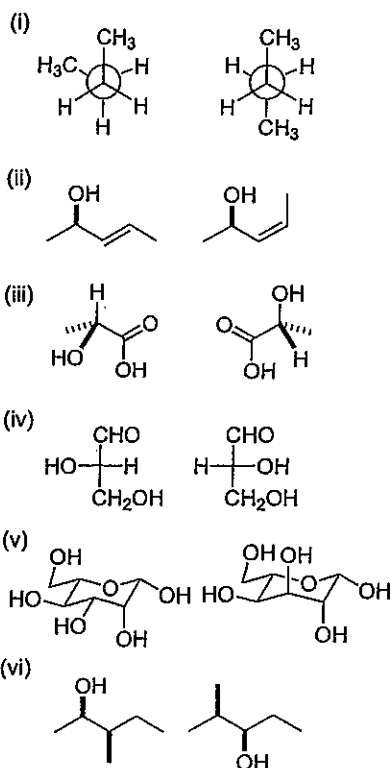


Problem 1. (18 pts)

For each of the following pairs, determine if the compounds are (a) constitutional isomers, (b) enantiomers, (c) diastereoisomers, (d) configurational (or geometrical) isomers, (e) conformers, or (f) identical molecules.

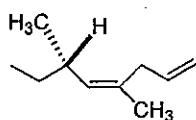


Problem 2. (4 pts)

An unknown compound is optically active and has the molecular formula of C_5H_{10} . Draw all possible isomers of the compound.

Problem 3. (6 pts)

What is the IUPAC name of the following compound? (*R*)- or (*S*)- designation and (*E*)- or (*Z*)- configuration have to be included in the nomenclature.



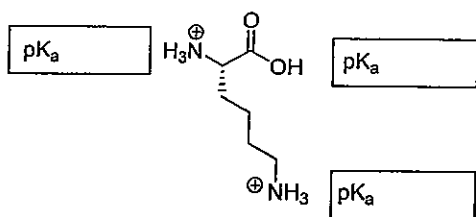
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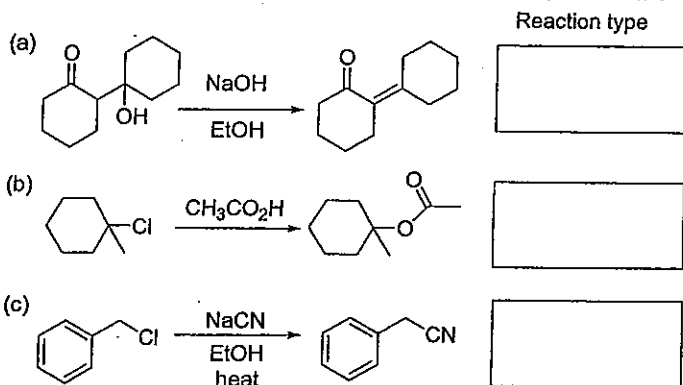
Problem 4. (6 pts)

Assign the pK_a values (2.18, 8.95, 10.53) to lysine.



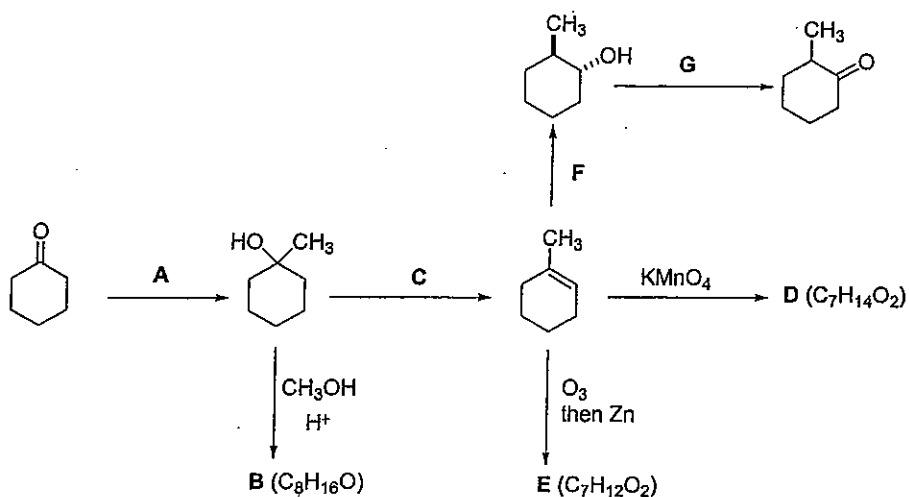
Problem 5. (9 pts)

Tell whether each of the following reactions is likely to be S_N1 , S_N2 , E1, E1CB, or E2.



Problem 6. (21 pts)

Identify the reagents and products A-G in the following reaction scheme.



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Problem 7. (8 pts)

(a) Propose a structure for the compound of molecular formula $C_4H_{10}O$ whose proton NMR and IR data are summarized as follows: (5 pts)

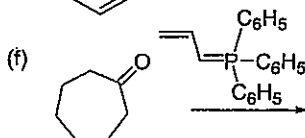
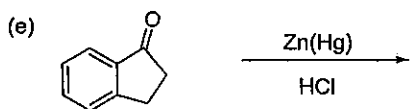
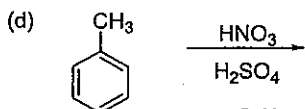
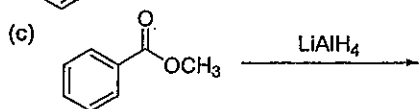
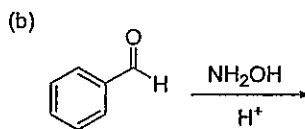
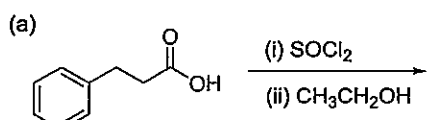
1H NMR: δ 3.41 (doublet, 2H), 2.42 (singlet, 1H), 1.77 (nonet, 1H), 0.91 (doublet, 6H)

IR: $\sim 3500\text{ cm}^{-1}$ (broad)

(b) Use tree diagram to explain the 1H NMR splitting. (3 pts)

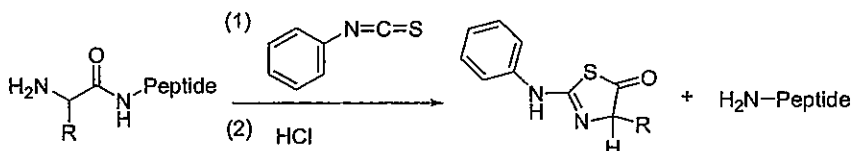
Problem 8 (18 pts)

Predict the products of the following reactions.



Problem 9 (5 pts)

Provide reaction mechanisms for the Edman degradation, an effective way for shortening a peptide chain.



Problem 10 (5 pts)

Provide reaction mechanisms for aldol condensation.



試題隨卷繳回