1. Draw the structures of the following compounds or an example of a specific compound from a class of compounds.

(a) 3-methylbutyl acetate (banana oil)

(b) acetone

(c) benzyl benzoate

(d) a fat

(e) a soap

(f) a trans fatty acid

(g) a phospholipid

2. (a) Hydrolysis of the artificial sweetener aspartame produces two amino acids and an alcohol. Draw the three products.

(b) The pKa of trimethylammonium chloride is 9.8. What is the major species present in water solution at pH = 6.8. Indicate the ratio of the two species under these conditions.
(c) The three pKa values of lysine are 2.18, 8.95, and 10.53. What is the net charge on the major species present at the isoelectric point of lysine? What is the major species present at the isoelectric point of lysine? What is the isoelectric point of lysine? 2.18, 4.70, 7.22, 8.95, 9.74, 10.53.

3. Write the expected organic products of the following reactions.

(a) 

\[ \text{CH}_3\text{CO} - \text{CH}_3 \xrightarrow{\text{LiAlH}_4} \text{H}_2\text{O} \xrightarrow{\text{Et}_2\text{O}} \]

(b) 

\[ \text{CH}_3\text{CH}_2\text{COOH} \xrightarrow{\text{SOCl}_2} \]

(c) Show the stereochemistry of the product

\[ \text{H}_3\text{C} - \text{C} - \text{C} - \text{CH}_3 + \text{H}_3\text{C} - \text{CH}_3 \rightarrow \text{NaOH} \]