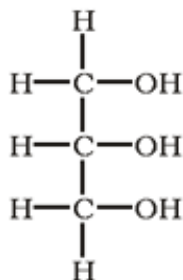


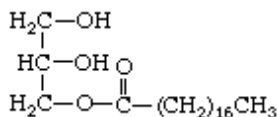
4.9 Triglycerides(Triacylglycerols)

One class of esters is particularly important in the nutritional areas and that is the class of esters formed from the alcohol glycerol (also called glycerin or 1,2,3 propanetriol).

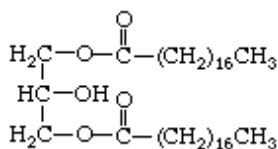
Figure 1. Structure of Glycerol



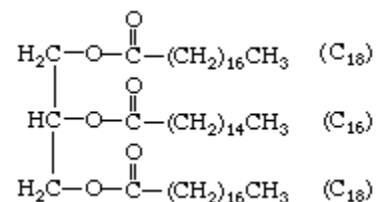
There are three alcohol groups here which can react with three long chain carboxylic acids, typically 12-20 Cs) called **fatty acids**. If one ester linkage is formed it is called a **monoglyceride or monoacylglycerol**. If two carboxylic acid molecules react to form two ester linkages it is called a **diglyceride or a diacyl glycerol**. If three carboxylic acids react to form three ester linkages, it is called a **triglyceride or a triacylglycerol**



Monoglyceride(monoacylglycerol)



Diglyceride(diacylglycerol)



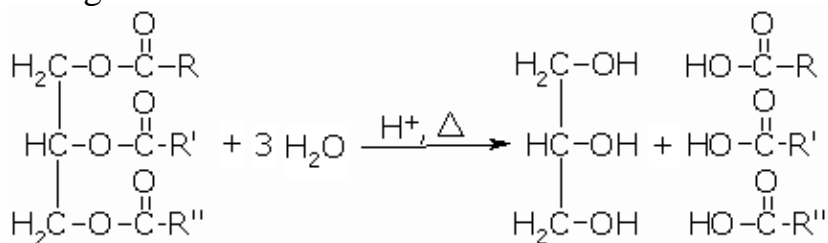
Triglyceride(triacylglycerol)

Fats and oils are both triglycerides; the only difference is that fats are solids at room temperature and oils are liquids at room temperature. The number of double bonds, i.e. the degree of unsaturation, is a major factor in determining the melting point. The higher the degree of unsaturation, the lower the melting point and the greater the tendency for the triglyceride to be liquid.

Certain brands of margarine commonly sold in grocery stores used to advertise that their products were fat free. If one read the label carefully, one found that monoglycerides and diglycerides were ingredients. Since monoglycerides and diglycerides are essentially equivalent to triglycerides in terms of their caloric value and their atherogenic potential, this claim was in fact quite misleading. Some brands of pastries and energy bars had similar claims. Stricter “truth in labeling” requirements have stopped this particular scam.

Hydrolysis of triglycerides

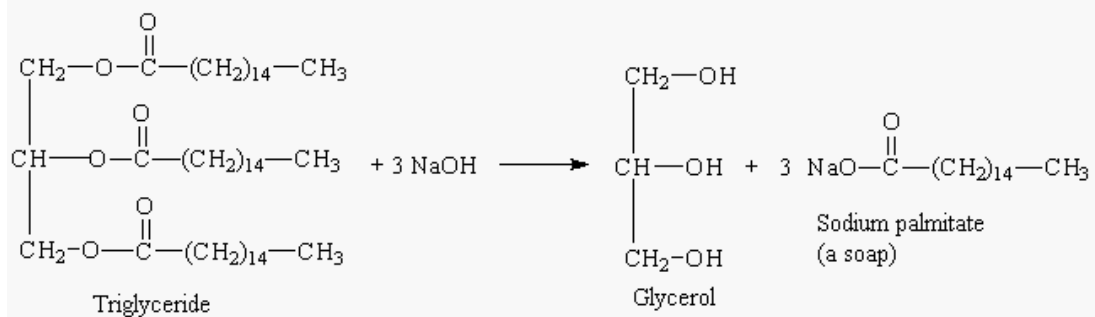
Triglycerides (fats) can be hydrolyzed to produce glycerol and 3 fatty acids in the presence of acid and heat or with a suitable **lipase** enzyme under biological conditions.



When these fatty acids are neutralized with base they produce carboxylate ions which are used as soaps.



The hydrolysis of triglycerides can also be carried out with base and this is the common way of doing it on an industrial scale. The hydrolysis and neutralization are carried out simultaneously and produces soap in a one step reaction called **saponification**.



www.chem.latech.edu/.../L06U00Soap122.htm