Lipids

Lipids

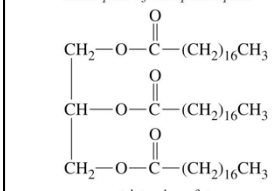
Lipids are natural products more soluble in nonpolar solvents than in water.

Some of them are related in that they have acetic acid (acetate) as their biosynthetic origin.

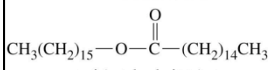
Acetyl coenzyme A serves as the source of acetate.

Some of them are related in that they have isoprene as their biosynthetic origin.

Examples of complex lipids

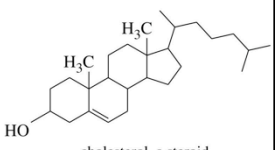


tristearin, a fat



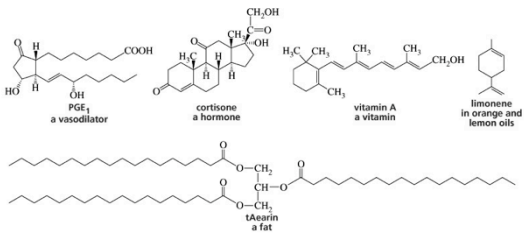
spermaceti (cetyl palmitate), a wax

Examples of simple lipids



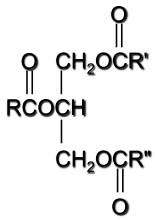
cholesterol, a steroid

α-pinene, a terpene



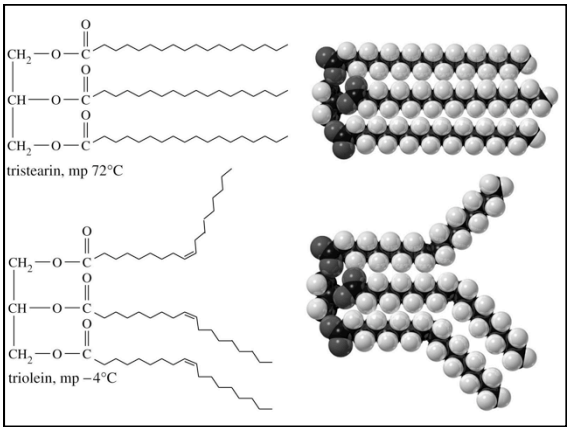
Fats, Oils, and Fatty Acids

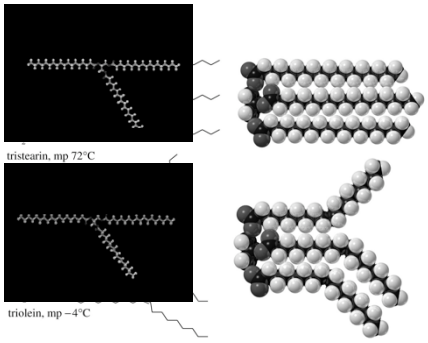
Fats and Oils



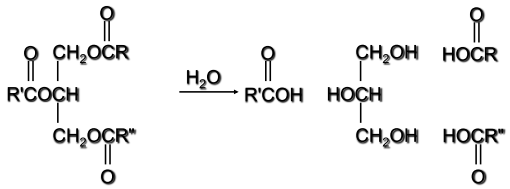
Fats and oils are naturally occurring mixture of triacylglycerols (also called triglycerides).

Fats are solids; oils are liquids.





Fatty Acids



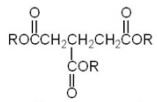
Acids obtained by the hydrolysis of fats and oils are called fatty acids.

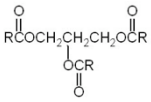
Fatty acids usually have an unbranched chain with an even number of carbon atoms.

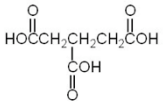
If double bonds are present, they are almost always cis.

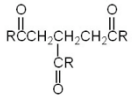
Question

Which one of the following is a triacylglycerol (triglyceride), a fat?

A) 

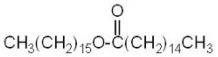
B) 

C) 

D) 

Question

When cetyl palmitate is subjected to saponification conditions (NaOH, H_2O, heat) which two compounds will be formed?



Cetyl palmitate

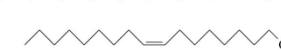
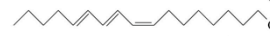
A) $CH_3(CH_2)_{15}OH$ + $HOCH_2(CH_2)_{14}CH_3$

B) $CH_3(CH_2)_{14}CO_2Na$ + $NaO_2C(CH_2)_{14}CH_3$

C) $CH_3(CH_2)_{14}CO_2H$ + $HOCH_2(CH_2)_{14}CH_3$

D) $CH_3(CH_2)_{15}OH$ + $NaO_2C(CH_2)_{14}CH_3$

Structures and Melting Points of Some Common Fatty Acids

Name	Carbons	Structure	Melting Point (°C)
Saturated acids			
lauric acid	12		44
myristic acid	14		59
palmitic acid	16		64
stearic acid	18		70
arachidic acid	20		76
Unsaturated acids			
oleic acid	18		4
linoleic acid	18		−5
linolenic acid	18		−11
eleostearic acid	18		49
arachidonic acid	20		−49

Question

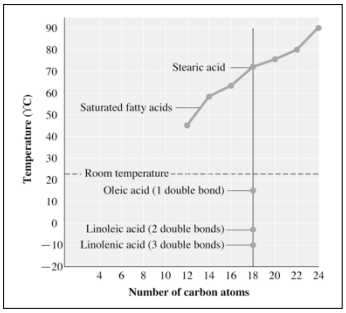
Which of the following is not an expected product of the acid hydrolysis of fats?

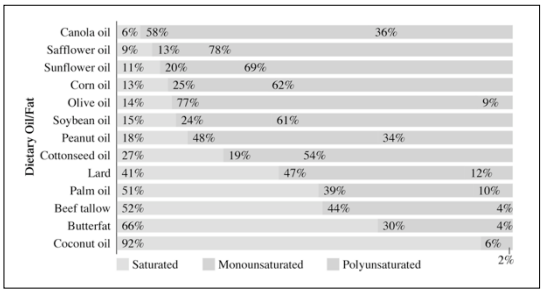
A) $CH_3(CH_2)_{12}CO_2H$

B) $HOCH_2CH_2(OH)CH_2OH$

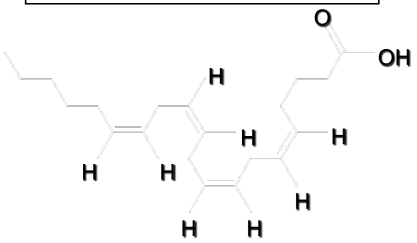
C) $CH_3(CH_2)_{16}CO_2H$

D) $CH_3(CH_2)_{14}CO_2H$





Fatty Acids

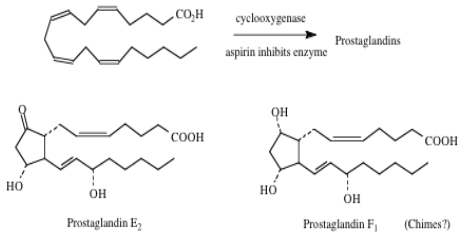


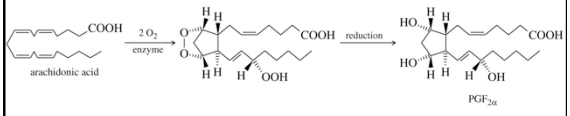
Systematic name: (5Z, 8Z, 11Z, 14Z)-5,8,11,14-Icosatetraenoic acid

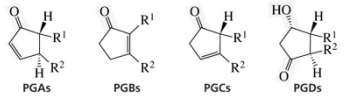
Common name: Arachidonic acid

Diterpenes & Pain

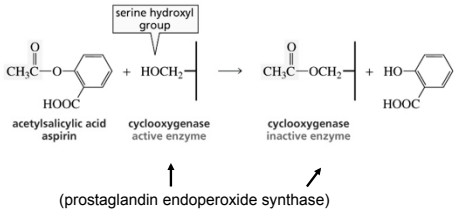
Aspirin's Mode of Action - Prostaglandin Cascades







Aspirin Inhibits the Synthesis of Prostaglandins



(prostaglandin endoperoxide synthase)