

Vitamins

Vitamins are organic compounds required by an organism in trace amounts to perform specific cellular functions. These compounds serve the same roles in nearly all forms of life, but higher animals lost the capacity to synthesize them in the course of evolution.

Vitamins are not synthesized by humans, and therefore must be supplied by the diet. Vitamins can be classified according to their solubility and their functions in metabolism. The requirement for any given vitamin depends on the organisms. Not all vitamins are required by all organisms.

Vitamins may be water soluble or fat soluble. Nine vitamins (thiamine, riboflavin, niacin, biotin, pantothenic acid, folic acid, cobalamin, pyridoxine, and ascorbic acid) are classified as water soluble, whereas four vitamins

(vitamins A,D,E and K) are termed fat – soluble. Except for vitamin C, the water soluble vitamins are all precursors of coenzymes.

COMPOSITION OF VITAMINS: Vitamins are of different chemical nature. These are alcohols, aldehydes, organic acids, their derivatives and nucleotide derivatives

Vitamins are **classified** according to their ability to be **absorbed** in **fat** or **water**.

1. Fat Soluble Vitamins: these are oily and hydrophobic compounds; they are stored in the liver and not excreted out of the body. Bile salts and fats are needed for their absorption. Vitamins A, D, E and K are fat soluble

2. Water Soluble Vitamins: Vitamin B complex and Vitamin C are water soluble. They are not stored in the body, therefore are required daily in small amount.

CLASSIFICATION

VITAMINS

Based on solubility in **oil**

Based on solubility in **water**

Fat soluble vitamins

Water soluble vitamins

Based on type of source

Vitamin -A Vitamin-D Vitamin-E Vitamin-K

Retinol

Tocopherol

B-complex vitamins

Non B-complex
vitamine

Ex: Vitamin-C

Based on Stability

Vitamin-D₂ Vitamin-D₃ Vitamin-K₁ Vitamin-K₃

Ergocalciferol

Cholecalciferol

Thermo labile

Thermostable

Ex: Vitamin-B₁

Thiamine

Ascorbic acid

Vitamin-B₂ Vitamin-B₃ Vitamin-B₆ Vitamin-B₁₂ Niacin Folic acid Biotin

Riboflavin

Pantothenic acid

Pyridoxine

Cyanacobalamine

Niacin

Folic acid

Biotin
Vit-H

Vitamin-K₁ - (Phytonadione)

Folic acid - (Pteroylglutamic acid)

Vitamin-K₃ - (Menadione)

(Niacinamide)- Nicotinamide

Nicotinic acid

Fat Soluble Vitamins:

As the name suggests these are soluble in lipids i.e. in fats. They are insoluble in water. Their absorption into the bloodstream happens in the intestines.

They are stored in human bodies as adipose tissues in the liver. Fat-soluble types of the vitamin are not easily excreted, hence it is very much possible to overdose on them if they reach toxic levels in your body, and this disease is hypervitaminosis.

The fat-soluble vitamins are Vitamin A, D, E and K.

Water Soluble Vitamins:

These are readily dissolvable in water. Excess water-soluble vitamin in your body passes out through urine. Since they are excreted so easily they also need to be replaced regularly. Water Soluble Vitamins are Vitamin B and Vitamin C.

Functions of Vitamins:

Vitamin A: is used for growing healthy new cells like skin, bones, and hair. Also is used for surface lining upkeep of the eyes, urinary tract, intestinal tract, and respiratory system.

Night vision is also assisted by Vitamin A. Vitamin A also performs other major functions in the body. It is required for reproductive functions such as normal growth and development of sperm and ovaries.

Vitamin A also helps vision by keeping cells which are used for transduction of light into nerve signals healthy. Vitamin can be found from certain foods such as egg yolk, whole milk, and butter.

Vitamin D: is needed for the body to properly use calcium and phosphorous. It is also used in the formation of some RNA, maintain a normal heart, and keep a stable nervous system and blood clotting.

Along with absorbing calcium, Vitamin D can also help regulate the amount of calcium and phosphorus that is present in the blood. Vitamin D can be found in dairy products, fish, and oysters.

Vitamin D deficiency caused severe growth retardation. The lack of calcium in the bones resulted in deformities of the skeleton, characterized by a widening at the ends of the long bones because of disorganization in the hypertrophy and maturation of chondrocytes in the epiphyseal plates.

Vitamin D deficiency is also associated with low-normal blood calcium, low or low-normal fasting blood phosphorus, and elevated parathyroid hormone (PTH) levels that cause a mineralization defect in the skeleton.

Vitamin E: is an antioxidant that helps the body get rid of free radicals to keep tissues healthy. It is also used in the creation of red blood cells.

The use of vitamin A, C and K are assisted by Vitamin E. Although the role of Vitamin E is not completely understood but it is clear that it presents antioxidant properties in the body.

They get rid of the free radicals in the body by preventing the oxidation of lipid-based cell membranes. Free radicals are very reactive and can steal electrons from membranes which could ultimately damage DNA.

Good sources of Vitamin E are almonds, spinach, wheat, and asparagus. Of the many such dietary components, vitamin E has commanded most interest because of its availability, strong marketing potential, overall health impact, and central role in preventing oxidation at the cellular level.