



Lipids or Fats

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Fats are greasy substances that are not soluble in water. They are soluble in some solvents such as ether, benzene, and chloroform. They provide a more concentrated source of energy than carbohydrates; each gram of fat contains 9 Kcalories. This is slightly more than twice the calorie content of carbohydrates. Fat-rich foods are generally more expensive than carbohydrate-rich foods. Like carbohydrates, fats are composed of carbon, hydrogen, and oxygen but with a substantially lower proportion of oxygen. The word lipid is derived from lipos, a Greek word for fat.

Food Sources

- ▶ Fats are present in both animal and plant foods. The animal foods that provide the richest sources of fats are meats, especially fatty meats such as bacon, fatty fish such as tuna and salmon; whole, low-fat, and reduced-fat milk; cream; butter; cheeses made with cream; egg yolks.
- ▶ The plant foods containing the richest sources of fats are cooking oils made from olives sunflower, safflower, or sesame seeds or from corn, peanuts, or soybeans, margarine, nuts, avocados, coconut, and cocoa butter.

Classification

Simple lipids which include:

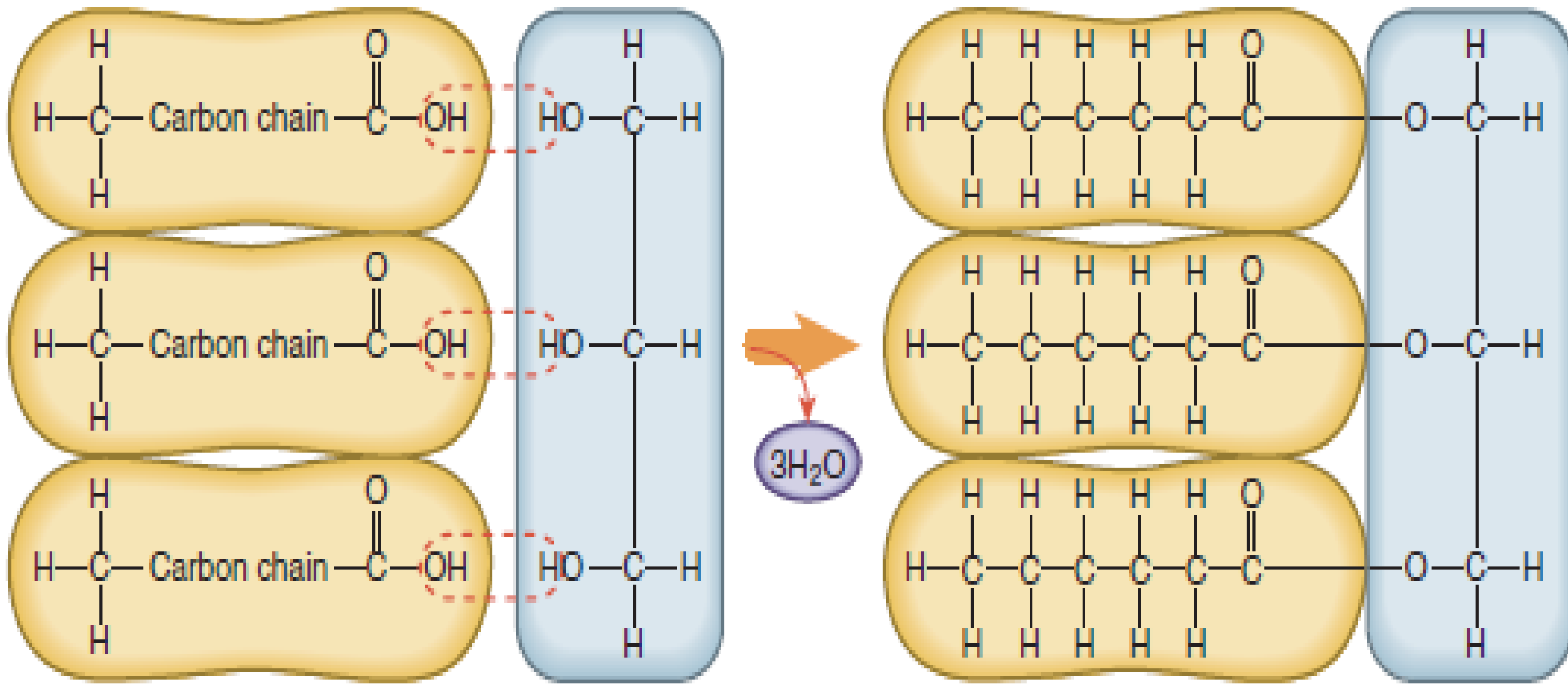
- Oils unsaturated fatty acid, liquid at room temperature.
- Fats saturated fatty acid, solid at room temperature.

Compound lipids which include:

- Phospholipids: compounds of fatty acids, phosphoric acid and nitrogenous base (lecithins, cephalins, sphingomyelins).
- Glycolipids: compounds of fatty acids combined with carbohydrates and nitrogenous base (cerebrosides, gangliosides).
- Lipoproteins: lipids in combination with protein (apolipoprotein).

Derived lipids which include:

- Fatty acids-Triglycerides-Glycerol-Sterols (cholesterol and ergosterol) – Fat soluble vitamins (A, D, E, K).



3 Fatty acids

+

Glycerol



Triglyceride

Triglycerides

➤ **Fatty acids** are organic compounds of carbon atoms to which hydrogen atoms are attached. They are classified in two methods:

1- About its necessary for the body essential or nonessential.

➤ **a- Essential fatty acids (EFAs)** are necessary fats that humans cannot synthesize so EFAs must be obtained through food. EFAs are long-chain polyunsaturated fatty acids derived from linoleic, linolenic, and oleic acids. There are two families of EFAs: omega-3 and omega-6.


➤ **b- Nonessential fatty acids (NEFAs)** are the omega-9 fatty acids because the body can manufacture a modest amount.

2- The other method of classification of fatty acids is by their degree of saturation with hydrogen atoms.

- **a- Saturated fatty acids** are usually found in animal foods, the most saturated food fats are two oils from plants coconut oil, which is 88% saturated, and palm kernel oil, which is 80% saturated.
- **b- Monounsaturated fatty acids** Food lipids that have a high proportion of fatty acids with a pair of hydrogen atoms missing, creating one double bond.
- **c- Polyunsaturated fatty acids** When fatty acids have four or more spaces unfilled with hydrogen atoms, creating two or more double bonds, they are polyunsaturated fats.

Functions

- Provide energy, lipids are a concentrated source of fuel, lipids yield 9 kcal/g
- Supply essential fatty acids.
- Add to food palatability, lipids add flavor and a pleasant mouth feel to food.
- Promote satiety, a meal containing lipids satisfies the appetite for a longer period than a meal containing only carbohydrate and protein.

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- **Thermal insulation, the layer of lipid deposited directly beneath the skin helps maintain body temperature.**
 - **Protection of vital organs.**
 - **Transmission of nerve impulses, lipid layers surrounding nerve fibers provide electrical insulation and transmit nerve impulses.**
 - **Formation of membranes, lipids are structural components of cell membranes**
 - **Carrier of fat-soluble materials, lipids transport the fat soluble vitamins A, D, E, and K to the cells for metabolic use.**