each. (10 %)

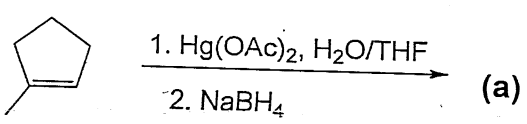
(a) (b) (c) (d) (e)



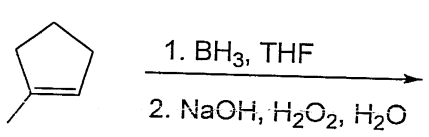
9. Identify the reagents **a-c** in the following scheme: (6 %)



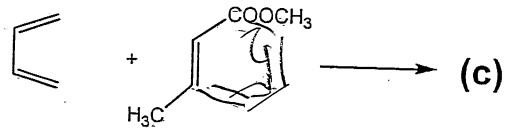
10. Give the major product of each of the following reactions. (14%)



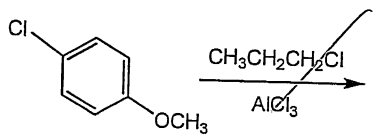
(a)



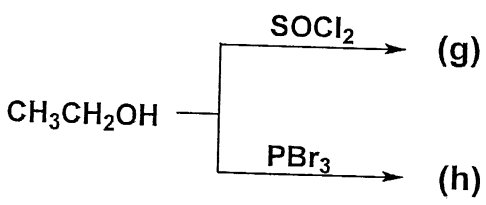
(b)



(c)



(d) + (e)



(g) CH_3CH_2Cl ($HCl + SO_2$)

(h) CH_3CH_2Br.