**FATTY ACIDS** 1. The fatty acid are the important component of [lipids](https://www.britannica.com/science/lipid) in plants, animals and microorganisms. 2. It is a type of lipid which is stored in our body in the form of storage lipid. 3. Generally, a fatty acid have the long hydrocarbon straight or aliphatic chain of an even number of [carbon](https://www.britannica.com/science/carbon-chemical-element) atoms with hydrogen atoms along the length of the chain. 4. In structure, at one end of the chain has a hydrogen atom and at the other end has a carboxyl group (― COOH). 5. The carboxyl group makes it an acid ([carboxylic acid](https://www.britannica.com/science/carboxylic-acid)). 6. So a fatty acid is a [carboxylic acid](https://en.wikipedia.org/wiki/Carboxylic_acid) with a long [aliphatic](https://en.wikipedia.org/wiki/Aliphatic) or straight chain, which is either [saturated or unsaturated](https://en.wikipedia.org/wiki/Saturated_and_unsaturated_compounds#Organic_chemistry). 7. Most naturally occurring fatty acids have an [unbranched chain](https://en.wikipedia.org/wiki/Branched_chain_fatty_acids) of an even number of carbon atoms from 4 to 28. 8. If the carbon – to – carbon bonds are all single, then the fatty acid is saturated and if any of the bonds is double or triple, then the fatty acid is unsaturated and is more reactive. 9. A few fatty acids have branched chains and others contain ring structures. 10. Fatty acids are not found in a free state in nature, they commonly exist in combination with [glycerol](https://www.britannica.com/science/glycerol) (an alcohol) in the form of [triglyceride](https://www.britannica.com/science/triglyceride).11. The most widely distributed fatty acids are the 16 – and 18 – carbon fatty acids, known as palmitic acid and [stearic acid](https://www.britannica.com/science/stearic-acid), respectively. 12. Both the palmitic and stearic acids occurs in the lipids of the majority of organisms. 13. The palmitic acid is 5 – 50% in lipids of vegetable fats, being especially abundant in palm [oil](https://www.britannica.com/science/lipid). 14. The Stearic [acid](https://www.britannica.com/science/oleic-acid) is abundant in some vegetable oils and makes up a relatively high proportion of the lipids. 15. Fatty acids have a wide range of commercial applications. For example, they are used not only in the production of numerous [food](https://www.britannica.com/topic/food) products but also in soaps, detergents, and cosmetics. Soaps are the sodium and potassium salts of fatty acids. Some skin – care products contain fatty acids, which can help maintain healthy skin appearance and function. 16. Fatty acids, particularly omega – 3 fatty acids, are also commonly sold as dietary supplements.

**FATTY ACID STRUCTURE** 1. The most naturally occurring fatty acids are the [unbranched chain](https://en.wikipedia.org/wiki/Branched_chain_fatty_acids) of carbon atoms. 2. The chain has a [carboxyl group](https://en.wikipedia.org/wiki/Carboxyl_group) (– COOH) at one end and a [methyl group](https://en.wikipedia.org/wiki/Methyl_group) (– CH3) at the other end which is designated by omega (ω). 3. The carbon atom next to the carboxyl group (– COOH) is labeled as [alpha](https://en.wikipedia.org/wiki/Alpha) carbon (α). 4. The next to [alpha](https://en.wikipedia.org/wiki/Alpha) carbon is labeled as [beta](https://en.wikipedia.org/wiki/Beta) carbon (β). 5. Although fatty acids can be of diverse lengths, the last position is always labeled as [omega](https://en.wikipedia.org/wiki/Omega) (ω).

CH3 – (CH2)n – CH2 – CH2 – COOH (ω) (β) (α)

 **SATURATED AND UNSATURATED FATTY ACID** 1. The Saturated and unsaturated fatty acids are different kinds of fat. 2. These are found in different kinds of food in different amount. 3. The products such as butter and cheese (ghee) are high in [saturated fat](https://www.pro-activ.com/en-ie/heart-and-cholesterol/cholesterol-and-fats/what-is-saturated-fat)ty acid. 4. The nuts, seeds and vegetable oils are good sources of unsaturated fatty acids. 5. The Saturated fatty acids have single bonds between the individual carbon atoms, while in unsaturated fatty acids there is at least one double bond in the fatty acid chain.

**SATURATED FATTY ACID** 1. In the saturated fatty acids the carbon – to – carbon are only of single bond in their structure. 2. It is made of two kinds of smaller molecules [glycerol](https://en.wikipedia.org/wiki/Glycerol) and [fatty acids](https://en.wikipedia.org/wiki/Fatty_acids). 3. Fats are made of long chains of carbon (C) atoms. 4. Some carbon atoms are linked by single bonds (-C-C-) and others are linked by [double bonds](https://en.wikipedia.org/wiki/Double_bond) (-C=C-). Double bonds can react with hydrogen to form single bonds. 5. They are called [saturated](https://en.wikipedia.org/wiki/Saturated_and_unsaturated_compounds) because the second bond is broken and each half of the bond is attached to (saturated with) a [hydrogen](https://en.wikipedia.org/wiki/Hydrogen) atom. 6. They have perfectly straight chain structure. 7. They have the formula CH3(CH2)nCOOH, with variations in "n".

Example Formula Caprylic acid CH3(CH2)6COOH [Capric acid](https://en.wikipedia.org/wiki/Capric_acid) CH3(CH2)8COOH [Lauric acid](https://en.wikipedia.org/wiki/Lauric_acid) CH3(CH2)10COOH [Stearic acid](https://en.wikipedia.org/wiki/Stearic_acid) CH3(CH2)16COOH

8. An important saturated fatty acid is [stearic acid](https://en.wikipedia.org/wiki/Stearic_acid) having the chemical formula CH3(CH2)16COOH and its structural formula is :- .

COOH - CH2 - CH2 - CH2 - CH2 - CH2 - CH2 - CH2 - CH2 - CH2 - CH2 - CH2 - CH2 - CH2 - CH2 - CH2 - CH2 - CH3

9. The chain is straight but zig – zag is formed. 10. They have saturated fats that usually solid at room temperature. 11. They cannot undergo the process of hydrogenation. 12. They have high melting point.

**UNSATURATED FATTY ACID** 1. These fatty acid have one or more double bond in their chain structure. 2. If the chain of fatty acid contains only one double bond then it is called monounsaturated fatty acid. 3. If the double bond are more than one in the chain, then they are called polyunsaturated fatty acids. 4. Where double bonds are formed, hydrogen atoms are eliminated.

Example Formula [Myristoleic acid](https://en.wikipedia.org/wiki/Myristoleic_acid) CH3(CH2)3CH=CH(CH2)7COOH [Oleic acid](https://en.wikipedia.org/wiki/Oleic_acid) CH3(CH2)7CH=CH(CH2)7COOH [Linoleic acid](https://en.wikipedia.org/wiki/Linoleic_acid) CH3(CH2)4CH=CHCH2CH=CH(CH2)7COOH [α-Linolenic acid](https://en.wikipedia.org/wiki/Alpha-linolenic_acid) CH3CH2CH=CHCH2CH=CHCH2CH=CH(CH2)7COOH

5. An important unsaturated fatty acid is Oleic  [acid](https://en.wikipedia.org/wiki/Stearic_acid) having the chemical formula C17H33COOH or CH3(CH2)7CH=CH(CH2)7COOH and its structural formula is :-

COOH - CH2 - CH2 - CH2 - CH2 - CH2 - CH2 - CH2 - CH2 - CH = CH - CH2 - CH2 - CH2 - CH2 - CH2 - CH2 - CH3

6. The chain is bent at the double bond. 7. These formed unsaturated fats are liquid at room temperature. 8. They undergoes the process of hydrogenation. 9. They have lower melting point. 10. In plants they are present in form of oils. Eg :- Groundnut oil, Mustard oil etc.

JANARDAN PRASAD SINGH VISTHAPIT MAHAVIDYALAYA, BALIDIH DEPARTMENT OF BOTANY