CHE 102 – Study Guide – Chapter 28-30

Overall Concepts:

1. Focus on recognizing structures and drawing structures from the component parts
2. Physical and Chemical characteristics
    a. Solubility
    b. Chemical Reactivity (standard chemical tests for Lipids and Proteins
    c. Hydrolysis/Dehydration
3. You will be given: Table 28.1, the structure of amino-alcohols and Table 29.1

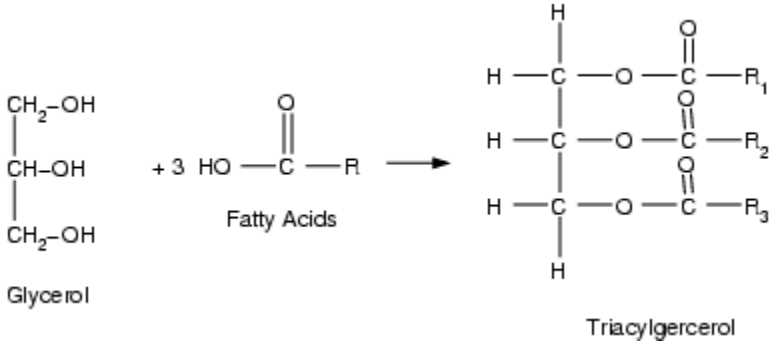
Chapter 28: Lipids

1. Lipid: Water insoluable class of molecules that can vary considerably in structure

2. Fatty Acids: long chain carboxylic acids
    a. Carboxy group: Polar, and soluable in water
    b. Aliphatic (R group): long and non-polar, thus insoluable in water, making overall molecule insoluable.
    c. Saturated: no C=C, mostly animal fats
    d. Unsaturated: one or more C=C present, mostly plant fats
    e. Cis/Trans Isomers: fatty acids with a C=C can form cis/trans isomers
        i. trans: most linear, not generally found in nature, can't digest
        ii. cis: bent shape, predominates in nature, lower Mp/Bp then trans isomers.
    f. Essential Fatty Acids: fatty acids that can't be synthesized by our bodies, we must
        i. Linoleic, Linolenic, Arachidonic
        ii. ω-3 vs ω-6 fatty acids (p 780, Chemistry in Action p809)
        iii. Arachidonic = precursor for "eicosanoid" class of molecules (Fig 28.2)

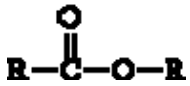
1. Prostaglandins, Leukotrienes, Prostacyclins, and Thromboxanes.
2. Responsible for swelling, inflammation etc
3. Asprin and other drugs can block the production
4. Read p 806-807 for more details.

3. Fats and Oils
    a. Composition: Glycerol + 3 Fatty acids.→ Triacylglycerol (Fatty Acid) + H_2O (p808)

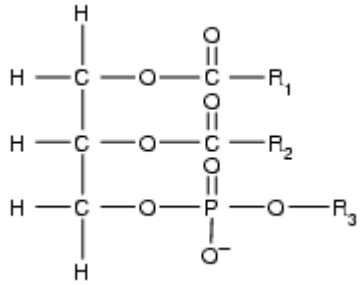


    b. Energy Storage:
        i. 25-50% of caloric intake, producing 9.5 kcal/g when oxidized completely
        ii. Excellent source of energy (2x) then carbohydrates and proteins
        iii. Carbon is in a more reduced form (therefore further to oxidize → more energy)
        iv. Fatty acids = 75% carbon vs 40% C for carbohydrates
    c. Components of complex membrane lipids

d. Olestra
e. Given "parts" you should be able to construct or hydrolyze a typical triacylglycerol

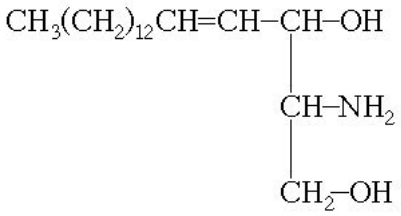
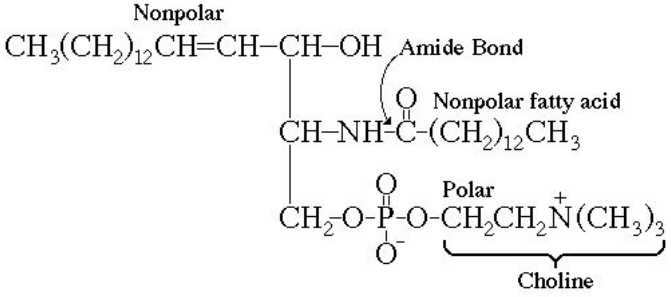
4. Waxes:
   a. Esters 
   b. Composition: Esters of long chain fatty acids and large (30+carbon) alcohols
   c. Used as water proof coating for fruits, fur, feathers, skin, plant leaves, cars.

5. Phospholipids (p811)
   a. Composition: Glycerol + 1 or more fatty acids (R_1 and R_2) + phosphate group + nitrogenous base (R_3)



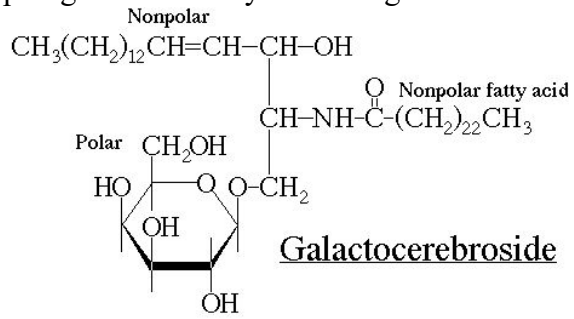
   b. The fatty acid portion of the molecule is hydrophobic/insoluable
   c. The phosphate/nitrogeneous base portion is hydrophilic/soluable
   d. Made in liver, used as protective sheath for nerve tissue, brain matter
   e. Given "parts" you should be able to construct or hydrolyze a typical phospholipid

6. Sphingolipids (p813)
   a. Composition: Sphingosine + 1 fatty acid + phosphate group + nitrogenous base (Choline)

	
Spingosine	Spingolipid

   b. Given "parts" you should be able to construct or hydrolyze a typical sphingolipid

7. Glycolipids (p814)
   a. Composition: sphingosine + 1 fatty acid + sugar



   b. Found in cerebrosides
   c. Given "parts" you should be able to construct or hydrolyze a typical glycolipid