

Prof ANIL KUMAR (Zoology)

B.Sc HONS Part - III Paper - V

Topic:- Write short notes on

1. oligosaccharide
2. sterols or cholesterol
3. vitamin K
4. vitamin D

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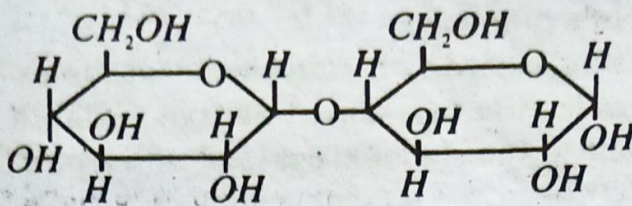
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Ans. 1. Oligosaccharide—It is carbohydrate in which two to ten monosaccharides are attached. One molecule of water released during the condensation of two molecules. Condensation occurs between hydroxyl group of one molecule (right) and anomeric Carbon (left) of the other which results in the formation of an oxygen bond between the two molecules. The bond is called glycosidic bond. The empirical formula of oligosaccharide is $C_n (H_2O)_n - 1$. The oligosaccharides yield monosaccharide on hydrolysis. These are :

(a) Disaccharides—These are formed by condensation of two molecules of monosaccharides with elimination of one water molecule.

Ex.—Maltose, Sucrose, Lactose.



Maltose

Maltose—glucose + glucose

Sucrose—glucose + fructose

Lactose—glucose + galactose.

(b) Trisaccharides—Trisaccharides are formed by condensation of three molecules of monosaccharides with elimination of two molecules of water.
Ex—Raffinose (one glucose + one galactose + one fructose).

(c) Tetrasaccharides—Tetrasaccharides are formed by Condensation of four Saccharide molecules with release of three water molecules.

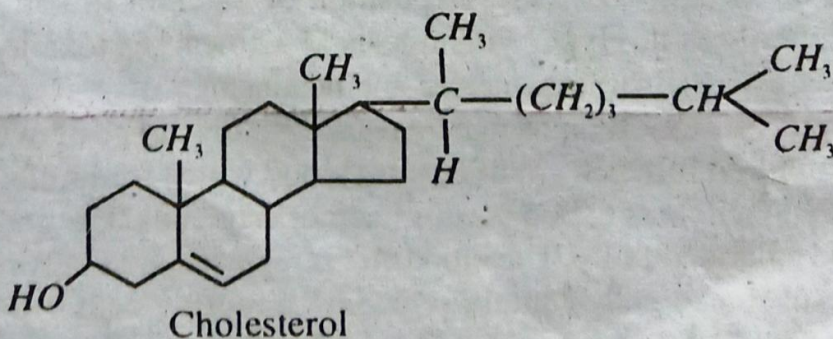
Ex—Stachyrose—one glucose + two galactose + one fructose.

(d) Pentasaccharides—Formed by condensation of five saccharide molecules with release of 4 water molecules.

Ex—Verbacose.

2. Sterols Or, Cholesterol—It is derived lipid. Lipid like substances obtained on the hydrolysis of simple or compound lipids are known as derived lipids.

Wax like solid alcohols of steroids are known as sterols. The most common sterol present in animals is cholesterol. It is present in human blood plasma in concentration of about 50–180 mg per 100 ml. It is supplied to the tissues from blood for the synthesis of membrane lipid, steroid hormone, bile salts and Vitamin D. The precursor of Vitamin D are known as ergasterol. Major source of Cholesterol is egg yolk, butter, Vanaspati, animal fat, liver oil etc. Its level in the circulating blood is regulated by liver. Its excretion takes place in the form of bile pigments and through skin to some extent but never with urine. Excessive increase in the level of cholesterol cause its deposition in the wall of arteries which makes them hard. It is recognized as arterosclerosis which leads to heart trouble.



Cholesterol

3. Vitamin K– Vitamin K is fat soluble. Vitamin K is found in two forms, namely Vitamin K₁–Phylloquinone and Vitamin K₂–Pharmoquinone. Both are derivatives of naphthoquinone.

Vitamin K is synthesized by bacteria in the intestine of man. It is found in green leafy vegetables like alfa-alfa, Cabbage, Spinach, tomato, soyabean etc. in enough quantity. In fish, milk, eggs, ghee, liver etc. Vitamin K is found in poor quantity.

Vitamin K regulates the synthesis of prothrombin, thromboplastin and proconvertin in the liver cells. It checks haemorrhages and hence vitamin K is also called antihaemorrhagic factor. It is essential for electron transport chain mechanism and oxidative phosphorylation.

Deficiency of Vitamin K inhibits the synthesis of prothrombin in the liver cells. In the absence of prothrombin the blood clotting time is prolonged which results in uncontrolled bleeding even from small wounds. In such a situation, sometimes, even a small injury proves to be fatal due to loss of blood.

4. Vitamin D–Chemically Vitamin D is called calciferol. In nature vitamin D is found in two forms that is D₂ & D₃. D₂ is Ergosterol and found mainly in plants. D₃ is 7-dehydrocholesterol and found mainly in animals.

Vitamin D is absent in vegetarian diet. Main sources are egg, milk, fish, liver, oil etc. Vitamin D is synthesized in body in presence of sunlight and therefore Vitamin D is also called Sun shine Vitamin. Vitamin D is absorbed in intestine in presence of bile salts. It is stored largely in liver, kidneys, intestine, adrenals and bones. Daily requirement in children is about 0.02 mg and in adults 0.025 mg.

Functions–Vitamin D regulates the metabolism of Calcium and Phosphorus. It increases the absorption of Calcium and Phosphorus in the intestine and their deposition in bones. It is essential for bones & teeth development.

Deficiency–In deficiency of Vitamin D in children retards the utilization of calcium. Due to this bones remain soft and cartilagenous. This leads to rickets.

In female deficiency causes osteomalasia. This results in deformities of pelvic bones and long bones.

Deficiency of Vitamin D in old aged persons makes the bones brittle and easily breakable. This is known as osteoporosis.

Excess of Vitamin D causes deposition of calcium in soft organs like kidney and damages it. Hyper vitaminosis D also causes toxicity leading to weakness, digestive disorders, nausea and headache.