

Question 1:- What are Carbohydrates? Classify and give detail of each class along with example. (2020)

Carbohydrates:-

Carbohydrates are also known as 'Saccharides'. Saccharides comes from Greek word $\sigma\alpha\kappa\chi\alpha\rho\alpha\upsilon\mu$, which means sugar. Carbohydrates are chief source of energy in human body. They provide 3.9 calories of energy per gram. When human body break down carbohydrates, glucose is produced. Carbohydrates are organic compounds and comprises of carbon, oxygen, and hydrogen.

Classification of Carbohydrates:-

Carbohydrates are classified into Monosaccharides, Oligosaccharides, and Polysaccharides.

Monosaccharides:-

The Greek word 'mono' means 1. Monosaccharides consist of simple sugar one molecule of sugar. They are also known as simple sugar. They are subdivided into trioses, tetroses, pentoses, hexoses, and heptoses. Monosaccharides cannot be further hydrolyzed.

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Example:-

Glucose, Fructose, Galactose

Oligosaccharides:-

The Greek word 'oligo' refers to few. Oligosaccharides contains 2 to 10 monosaccharides. On hydrolysis, the oligosaccharides which contains 2 molecules of monosaccharides is known as oligo disaccharide. And the oligosaccharide ~~Example:-~~ which consists of 3 and 4 monosaccharides are called trisaccharides and tetrasaccharides respectively.

Example:- examples of disaccharides are Maltose, Sucrose, and lactose.

Polysaccharides:-

From Greek word 'Poly' means many. Polysaccharides consists of many monosaccharides. Polysaccharides which contains same type of monosaccharide are called homo polysaccharides, whereas polysaccharides which contains different types of monosaccharides are called hetero polysaccharides.

Example:- Glycogen, Pectin, starch, Hyaluronic acid, chondroitin, and cellulose.

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Question 2:- What is role of carbohydrates and vitamins in the body? Discuss briefly.

A. Role of Carbohydrates in body:

Carbohydrates play ^{following} key roles in body.

1 Source of energy:-

Carbs are broken down into glucose by the body's cells for energy. Glucose is especially important for brain and muscles, which rely heavily on it during activities.

2 Storage of Energy:-

Excess glucose can be stored in liver and muscles in the form of glycogen, which can be broken down into glucose when body needs energy.

3 Preserve body muscles:-

When body has enough carbohydrates, it does not have to break protein for energy. In this way, it helps in preserving the body muscles.

4 Improved digestive health:-

Some carbs, like fibres, do not get digested, but it helps in maintaining the digestive health. It prevents constipation, helps regulate bowel movements.

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5 Support of Physical activity:-

Carbohydrates are body's preferred source of energy ~~in~~ during high ~~ener~~ intensity exercises. It relies ~~of~~ on glycogen for quick burst of energy.

6 Fuel for the Brain:-

The brain uses glucose as its fuel. ~~th~~ Without sufficient carbohydrates, mental clarity and cognitive functions can suffer.

7 Fat metabolism:-

Carbohydrates helps in metabolism of fats. Without enough carbohydrates body may enter a state of Ketosis, ~~wh~~ where fat is used for fuel instead, which ~~may~~ can cause imbalances.

8 Synthesis of RNA and DNA:-

Carbohydrates are important in formation of nucleotides, which are building blocks of DNA and RNA, influencing genetic information transfer.

9 Cell structure :-

Carbohydrates are involved in formation of cell membrane as certain carbohydrates (like glyco-proteins and glycolipids) ~~are~~ play a key role in cell signaling and structural integrity.

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10 Regulation of blood sugar:-

Carbohydrates help maintain balanced blood sugar levels. Particularly, the complex carbohydrates, provide slow and steady release of glucose into bloodstream.

11 Immune System Support:-

Certain carbohydrates, like those in fruits and vegetables, support immune system. For example, fiber can promote growth of beneficial gut bacteria, which play a role in immune function.

B. Role of vitamins in body:

Vitamins are essential micronutrients. They help in maintaining overall health and support various bodily functions. Human body needs vitamins in small amount to work properly. Different vitamins play following different roles in our bodies:

1. Vitamin A (Retinal):-

Supports vision, immune system, and skin health. It is crucial for maintaining healthy vision, especially in low-light conditions, and helps in cell growth and repair. It is found in milk, green vegetables, liver, eggs, and carrots.

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2 Vitamin B₁ (Thiamine):

Thiamine is important for energy production, nerve functioning, and carbohydrates metabolism. It helps convert food into energy and supports nervous system. Its sources are whole grains, nuts, and beans.

3 Vitamin B₂ (Riboflavin):

Riboflavin helps in production of Red blood cells, supports healthy skin, and nerve functioning. It is also important in energy production. It is found in milk and dairy products, liver, and eggs.

4 Vitamin B₃ (Niacin):

Niacin turns food into energy. It also supports healthy skin, nervous system and digestive system. It is found in meat, poultry, fish, whole grains, and nuts.

5 Vitamin B₅ (Pantothenic acid):

Vitamin B₅ is important for the metabolism of food. It helps in production of hormones and cholesterol. It is found in chicken, beef, oats and eggs.

6 Vitamin B₆ (Pyridoxine):

Pyridoxine helps in the formation of red blood cells and maintain brain functions. It is important for protein

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metabolism. It is found in Avocado, Bananas, Legumes, meat, nuts, poultry, and whole grains.

7 Vitamin B₇ (Biotin):-

essential for the metabolism of protein and carbohydrates, and in the production of hormones and cholesterol. Its sources are egg yolk, milk, legumes, nuts, and organ meat (liver, kidney).

8 Vitamin B₉ (Folic Acid):-

Vitamin B₉ is essential for DNA synthesis and repair, red blood cell production. It is crucial during pregnancy for fetal development. It is found in green leafy vegetables, citrus fruit, lentils, and fortified cereals.

9 Vitamin B₁₂ (Cobalamin):-

Cobalamin is vital for nerve function, red blood cell formation, and DNA synthesis. Its sources are meat, eggs, milk and other dairy products, and poultry.

10 Vitamin C (Ascorbic Acid):-

Vitamin C supports acts as an antioxidant and supports immune system, and helps with collagen⁺ production and improves iron absorption. It is found in citrus fruits, tomatoes, bell peppers, Cabbage, strawberries and ~~Bro~~ Broccoli.

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11 Vitamin D:-

Vitamin D helps the body absorb calcium. Human body needs calcium for the proper development and maintenance of healthy teeth and bones. It is found in sunlight, fatty fish, fish liver oil, fortified cereals, fortified milk, and dairy products.

12 Vitamin E (Tocopherol):-

Vitamin E acts as an antioxidant. It helps body form red blood cells, and supports immune function and skin health. It is found in leafy green vegetables, nuts, mango, papaya, and nuts.

13 Vitamin K:-

It is vital for blood clotting and bone health. It is found in cabbage, cauliflowers, leafy green vegetables, fish, liver, beef, and eggs.