

ALL YOU NEED TO KNOW ABOUT FATS

ANHYDROUS, INSOLUBLE IN WATER AND HAVING THE PROPERTY OF SOLUBILIZING IN NONPOLAR ORGANIC SOLVENTS (ETHER, HEXANE, CHLOROFORM,..), THEY ARE FOUND NATURALLY IN THE ANIMAL AND PLANT KINGDOMS, IN SOLID (FAT) OR LIQUID (OIL) FORM.
LIPIDS ARE A COMPLEX MIXTURE OF TRIGLYCERIDES (95 TO 98%) AND MINOR CONSTITUENTS: NATURAL CONSTITUENTS, DEGRADATION COMPOUNDS AND CONTAMINANTS.

Fact sheet : N°1

ITERG
11 rue Gaspard MONGE - ZA Pessac-Canéjan, CS 20428, 33612 CANEJAN CEDEX FRANCE

MINOR CONSTITUENTS OF FUNCTIONAL OR NUTRITIONAL INTEREST

Phospholipids :

They are glycerol esters whose alcohol function is naturally esterified by a phosphoric acid molecule, itself associated with an amine or sugar (inositol). These are referred to as phosphatidylserine, phosphatidylcholine (or lecithin), phosphatidylethanolamine and phosphatidylinositol. These molecules are called amphiphilic because they have a hydrophilic and a lipophilic pole and therefore have emulsifying properties.



Unsaponifiable

Unsaponifiable is made up of compounds which, after basic hydrolysis (saponification), are very poorly soluble in water but soluble in traditional solvents of fats.
The proportion of unsaponifiable varies for an unrefined (crude) fat from 0.2 to 2% (average around 1%); it depends on the origin and the treatments undergone by the fat (refining).

Tocopherols

There are four isomers consisting of a carbon chain associated with a quinone group; they essentially have antioxidant properties (in particular with regard to polyunsaturated fatty acids) and are found in significant quantities in vegetable oils (sunflower, corn, soya, rapeseed); they also possess vitamin E activity, the strongest being that of -tocopherol. In crude vegetable oils, their content varies from 200 to 1200 mg/kg. ; In animal fats, the levels are lower: 10 to 20 mg/kg.

Monoglycerides and diglycerides or partial glycerides

Mono- or diesters of glycerol and fatty acids from the partial hydrolysis of triglycerides; Their free alcohol function(s) give them a certain hydrophilicity and emulsifying properties. For this reason, there is an industrial manufacture of these molecules (authorized food additives).

Sterols

They are multi-ring molecules, of high molecular weight, with an alcohol function: they are found in a free state or esterified by a fatty acid. In the animal kingdom, the main sterol is cholesterol; In the plant kingdom, we speak of phytosterols, the main one being -sitosterol. They represent 30 to 60% of unsaponifiable.

Pigments

Carotenes, carotenoids (xantophylls) and chlorophylls contribute to the color of the oils; These natural pigments are largely removed by refining. As an indication, palm oil particularly rich in carotene contains 500 to 800 mg/kg.

Waxes

They are esters of fatty acids and aliphatic monoalcohols (mainly fatty alcohols). In plants, they contribute to the formation of protective films of seeds and fruits.

TRIGLYCERIDES

A triglyceride is made up of a glycerol molecule esterified by three similar or different fatty acid molecules. Depending on the combination and assembly of fatty acids on glycerol, triglyceride will have a different structure and can be monoacid, diacid, or triacid. Position 2 on triglyceride (asymmetric C2) is of particular nutritional value.



FATTY ACIDS

A fatty acid is made up of carbon atoms (C) forming the carbon chain, hydrogen atoms (H) saturating the bonds around the carbon and oxygen (O) at the end of the chain (COOH carboxyl group).

Fatty acids are distinguished by:

- The number of carbon atoms: it varies from 4 to 24. This number is most often even (plant kingdom), sometimes odd (animal kingdom). We are talking about short fatty acids below 6 C, medium fatty acids from 6 to 12 C, and long fatty acids from 14 C.
- Unsaturation (Δ) or number of ethylene double bonds (C=C). In the natural state, there are between 0 and 6 double bonds. It conditions the chemical reactivity of the molecule, its stability (zone of fragility), and its physical and physiological properties. * 0 double bond: the fatty acid is saturated, * 1 double bond: the fatty acid is monounsaturated * several double bonds: the fatty acid is polyunsaturated. The position of the double bonds (positional isomerism): the fatty acid is polyunsaturated.
- The position of the double bonds (positional isomerism): in their natural state, the double bonds generally never touch each other (malonic system) except in special cases: this is called a conjugated system (the case of calendula oil).
- The shape of double bonds (geometric isomerism): in the plant kingdom, double bonds are of the form cis (curvature to the molecule). Trans fatty acids are present in milk fat and can be produced during certain fat transformations (hydrogenation).