

Vitamins
Skill Enhancement Course
Chemistry
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Vitamins

What are Vitamins?

Vitamins are the organic compounds which help in performing biological functions of a living organism. It is a vital nutrient that should be included in our daily diet in the required quantity.

Vitamins are referred to as organic compounds, they are required in very small amounts, hence, they are mentioned as **micronutrients**. They perform vital functions and an essential role in our body functions such as metabolism, immunity and digestion.

Vitamine is a Greek word – “*vita*”- life and “amine”

Classification Of Vitamins

During the beginning of the 20th century, it was clearly understood that the diet containing purified carbohydrates, proteins, fat, and minerals was not sufficient to maintain the proper **growth and development** of an individual. An English biochemist “Sir Frederick Gowland Hopkins” in the year 1929 was awarded the Nobel Prize for the discovery of vitamins.

Based on their physical and biological activity, these organic compounds are classified into:

Fat-soluble vitamins:

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

Water-soluble vitamins:

- Biotin.
- Niacin.
- Pyridine.
- Thiamine.
- Vitamin C.
- Folic acid.
- Riboflavin.
- Vitamin B12.
- Pantothenic acid.

Nomenclature of Vitamins

CommonName	Scientific Name	Food Sources
Vitamin A (Fat-soluble)	Retinol	Green leafy vegetables, nuts, tomatoes, oranges, ripe yellow fruits, guava, milk, liver, carrots, broccoli and watermelon.
Vitamin B1 (Water-soluble)	Thiamine	Fresh fruits, corn, cashew nuts, potatoes, sweet potatoes, peas, wheat, milk, dates, black beans, etc.

Vitamin B2 (Water-soluble)	Riboflavin	Bananas, grapes, mangoes, peas, pumpkin, dates, yoghurt, milk, mushrooms, popcorn, beef liver, etc.
Vitamin B3 (Water-soluble)	Niacin	Meat, eggs, fish, milk products, guava, mushroom, peanuts, cereals, green peas, etc.
Vitamin B5 (Water-soluble)	Pantothenic Acid	Meat, kidney, egg yolk, broccoli, peanuts, fish, chicken, milk, yoghurt, legumes, mushrooms, avocado, etc.
Vitamin B6 (Water-soluble)	Pyridoxine	Pork, chicken, fish, bread, wholegrain cereals, eggs, vegetables, soya beans, etc.
Vitamin B7 (Water-soluble)	Biotin	Walnuts, peanuts, cereals, milk, egg yolks, salmon, pork, mushroom, cauliflower, avocados, bananas, raspberries, etc.
Vitamin B9 (Water-soluble)	Folic Acid	Citrus fruits, green leafy vegetables, whole grains, legumes, beets, etc.
Vitamin B12 (Water-soluble)	Cobalamin	Fish, meat, poultry, eggs, milk, etc.
Vitamin C (Water-soluble)	Ascorbic acid	Fresh citrus fruits such as orange and grapefruit, broccoli, goat milk, black currant and chestnuts.

Vitamin D (Fat-soluble)	Calciferol	Fish, beef, cod liver oil, egg yolk, liver, chicken breast and cereals.
Vitamin E (Fat-soluble)	Tocopherol	Potatoes, pumpkin, guava, mango, milk, nuts and seeds.
Vitamin K (Fat-soluble)	Phytonadione	Tomatoes, broccoli, mangoes, grapes, chestnuts, cashew nuts, beef and lamb.

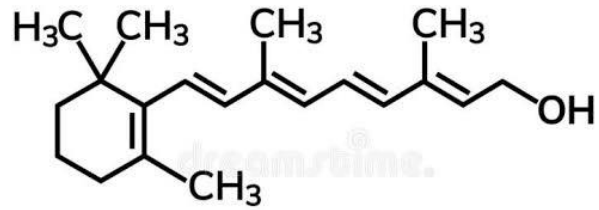
Vitamin	Sources	Functions	Deficiency Disease
Vitamin A (Retinol)	Liver oil, Fish, Carrot, Milk, spinach and fruits such as Papaya and mango	Vision and growth	Night blindness, Xerophthalmia Keratinisation of skin
Vitamin B ₁ (Thiamine)	Yeast, Milk, Cereals, Green vegetables, Liver, Pork	Co - enzyme in the form of Thiamine pyrophosphate (TPP) in glycolysis	Beri - Beri (peripheral nerve damage)
Vitamin B ₂ (Riboflavin)	Soybean, Green vegetable Yeast, Egg white, Milk, Liver kidney	Co enzyme in the form of FMN (Flavin mono nucleotide) and FAD (Flavin adenine dinucleotide) in redox reactions	Cheilosis (lesions of corner of mouth, lips and tongue)
Vitamin B ₃ (Niacin)	Cereals, Green leafy vegetables, Liver, Kidney	Co enzyme in the form of NAD and NADP ⁺ in redox reactions.	Pellagra (photo sensitive dermatitis)
Vitamin B ₅ (Pantothenic acid)	Mushroom, Avocado, Egg yolk, Sunflower oil	Part of coenzyme A in carbohydrate protein and Fat metabolism	Inadequate growth
Vitamin B ₆ (Pyridoxine)	Meat, Cereals, Milk, Whole grains, Egg.	Co enzyme in amino acid metabolism, formation of Heme in Hemoglobin	Convulsions
Vitamin B ₇ (Biotin)	Liver, kidney, Milk, Egg yolk, Vegetables, Grains	Co enzyme in fatty acid Biosynthesis	Depression, Hair loss, muscle pain.
Vitamin B ₉ (Folic acid)	Egg, Meat, Beet root, Leafy vegetables, Cereals, Yeast	Nucleic acid synthesis, maturation of red blood cells	Megaloblastic anaemia

Vitamin	Sources	Functions	Deficiency Disease
Vitamin B ₁₂ (Cobalamin)	Egg, Meat, Fish	Co-enzyme in amino acid metabolism, Red blood cells maturation	Pernicious Anaemia
Vitamin C (Ascorbic acid)	Citrus fruits (Orange, Lemon etc...), Tomato, Amla, Leafy Vegetables	Coenzyme in Antioxidant, building of collagen	Scurvy (bleeding gums)
Vitamin D Cholecalciferol (D3), Ergocalciferol (D2)	Fish liver oil, Milk, Egg yolk, (exposure to sunlight)	Absorption and maintenance of calcium	Rickets (children), Osteomalacia (adults)
Vitamin E (Tocopherols)	Cotton seed oil, Sun flower oil, wheat germ oil, Vegetable oils	Antioxidant	muscular dystrophy (muscular weakness) and neurological dysfunction
Vitamin K (Phylloquinone & Menaquinones)	Green leafy vegetable, soybean oil, tomato	Blood clotting	Increased blood clotting time, Haemorrhagic diseases

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Structures of few Vitamins

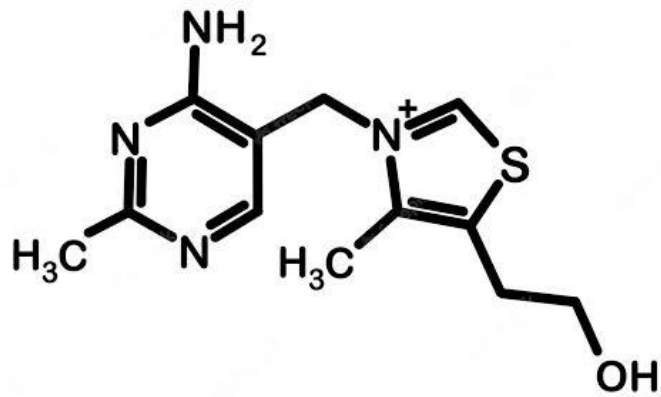
Vitamin A1



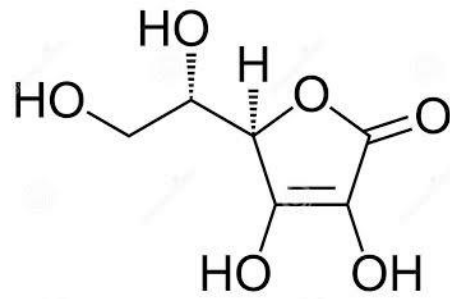
retinol

Vitamin B1

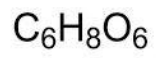
Thiamine



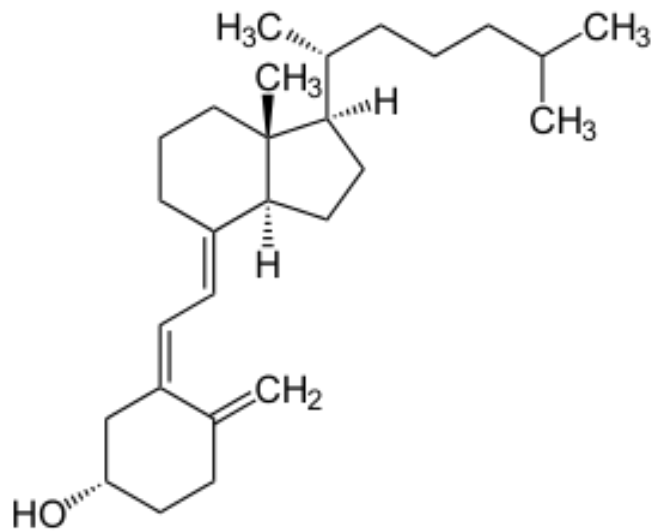
Vitamin C



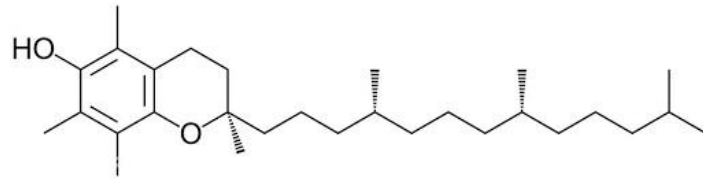
Vitamin C
Ascorbic acid



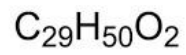
Vitamin D



Vitamin E



α -Tocopherol
Vitamin E



Vitamin K1

