

BIOMOLECULES

Topic: 8 VITAMINS

VERY SHORT ANSWER QUESTIONS

1. **Define vitamins?**

Ans: **Vitamins** are the organic compounds required for the normal maintenance and health of an organism in minute quantities and their absence cause specific deficiency diseases. These are required in diet in order to perform specific biological functions

2. **How vitamin D is produced?**

Ans: Vitamin D may be supplied through food or may be produced in the skin by irradiation of sterols with sunlight (UV light).

3. **What are fat soluble vitamins?**

Ans: These vitamins are soluble in fats, oils and in fat solvents like alcohol, etc. There are four fat soluble vitamins. They are: Vitamin A, Vitamin D, Vitamin E and Vitamin K.

4. **What are water soluble vitamins?**

Ans: These vitamins are soluble in water. They are again divided into B complex vitamins and non B complex vitamins. B-complex vitamins are - Thiamine (B₁), Riboflavine (B₂), Niacin (B₃), Pyridoxine (B₆), Biotin (B₇), pantothenic acid, Folic acid and Cyanocobalamine (B₁₂). Vitamin C is the non-B complex vitamin

SHORT ANSWER QUESTION

1. **How vitamins are classified?**

Ans: **There are two types of vitamins**

Water soluble vitamins - These vitamins are easily soluble and absorbed by our body but are not stored by the body. So, we need to take these vitamins daily in our diet. These vitamins are attained by our body through food which should always be prevented from overcooking that destroys vitamins. There are nine types of water soluble vitamins

- Thiamin
- Niacin
- Riboflavin
- Biotin
- Pyridioxine
- Panthothenic acid
- Vitamin B - 12
- Falate
- Vitamin C

Fat soluble vitamins - These vitamins are stored in body as fats and are absorbed by body through intestinal tract with the help of bile acid. We should always take proper intake of these vitamins as excess of these may cause irritability, weight loss, dry skin etc. Fat soluble vitamins are

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

2. How vitamins are produced industrially?

Ans: Production of Vitamins:

Vitamins can be produced on industrial scale by microorganisms.

For e.g.,

- Riboflavin (B₂) can be produced by *Ashbya gossypii*, *Eremothecium ashbyii*
- Cobalamine (B₁₂) cause produced by bacteria propioni bacterium, *Pseudomonas denitrificans*, *Bacillus megatherium*, *Streptomyces oleaceus*
- a - Sorbode - a precursor of vitamin C can be produced from *Acetobacter*.

This is a fat soluble vitamin which is present mostly in animals. Its provitamins carotenes are found in plants. Vitamin A is necessary for vision and proper growth. It is necessary for maintenance of proper immune system to fight various infections. Cholesterol synthesis requires vitamin A. The carotenoids act as antioxidants and reduce risk of cancers

3. What are the foods containing different types of vitamins?

Ans: **Products Containing Different Types of Vitamins:**

1. **Vitamin A:** It helps in maintaining eyesight and healthy skin. It is present in eggs, milk, carrot, spinach and sweet potatoes etc.
2. **Vitamin B:** It includes vitamin B1, B2, B6, B12, niacin, folic acid, biotin, and pantothenic acid. Vitamin B generates energy for daily activities and maintains red blood cells. It is present in wheat, oats, seafood, leafy green vegetable, yogurt, beans and peas.
3. **Vitamin C:** It helps on strengthening gums and muscles. Foods rich in Vitamin C include strawberries, tomatoes, broccoli, cabbage and etc.
4. **Vitamin D:** It is known as sunshine vitamin, because it is manufactured by body after exposure to sun. It is found in mushrooms, chickens breast, cows milk etc.
5. **Vitamin E:** It is important for the production of red blood cells and in the consumption of vitamin k. It helps in minimizing the appearance of wrinkles. It is present in avocado, blackberries, guava, mango, potatoes, pumpkins, almonds, eggs.
6. **Vitamin k:** It plays a critical role in blood clotting. It regulates blood calcium levels. It is present in blackberries, grapes, mango, beef etc.

LONG ANSWER QUESTIONS

1. How vitamins are classified?

1. Fat soluble vitamins

These vitamins are soluble in fats, oils and in fat solvents like alcohol, etc. There are four fat soluble vitamins. They are: Vitamin A, Vitamin D, Vitamin E and Vitamin K.

These vitamins are stored in liver and are not readily excreted in urine and are not absorbed in the body unless fat digestion and absorption proceed normally. Among all the four vitamins only Vitamin K has a specific coenzyme function. Fat soluble vitamins are made up of one or more carbon units and hence they are called Isoprenoid compounds.

Their deficiency can cause malabsorptive disease.

Excess intake of these vitamins may cause hyper vitaminose

2. Water soluble vitamins

These vitamins are soluble in water. They are again divided into B complex vitamins and non B complex vitamins. B-complex vitamins are - Thiamine (B₁), Riboflavine (B₂),

Niacin (B₃), Pyridoxine (B₆), Biotin (B₇), pantothenic acid, Folic acid and Cyanocobalamine (B₁₂). Vitamin C is the non-B complex vitamin. These vitamins are not stored in the body (except B₁₂). Hence, they are to be continuously supplied in the diet. The biochemical reactions of these vitamins is through co-enzymes. The common deficiency symptoms of these vitamins are Dermatitis, glossitis, diarrhea, depression, etc.

2. Explain the deficiency of vitamins and products containing different types of vitamins.

a) Deficiencies of Vitamins

As we studied earlier that water soluble vitamins are not stored in body so their deficiencies is most common.

- Lack of vitamin C causes infection and reduction in wound healing
- Lack of Thiamin and Niacin causes mental confusion and muscle weakness.
- Deficiency of Riboflavin and vitamin B6 can cause dermatitis.
- Folate and vitamin B 12 deficiency cause anemia.

Deficiency of fat soluble vitamins

- Children having deficiency of vitamin D suffer disease called rickets.
- Vitamin A deficiency causes intestinal deficiency.
- Lack of vitamin K causes excessive bleeding.

We should take care of water soluble vitamins as they cannot be stored by body.

b) Products Containing Different Types of Vitamins

- 1 **Vitamin A:** It helps in maintaining eyesight and healthy skin. It is present in eggs, milk, carrot, spinach and sweet potatoes etc.
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3. Explain the foods rich in different vitamins.

Food Rich in Vitamin

1. Vitamin A:

It is very essential vitamin. It gives good vision, renew our body tissue, and it gives the normal growth.

Food which is rich in vitamin A:

- Carrot
- Mango's
- Sweet potato
- Spinach
- Ghee
- Cheese
- Egg
- Milk

2. Vitamin B:

It is a very important metabolic activity – it is used to help make energy.

The vitamin B complexes are,

Vitamin B1, B2, B3, B5, B6, B12.

Vitamin B1: it is also said to be thiamin it is a water soluble vitamin.

Vitamin B2: it is also said to be riboflavin.

Vitamin B3: it is also said to be niacin.

Vitamin B6: it is also said to be pyridoxine.

Vitamin B12: it is necessary for proteins, carbohydrates, and proteins.

Food which is rich in vitamin B:

- Brazil nuts
- Potato
- Banana
- Oats
- Beef
- Green vegetables

3. Vitamin C:

Vitamin is very important for maintaining body tissues. It is used strengthen the body vessels.

Food which is rich in vitamin C

- Strawberry
- Peppers
- Tomato
- Mangoes
- Raspberry
- Orange
- Peaches
- Cauliflower
- Kiwi fruit
- Green cabbage.

4. Vitamin D:

It gives strong bones, and it is used to forming strong teeth.

Food which is rich in vitamin D:

- Cod liver oil
- Tuna
- Fish
- Milk
- Herring
- Egg yolks

5. Vitamin E:

It is very important vitamin to maintain a nerve and healthy reproductive system.

Food which is rich in vitamin E:

- Nuts and seeds
- Wheat

- Grains
- Leafy green vegetables
- egg

6. Vitamin K:

It is used for blood clotting and it is used to make kidney tissue and bone.

Food which is rich in vitamin k:

- Mustard greens
- Beet greens
- Cabbage
- Kale
- Milk
- Liver
- Fish oil
- Onions
- Peas
- Soybean oil

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