

FATS

Fatty acids:

A fatty acid is a long-chain carboxylic acid, Fatty acids are a major component of lipids.

In animals, fatty acids are formed from carbohydrates predominantly in the liver, adipose tissue, and the mammary glands during lactation.

Classification of fatty acids:

- 1) **Saturated fatty acids:** Although straight-chain fatty acids containing from 2 to 80 carbon atoms per molecule are known. The most commonly encountered saturated acids are Lauric, Myristic, Palmitic and Stearic.
- 2) **Unsaturated fatty acids:** Unsaturated fatty acids differing with respect to the number of carbon atoms and double-bond characteristics are found in lipids. Unsaturated fatty acids may have one to six double bonds. Polyunsaturated fatty acids usually have a methylene group between double bonds.

Example: Oleic Acid: found in almost all fats.(particularly olive oil)

Linoleic Acid: found in Safflowerseed oil.

Linolenic Acid: found in linseed oil.

- 3) **Essential Fatty Acids:** These are fatty acids that cannot be synthesized within the human body, and therefore must be obtained from diet. There are two families of essential fatty acids: omega-3 and omega-6 fatty acids.

Omega-3 fatty acids sources: Fish, Nuts, Canola oil and sunflower oil.

Types of omega-3 fatty acids:

ALA(Alpha-linolenic Acid): found in Canola, Soybeans, Walnuts and Flaxseed.

EPA(Eicosapentenoic acid): found in oily fish such as cod liver, Herring, Mackerel, Salmon.

DHA(Docosahexaenoic Acid): found in oily fish such as cod liver, Herring, Mackerel, Salmon.

Health benefits of omega-3 fatty acids: It can help lower the risk of chronic diseases such as: Heart disease, stroke, Cancer, Lower LDL or bad cholesterol, Help to prevent Alzheimer's disease.

Omega-6 fatty acids:

Sources: Poultry, Eggs, Nuts, Canola and Sunflower oil.

Types of Omega-6 fatty acids:

LA or linolenic Acid: sources: Soyabin oil, Corn oil, safflower Oil, Sunflower Oil, Peanut oil, Cottonseed Oil, Rice Bran Oil.

AA or Arachidonic Acid: Sources: Peanut oil, Meat, Eggs, Dairy Products.

Health benefits of omega-6 fatty acids: It contribute to inflammation and result in heart disease, cancer, asthma, arthritis, and depression.

Physical Characteristics:

Polymorphism: It is the phenomenon in which a substance occur in different crystalline forms, e.g, the existence of carbon in common black form or diamond.

Tempering: A process which permits the formation of the proper polymorphic form is known as tempering

Shortening: the quality of shortening of fat depends on the incorporation of air, plasticity and consistency, and solid –liquid ratio.

Reaction of fats:

The stability of a fat or fatty food is important to maintain a fresh taste or odour during storage and use.

Rancidity:

The change that a lipid undergoes leading to an undesirable flavor and odour is known as rancidity. This is brought about in two ways: Hydrolysis and Oxidation.

Hydrolysis is catalyzed by acids, bases, enzymes or thermal effects. When a base is the hydrolyzing agent, the liberated fatty acids are converted into their salts, or soaps, and the hydrolysis is termed “**saponification**”.

The other agents release free fatty acids and the reactions brought about by them are collectively known as “**lipolysis**”, “**Lipolytic rancidity**” or “**Hydrolytic rancidity**”.

Fats, when in contact with air, react with oxygen producing products with undesirable characteristics. This is known as “oxidative Rancidity”. This type of rancidity is promoted by heat, light ,ionizing radiations, catalysis and enzymes.

Acid Value:

It is the mass of potassium hydroxide in milligrams that is required to neutralize one gram of chemical substances. The acid number is a measure of the number of carboxylic acid groups in a chemical compound, such as fatty acid, or in a mixture of compounds.

Peroxide value:

It is defined as the amount of peroxide oxygen per 1 kg of fat or oil.

Iodine Value:

It is the degree of unsaturation of a fat or oil.

Richert-meissel Number:

It is the number of ml of 0.1N KOH required to neutralize soluble volatile fatty acids distilled from 5g of fat.

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FOOD PROCESSING & QUALITY MANAGEMENT