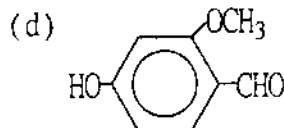
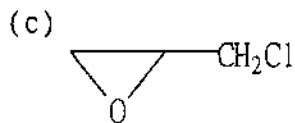


請將答案依序寫在答案紙上

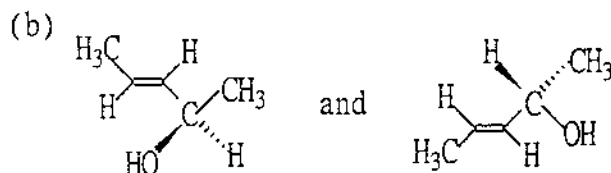
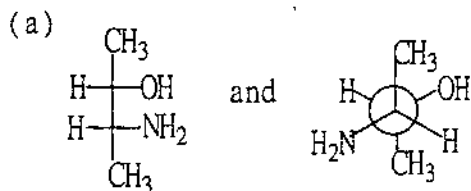
1. Give the IUPAC name for each of the following compounds. (8%)

(a)  $\text{CH}_3\text{MgBr}$       (b)  $\text{NH}_2\text{CH}_2\text{CO}-\text{CO}_2\text{H}$



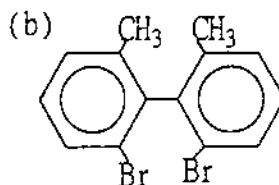
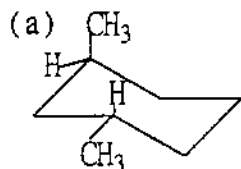
2. Draw the two stereoisomeric, cis- and trans-, bicyclo[4.4.0]decanes (decalin,  $\text{C}_{10}\text{H}_{18}$ ) in their stable chair forms. Which one, cis- or trans-, is more stable? Why? (6%)

3. Give the stereochemical relationships between the following pairs of isomers (same compound, structural isomers, enantiomers, diastereomers). (4%)

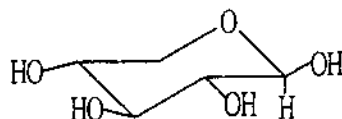


4. For each of the following compounds (6%)

- (1) Star any chiral carbon atoms.
- (2) Label each chiral carbon as (R) or (S).
- (3) Label the structures as chiral or achiral.



5. Draw the structure of the open-chain form (Fischer projection) of the following monosaccharide:

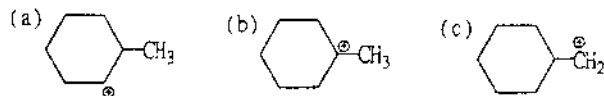


Is it an aldose or ketose? D- or L-form? (4%)

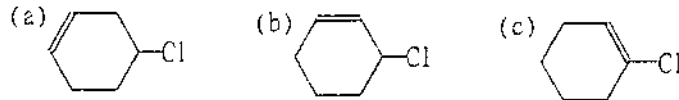
(背面仍有題目,請繼續作答)

6. List the following compounds in decreasing order of: (e.g.  $a > b > c$ ) (10%)

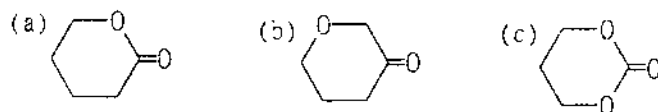
(1) Stability of carbocation:



(2) Rate of  $S_N1$  reaction:



(3) Acidity:



(4) Dipole moment: (a) 1-Butene (b) trans-2-Butene (c) 2-Methylpropene

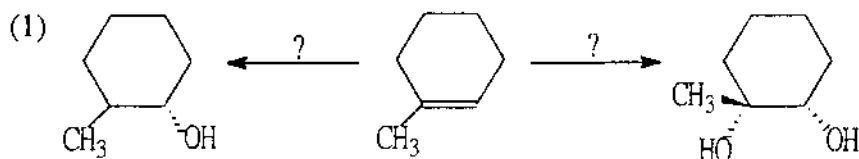
(5) Heat of hydrogenation: (a) Allene (b) 1-Butyne (c) 2-Butyne

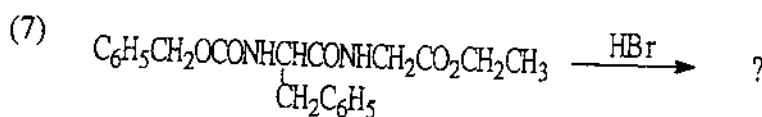
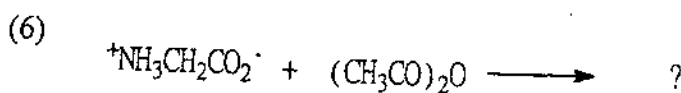
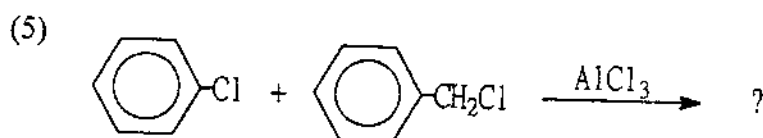
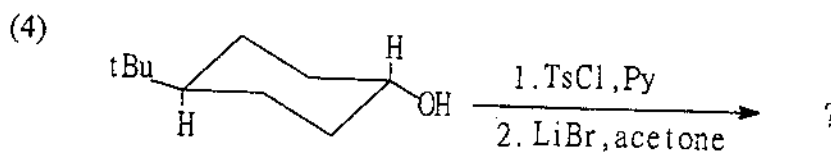
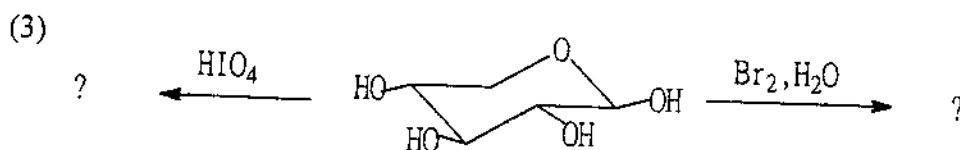
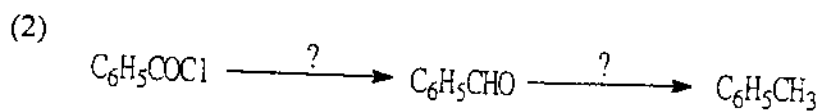
7. Draw the energy diagrams for  $\pi$  molecular orbitals of cyclobutadiene and cyclopentadienyl anion. Is either aromatic according to Hückel rule? (4%)

8. Draw resonance structures for cyanobenzene. Discuss the resonance effects of the cyano substituent on the ring; whether it activate or deactivate the aromatic ring? What position(s) in the ring is more negative or positive charged? (6%)

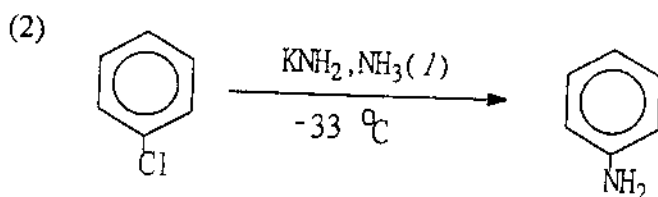
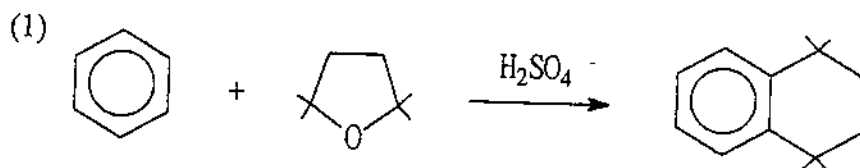
9. Draw the potential energy diagram for the addition reaction of HBr to 1,3-butadiene. Show clearly the molecules of reactants, intermediates and products in the diagram. Explain that which product occurs faster and which product is more stable. (6%)

10. Supply the missing reactants, reagents, or products, as required, to complete the following equations: (20%)

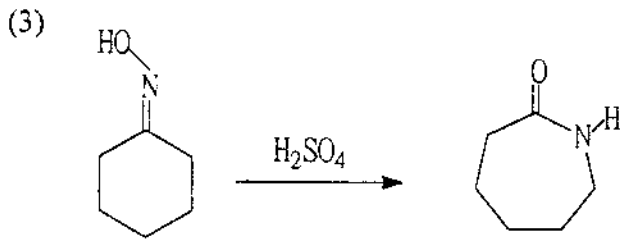




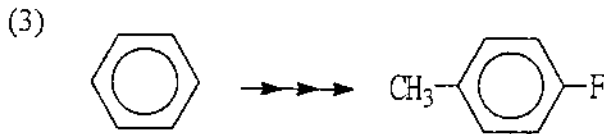
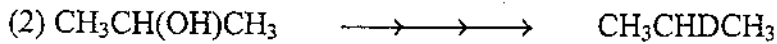
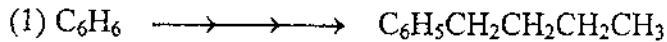
11. Propose the mechanism to account for the following reactions: (10%)



(背面仍有題目,請繼續作答)



12. Show how each of the following transformations could be carried out. (10%)



13. The compound (m.p.  $248^\circ C$ ) whose spectral data are shown below. Deduce the structure of the compound and account for all the observed data. (6%)

