Chem 130: Chemistry for Funeral Services
Problem Set 12

Name: **KEY** Date:

Each question is worth two points. Show your work wherever calculations are required.

1. What is the difference between a fat and an oil?

   Oil: Liquid at room temp. Additionally, the fatty acids in tend to be more unsaturated.
   Fats: Solid at room temp. Additionally, the fatty acids in tend to be more saturated.

2. Give the reaction for the formation of a fatty acid. What type of functional group is produced?

   To produce a fatty acid from a lipid, a hydrolysis reaction is required. The lipid produces glycerol and a number of fatty acids. See lecture notes and text for further details.

3. What is the difference between a saturated and an unsaturated fatty acid? Which fatty acids are essential?

   An unsaturated fatty acid contains one or more carbon-carbon double bonds (alkene groups). Essential fatty acids are ones that we cannot produce and so must consume. They include linoleic, linolenic and arachidonic acids.

4. What is saponification? What is adipocere and how does it relate to saponification? Also, describe how a micelle works.

   Saponification is the hydrolysis of a lipid through the use of alkali (hydroxide ion). Adipocere (gravewax) can be produced from the lipids in remains buried in, and in contact with, alkaline soils. For the micelle description, see the lecture notes and text.

5. What causes rancidity of fats and oils? Describe the process in some detail.

   Rancidity is caused by the decomposition of lipids to smaller carbon chains. Bacteria can cause such decomposition (hydrolytic rancidity). The oxygen in air can also oxidize the double bonds in unsaturated fatty acids. Both processes can result in shorter chained aldehydes, ketones or carboxylic acids with disagreeable odors.