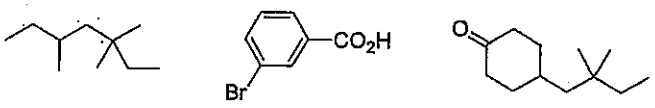
第一題 **(Problem 1)** Give IUPAC names for the following compounds

(i) 4 pts　　(ii) 4 pts　　(iii) 4 pts



第二題 **(Problem 2)** Answer the following questions about glyceraldehyde, the simplest monosaccharide.

(i) Sight along the C*-C** bond, draw the Newman projection of glyceraldehyde. (3 pts)

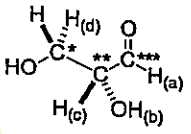
(ii) Among the carbon atoms, C*, C**, and C***, which one is a chirality center. (3 pts)

(iii) Assign *R* or *S* configuration to the chirality center. (3 pts)

(iv) Among the protons $H_{(a)}$, $H_{(b)}$, $H_{(c)}$, and $H_{(d)}$, which one is the most acidic proton? (3 pts)

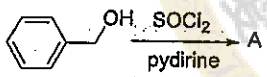
(v) On catalytic hydrogenation, glyceraldehyde can be converted to glycerol. Write the structural formula of glycerol. (3 pts)

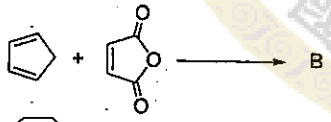
(vi) What is the specific rotation of glycerol? (3 pts)

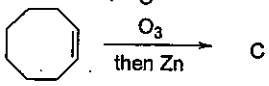


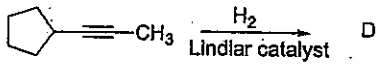
Glyceraldehyde

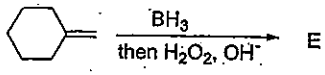
第三題 **(Problem 3)** Predict the products of the following reactions. (4 pts for each answer, totally 32 pts)

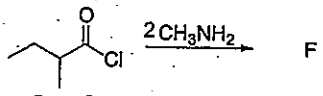
(i)


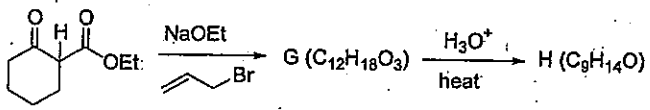
(ii)


(iii)


(iv)


(v)


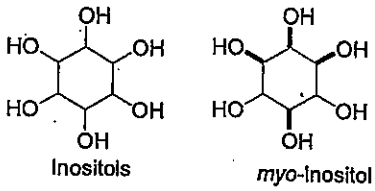
(vi)


(vii)


見背面

第四題 **(Problem 4)**

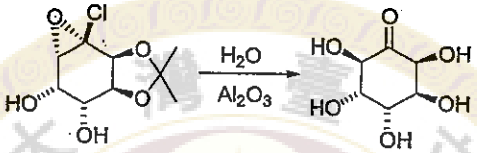
Cyclohexane-1,2,3,4,5,6-hexol, also known as inositol, is a chemical compound with a formula of $C_6H_{12}O_6$ or $(\text{-CHOH-})_6$.



(i) Draw chemical structures for all stereoisomeric inositols. (9 pts)

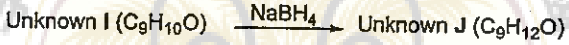
(ii) *myo*-Inositol is one of the isomers. Draw *myo*-inositol in chair-forms. (4 pts)

(iii) Propose reaction mechanisms for the following transformation. (4 pts)



第五題 **(Problem 5)**

Propose chemical structures for the unknowns **I** and **J**. (6 pts)

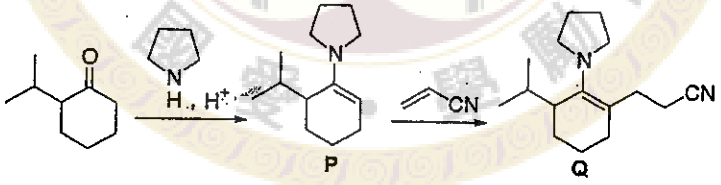


The ^{1}H NMR data of unknown **I**: δ 7.3-7.9 (multiplet, 5H); 2.92 (quartet, 2 H); 1.18 (triplet, 3H); IR: 1690 cm^{-1}

The ^{1}H NMR data of unknown **J**: δ 7.16-7.36 (multiplet, 5H); 4.54 (triplet, 1 H); 2.32 (broad singlet, 1 H), 1.74 (quintet, 2 H); 0.88 (triplet, 3H); IR: 3400 cm^{-1} (broad)

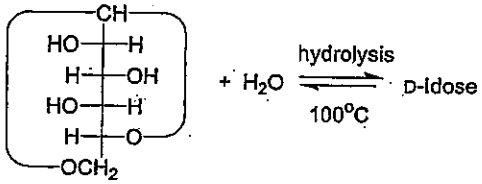
第六題 **(Problem 6)**

Propose reaction mechanisms for the formation of **P** and **Q** in the following reaction sequence. (6 pts)



第七題 **(Problem 7)**

When heated to 100°C, D-idose undergoes a reversible loss of water to give 1,6-anhydro-D-idopyranose.



1,6-Anhydro-D-idopyranose

(i) Draw D-idose in its pyranose form, showing the more stable conformation of the ring. (3 pts)

(ii) Draw 1,6-anhydro-D-idopyranose in its most stable conformation. (3 pts)

(iii) Under the same conditions, D-glucose does not lose water and does not exist in a 1,6-anhydro form. Explain. (3 pts)

試題隨卷繳回