

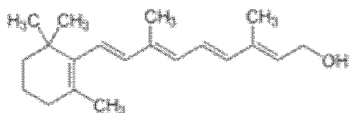
## E. Vitamins

A **vitamin** is an organic compound required as a nutrient in tiny amounts by an organism.<sup>[1]</sup> In other words, an organic chemical compound (or related set of compounds) is called a vitamin when it cannot be synthesized in sufficient quantities by an organism, and must be obtained from the diet.

### Types of vitamin and their structures

The types of vitamins are Vitamin C, Vitamin B1 (Thiamin), Niacin, Riboflavin, Vitamin B6, Folic Acid (Folacin), Vitamin B12 (Cobalamin), Vitamin A, Vitamin D, Vitamin E, Vitamin K, Biotin, Pantothenic Acid.

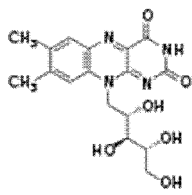
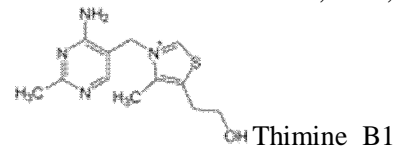
#### Vitamin A:



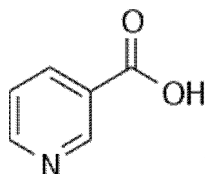
#### Vitamin B

A vitamin that can be dissolved in water. It is one of the B complex vitamins. Vitamin B6 helps the body by building protein, making antibodies and making the red blood cells. There are actually eight separate vitamins in the B family: thiamin (vitamin B1), riboflavin (vitamin B2), niacin, vitamin B6, folate, vitamin B12, biotin, and pantothenic. B vitamins increase energy levels, regulate metabolism, and help create new red blood cells. Foods with high B levels include meats, fish,

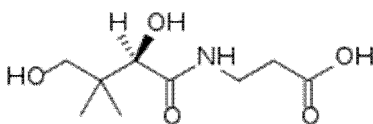
liver, dark/leafy vegetables, whole-grains, and fortified products.



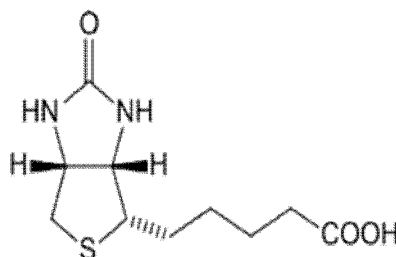
Riboflavin B2



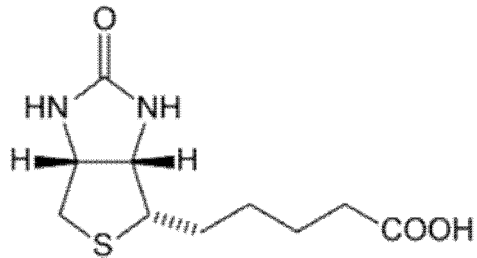
Niacin B3



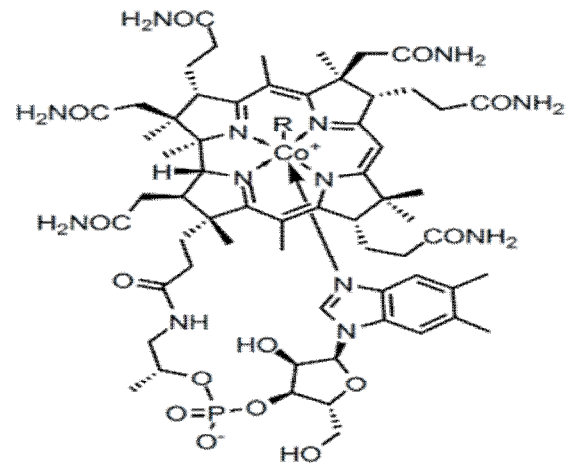
Pantothenic acid B5



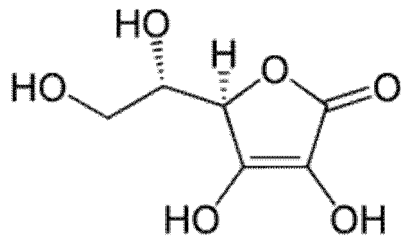
Biotin B7



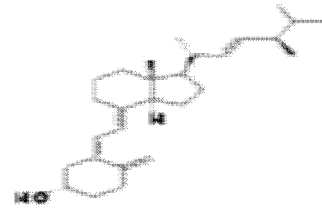
Folic acid B9



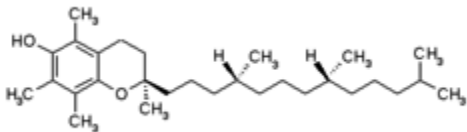
R = 5'-deoxyadenosyl, Me, OH, CN  
Cobalamin B12



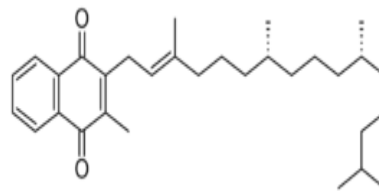
L-Ascorbic acid C



ergocalciferol D2



Tocopherol E



Phylloquinone K

### **Biotin:**

The B vitamin complex includes vitamins B1, niacin, B6, B12, folate, biotin, and pantothenic acid. Biotin helps the body use protein, fat and carbohydrate from foods for energy. It helps the body produce energy in the cells. Pantothenic acid is needed to make cholesterol, bile, some fats, red blood cells, hormones and nerve regulators.

### **Folic Acid:**

Folacin is also known as folic acid and folate. It is a water-soluble vitamin and is one of 8 members of the B complex including vitamins B1, B2, B3, B6, B12, biotin and pantothenic acid. Fortified grain products such as commercial breads, cereals and pastas are good sources of folacin.

Folate assists prevention of neural tube defects (spina bifida) in fetuses before birth and involvement in production of neurotransmitters, such as serotonin, that regulate mood, sleep, and appetite.

### **Niacin**

Niacin is one of the eight B complex vitamins including vitamins B1, B2, B6, B12, folate, biotin, and pantothenic acid. Niacin works closely with vitamin B1, B2, B6, pantothenic acid, and biotin to break the carbohydrates, fats, and proteins in food down into energy. Without niacin, the body would not be able to convert the food we eat into energy. Niacin has been used with some success to treat people with high cholesterol levels.

### **Pantothenic Acid:**

Pantothenic Acid and biotin are water-soluble vitamins.

### **Riboflavin:**

Riboflavin is also called Vitamin B2. Milk products supply about half of the riboflavin that people get and unlike other vitamins, riboflavin is not destroyed by cooking. Vegetarians may have riboflavin deficiencies. Children who do not get enough riboflavin may have poor growth. Vitamin supplements usually reverse symptoms within days to a few weeks.

### **Thiamine:**

Thiamine, also known as Vitamin B1 and because thiamine is water-soluble, any extra is passed out of the body in the urine. Thiamine is needed each day to maintain health. Thiamine can be lost in cooking due to heat. A well balanced diet based on the New Food Pyramid should provide enough thiamine daily.

**Vitamin E** is involved with immune system, DNA, and metabolism maintenance. As an antioxidant, research indicates that it may have a positive effect against cardiovascular disease and cancer. Vitamin E can be found in nuts, particularly almonds, wheat germ oil, vegetable oil, green/leafy vegetables, and enriched cereals.

### **Vitamin K:**

While involved in protection against osteoporosis, skin wounds, and possibly cancer, Vitamin K significantly helps blood to clot after an injury. Also found in a variety of foods, especially vegetables, K most often forms from intestine bacteria in the body.

**Vitamin K is in foods:** collards, kale, and other green leafy vegetables cabbage family including broccoli, cauliflower and Brussels, sprouts, egg yolk, some fruits, liver, cheese, milk.

### **Course requirements:**

- **CAT: 30% (Test 20% & assignment 10%)**
- **Exam: 70%**
- **70% Class attendance compulsory**