CARBOHYDRATES

The Compounds that are chemically made up of carbon, hydrogen and oxygen, called Carbohydrates. Carbohydrates are formed in the green parts of plants that absorb CO2 from air, water from soil through the process called photosynthesis. Sun rays serves as the source of energy in this process as given below:

$$6CO_2 + 6H_2O \longrightarrow C_6H_{12}O_6 + 6O_2$$

Classification of Carbohydrates

1. **Monosaccharaides**

   Simple sugars that cannot be hydrolysed into anything simpler, e.g. glucose, fructose and galactose

2. **Disaccharides**

   Two monosacchrides condensed together with the release of a water molecule to form a disaccharide. E.g. sucrose (Glucose + Fructose) present in cane and beet, maltose (Glucose + Glucose) present in bread, candies etc. and lactose (Glucose + Galactose) present in milk.

Monosacchrides and disaccharides are collectively known as sugars, these are white crystalline, water soluble and sweet in taste. Caramelization is an important property of in the products where caramel color and flavor is desirable e.g. sweets, candies, custard, ice cream and beverages.

3. **Oligosaccharides**

   3-7 monosacchrides are linked together, they form an oligosaccharide. Two important oligosaccharides found in legumes are trisaccharide and tetrasacchrides

4. Polysaccharides

Monosacchrides greater than 7 linked to form polysaccharides. This linking can be either in straight form or in branch form. Amylose: Straight form (70-350 glucose units) Amylopectin: Branch form

Important polysaccharides:

Starch: Has role in corn syrup. When starch is heated in water ,it produces a gel or thickening agent as in gravies, soups, sauces, baking of bread and formation of custards

Cellulose: Principle carbohydrate in plants. It is indigestible in human stomach due to lack of digestive enzymes but is digestible in ruminants

Glycogen: Excess starch in human body is stored in the form of glycogen.

Pectin: Mainly found in fruit in some root vegetables. It has gelling property and is used in the manufacture of jam, jellies and marmalades.

Agar and alginate: Extracted from seaweeds. Capable of farming gels and used in many foods as gelling agent, Agar is especially used in manufacture of culture media for growth of microorganisms.

Cellulose, pectin, agar and alginate have no nutritive value for humans but are used as bulking agent

Role of carbohydrates in human nutrition:

Digestible carbohydrates (Sugars, starches) mainly serve as energy source in human body. On complete absorption, they yield 16 kJ (3.75 kcal) of energy/g on oxidation. Major sources of carbohydrates are cereals (wheat, rice, corn and their products, roots and tubers. Fruits and vegetables supply carbohydrate in form of sugars and fiber.