



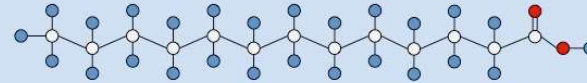
Fats and Oils

Mr Dhue

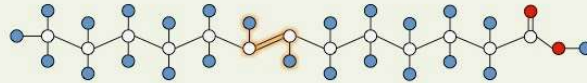
Recall fatty acids

- Remember that fatty acids were carboxylic acids with long chains of saturated or unsaturated hydrocarbons.
- They appeared naturally in even number carbon lengths

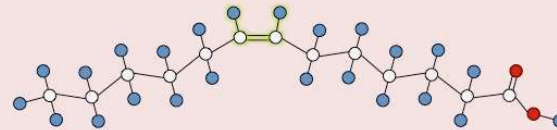
Saturated fatty acid
(no double bonds)



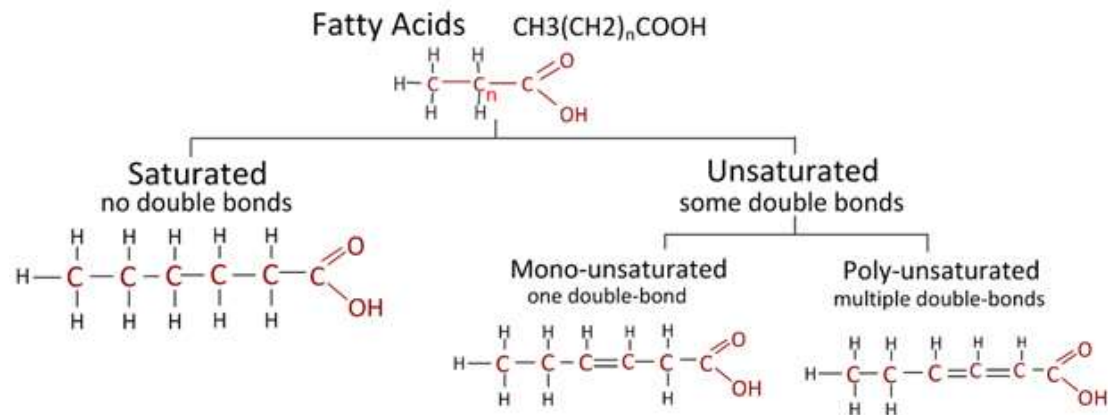
Unsaturated – *trans*
(H atoms opposite)



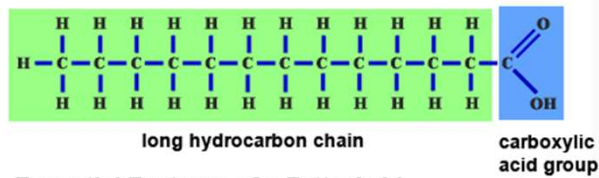
Unsaturated – *cis*
(H atoms same side)
⇒ bent configuration



○ = C ● = O ● = H



Fatty acids



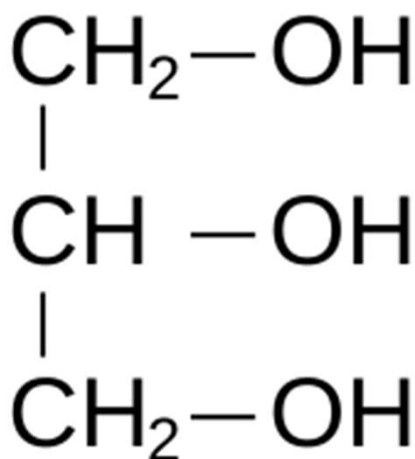
Essential Features of a Fatty Acid

Common Fatty Acids

Chemical Names and Descriptions of some Common Fatty Acids				
Common Name	Carbon Atoms	Double Bonds	Scientific Name	Sources
Butyric acid	4	0	butanoic acid	butterfat
Caproic Acid	6	0	hexanoic acid	butterfat
Caprylic Acid	8	0	octanoic acid	coconut oil
Capric Acid	10	0	decanoic acid	coconut oil
Lauric Acid	12	0	dodecanoic acid	coconut oil
Myristic Acid	14	0	tetradecanoic acid	palm kernel oil
Palmitic Acid	16	0	hexadecanoic acid	palm oil
Palmitoleic Acid	16	1	9-hexadecenoic acid	animal fats
Stearic Acid	18	0	octadecanoic acid	animal fats
Oleic Acid	18	1	9-octadecenoic acid	olive oil
Ricinoleic acid	18	1	12-hydroxy-9-octadecenoic acid	castor oil
Vaccenic Acid	18	1	11-octadecenoic acid	butterfat
Linoleic Acid	18	2	9,12-octadecadienoic acid	grape seed oil
Alpha-Linolenic Acid (ALA)	18	3	9,12,15-octadecatrienoic acid	flaxseed (linseed) oil
Gamma-Linolenic Acid (GLA)	18	3	6,9,12-octadecatrienoic acid	borage oil

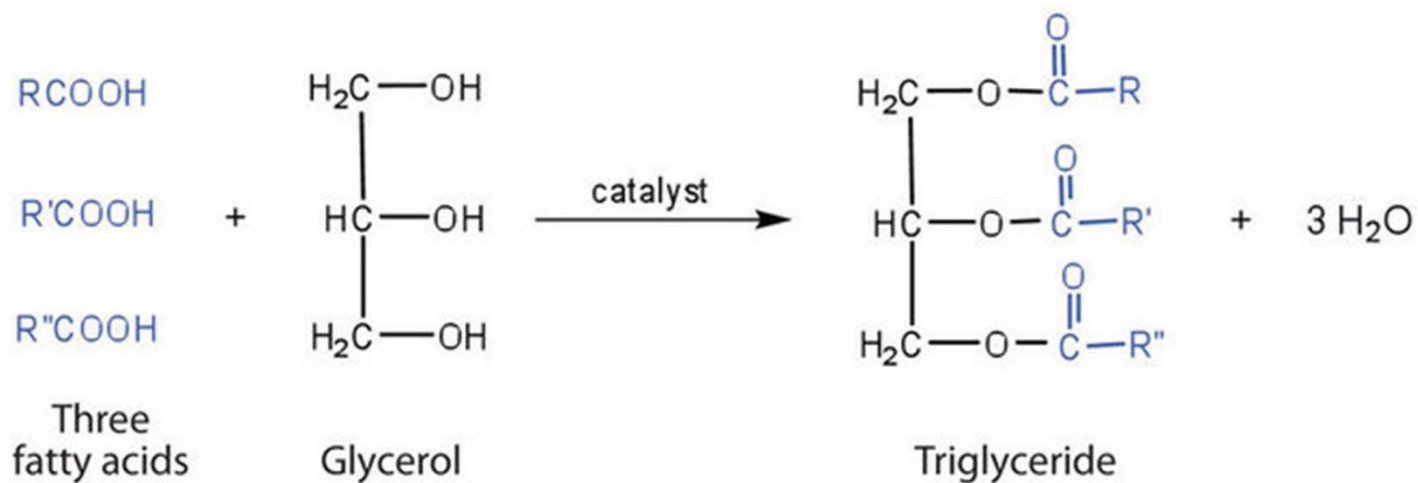
Fats and oils

- Fats and oils are esters of 1,2,3 – propantriol (also called glycerine or glycerol)
- Glycerol has a sweet taste, thick/viscous and is used in making all sorts of deserts and candies.
- Glycerol has three alcohol groups

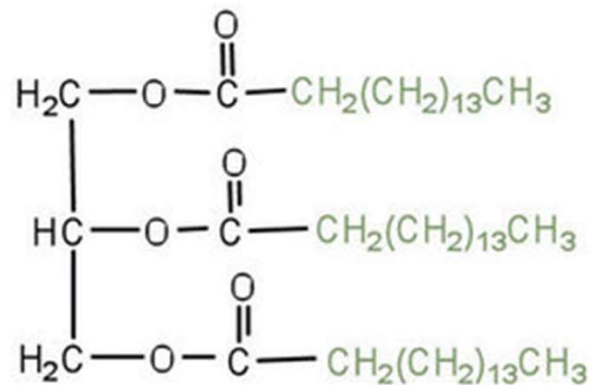


Fats and Oils

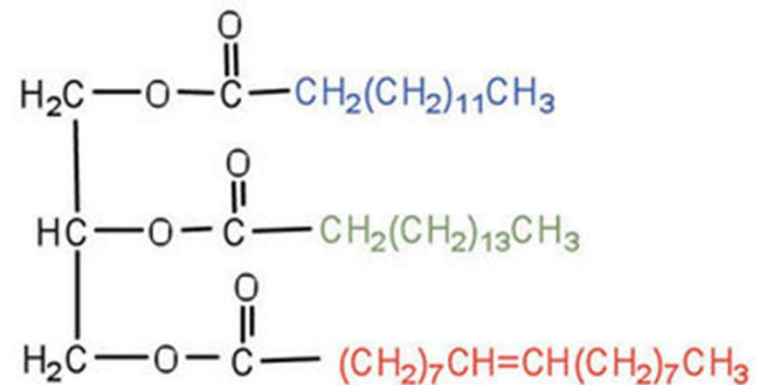
- Glycerol + fatty acids = fats or oils
- They are also called triglycerides



Each “arm” can have a different fatty acid

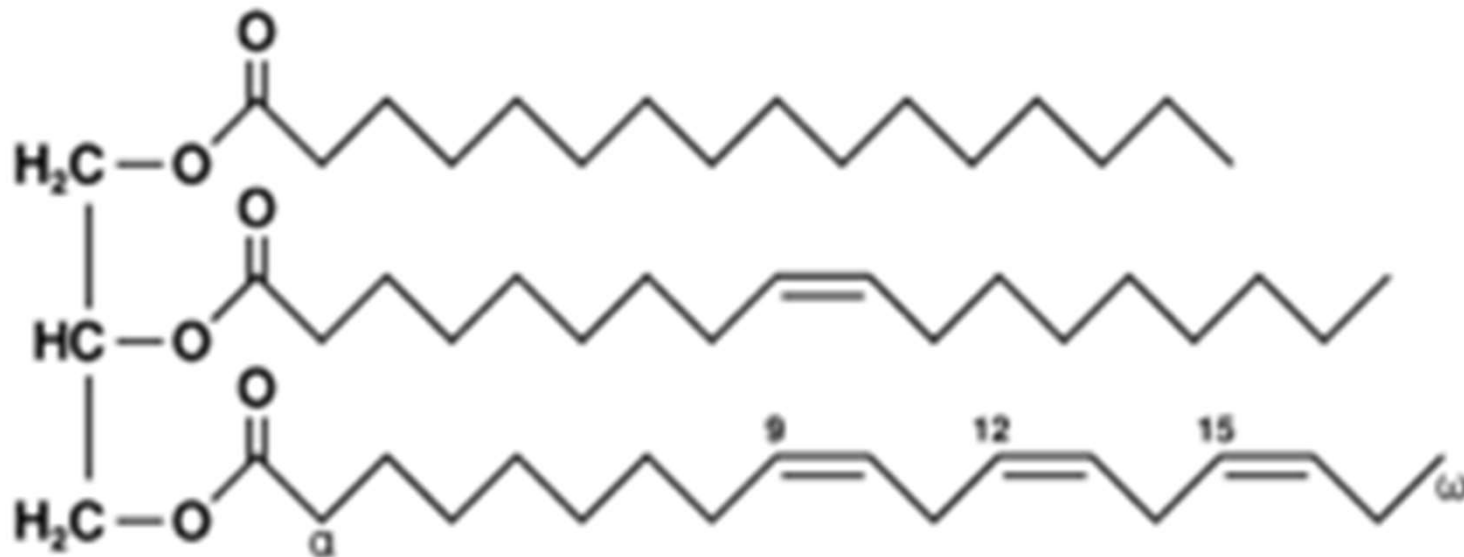


Tristearin
a simple triglyceride



a mixed triglyceride

Fat made from Glycerol and palmitic acid, oleic acid and alpha-linolenic acid.



Fats

- Tend to be solids
- Come from animals
- Usually saturated



Oils

- Tend to be liquid
- Often come from plants
- Tend to have multiple double bonds (polyunsaturated)
- Can be hydrogenated to produce a solid, margarine (spread)



The shape and physical properties of the oil/fat is determined by the geometric shape of the hydrocarbon chains – Look at Fig 16 (pg 125) read the comment in margin

Three different **triglyceride** molecules: **A** represents tristearin, a **saturated** fat; **B** is the triglyceride ester of oleic acid, a **monounsaturated cis** ester and **C** is the **trans** version of **B**. Notice the distinctly **non-linear shape** of the **cis** isomer, **B**.

