

# Spirulina اسبيرولينا

Spirulina Protein content (more than 55%) is the highest amount of protein in natural foods. Spirulina Protein is made up of amino acids and contains all the essential amino acids. Lack of cell wall leads to better digestion and absorption of Spirulina protein. Spirulina are a rich source of low-fat, low-calorie, cholesterol-free protein and, like other high-fat protein sources such as meat and dairy, are not high in calories and cholesterol.

## The amino acids

The amino acids in Spirulina include Isoleucine, Leucine, Valine, Phenylalanine, Lysine, Methionine, Threonine, Tryptophan, Cysteine, Tyrosine, Histidine, Arginine, Alanine, Aspartic acid, Glycine, Proline and Serine similar to eggs and its quality has been approved by the US Food and Agriculture Organization.

## Carbohydrates

The primary types of carbohydrates in Spirulina are Rhamnose and Glycogen that are easily absorbed without the intervention of insulin. They also contain 4-8% fiber.

## Pigments

The dark color of Spirulina is due to the presence of high concentrations of three natural pigments Carotenoid, Chlorophyll and Phycocyanin that regulate the body's metabolism. The most important pigment in it is Phycocyanin. This pigment has very important effects like stimulating the immune system.

Pigment content in Spirulina Powder	
Compounds	In 100 grams of Spirulina powder
Chlorophyll A	1.29 g
Total Carotenes	157 mg
Xanthophyll	82 mg
Carotenoids(Beta carotene)	201 mg
Phycocyanine	756 mg
Zeaxanthin	72 mg
Luteine	ND

Composition of Essential amino acids in Spirulina powder	
Essential amino acids	In 100 grams of Spirulina powder
Isoleucine	3.17 g
Leucine	5.02 g
Lysine	2.70 g
Methionine (Cysteine)	2.19 g
Phenylalanine (Tyrosine)	5.00 g
Threonine	2.70 g
Tryptophan	0.84 g
Valine	3.48 g

Composition of non-essential amino acids in Spirulina powder	
non-essential amino acids	In 100 grams of Spirulina powder
Arginine	3.60 g
Alanine	4.11 g
Aspartic acid	5.47 g
Glutamic acid	8.02 g
Glycine	2.85 g
Histidine	1.09 g
Proline	2.04 g
Serine	2.74 g

## Fats

Fats are made up of fatty acids. The human body needs a food source of unsaturated fatty acids that are essential for maintaining the body's vital functions. Fatty acids play a role in this vital processes by being converted to prostaglandins. Spirulina contain unsaturated essential fatty acids called Gamma-Linolenic acid (GLA). It is a precursor of prostaglandins that control many processes in the body. After breast milk, Spirulina is the only source of GLA. Spirulina is a rich source of GLA among other algae (more than 3.1%).

## The enzymes

The enzymes in this plant accelerate the necessary chemical changes in the body. Superoxide dismutase and glutathione peroxidase are the most important enzymes in Spirulina. These enzymes are well known to have antioxidant effects and delay the aging process.

## Glycolipid and Sulfolipids

These two substances make up the fat in Spirulina. They remarkably increase the body's resistance to viral infections.

## Polyamines

These substances cause a specific odor of spirulina and are also responsible for keeping cell membranes healthy. The amount of polyamine in fresh Spirulina is very high. When spirulina is exposed to light and heat, the metabolism of polyamines decreases.

## vitamins

Spirulina is the richest plant source of vitamins containing beta carotene and vitamins such as vitamin E, K1, K2, B1, B2, B6, B12, niacin, pantothenic acid, biotin, Folic acid and inositol, which is one of the essential substances for releasing energy in the body and making the nervous system work better.

## Minerals

Minerals include zinc, iron, magnesium, potassium, sodium, phosphorus, calcium, sulfur, selenium, cobalt, chromium and manganese. Iron is essential for the formation of hemoglobin and the strengthening of the immune system. The iron in Spirulina is easily digested and absorbed. Pigment phycocyanin in Spirulina increases the bioavailability of iron. Also, the iron in Spirulina does not cause any allergic reactions. People who suffer from iron deficiency can get their iron from Spirulina.

## High digestibility and absorption

The high rate of digestion and absorption of a substance indicates its high nutritional value. Due to the thin cell wall of the Spirulina, it is easily broken. With experiments performed on different animals, 95% of Spirulina are digested and absorbed in the body of animals without performing any process on its cell wall.

## Consumption of Spirulina

In more than 40 countries, people are familiar with different forms of Spirulina such as Tablets, capsules and powders. Spirulina is one of the ingredients of snack biscuit pasta and juice. Spirulina have been used as a dietary supplement in Japan since 1970. Spirulina have grown in popularity among Americans over the past two decades. Its safety has been carefully and extensively studied and the results have not shown any toxic effects and side effects for humans. Spirulina are free of heavy metals and insecticides and no harmful bacteria were found in it. This product is completely safe for human consumption.

Spirulina strengthen the immune system and increase physical strength, help improve recovery in people with malnutrition and excessive weight loss, help provide the nutrients needed by the body in people on a diet, prevent cardiovascular disease by lowering cholesterol, and It regulates blood pressure, helps treat people with diabetes, prevents cancers due to its high antioxidant capacity, helps treat anemia, improves gastrointestinal function, and helps eliminate toxins from the body. In fact Spirulina is very suitable and valuable as a dietary supplement for humans, livestock, poultry and aquatic animals. Spirulina have no side effects. In case of gastrointestinal symptoms in new consumers, start with smaller amounts and gradually increase the amount received.

Nutrient content in Spirulina powder	
Nutrients	In 100 grams of Spirulina powder
Total Proteins	55.70 g
Total Fats	6 – 9 g
Total Fibers	2 – 10 g
Chlorophyll	800 -2000 mg
Ash	6.62 g
Polysaccharide	10 -15 g
Beta carotene	258 mg
Phosphorus	914 mg
Sodium	186 mg
Calcium	171 mg
Magnesium	260 mg
Potassium	1770 mg
Iron	75 mg
Zinc	5 mg
Folic acid	0.61 mg
Vitamin E	2 - 20 mg
Vitamin B1	4 -15 mg
Vitamin B2	3 – 5 mg
Vitamin B3	14 – 200 mg
Vitamin B6	0.5 – 1 mg
Vitamin B12	0.05 – 0.2 mg
Biotin	0.25 mg

## Storage conditions

Store in a cool and dry place away from sunlight and out of reach of children.