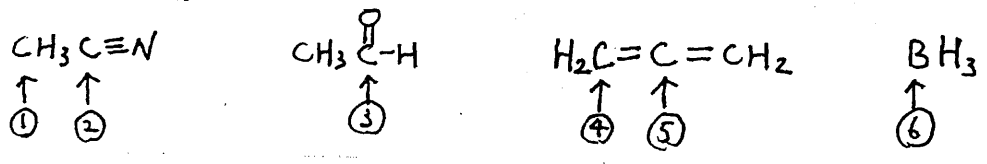
大同大學 九十四 學年度 轉學考試 試題

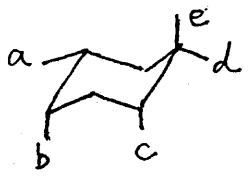
考試科目：有機化學　系別：生物工程學系　　第 1 頁，共 1 頁

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。

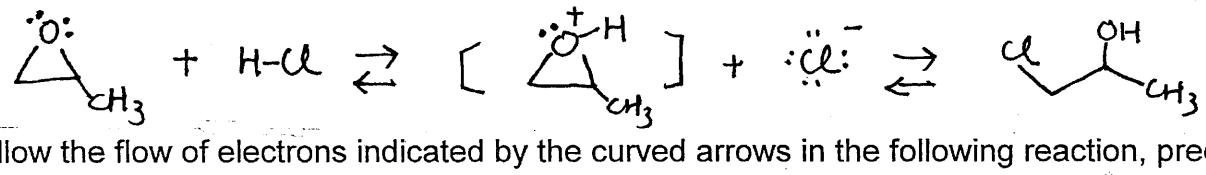
1. (a) Give the ground-state electron configuration for carbon (atomic number 6). (2%)
   (b) How many electrons does carbon have in its valence shell? (2%)
   (c) Determine the hybridization for the indicated atoms in each structure below. (6%)



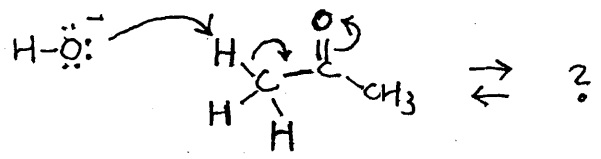
2. Refer to the structure below to answer the following questions:
   (a) Which of the labeled bonds in the structure are *equatorial* bonds? (2%)
   (b) Which of the labeled bonds is *trans* to bond b? (2%)
   (c) Which bonds have 1,3-diaxial interaction with each other? (2%)
   (d) Draw the two chair conformations of *cis*-1-*tert*-butyl-4-chlorocyclohexane. Which is more stable? (4%)



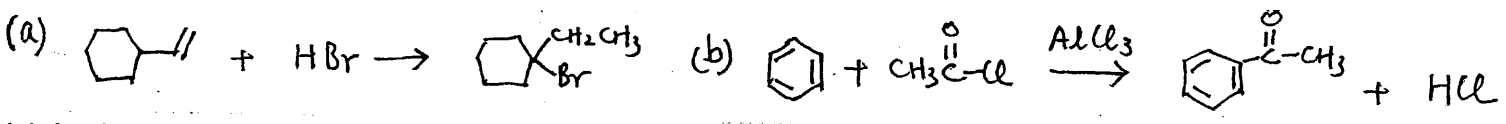
3. Draw structures corresponding to the following names: (a) 3-Isopropylcyclopentene, (b) 1,4-Pentadiene, (c) 4-Chloro-2-heptyne, (d) *p*-Aminobenzoic acid, (e) 2,4,6-Trinitrotoluene (10%)
4. (a) Add curved arrows to the following reaction to indicate the flow of electrons: (5%)



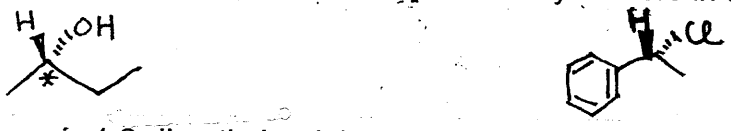
   (b) Follow the flow of electrons indicated by the curved arrows in the following reaction, predict the products that result: (5%)



5. Write the complete stepwise mechanism for the following reactions. Show all intermediate structures and all electron flow with curved arrows. (10%)



6. (a) Assign *R* or *S* configurations to the chirality centers in the following molecules: (4%)



   (b) Does *cis*-1,2-dimethylcyclobutane have any chirality centers? Is it chiral? Explain your answer. (6%)
7. Describe the effects of each of the following variables on S_N2 reactions: (a) Solvent (b) Leaving group (c) Nucleophile (d) Substrate (10%)
8. Predict the major organic product(s) of the following reactions: (30%)