

class — B.Sc . Part -II (subsidiary)

subject — chemistry

Topic — carbohydrates

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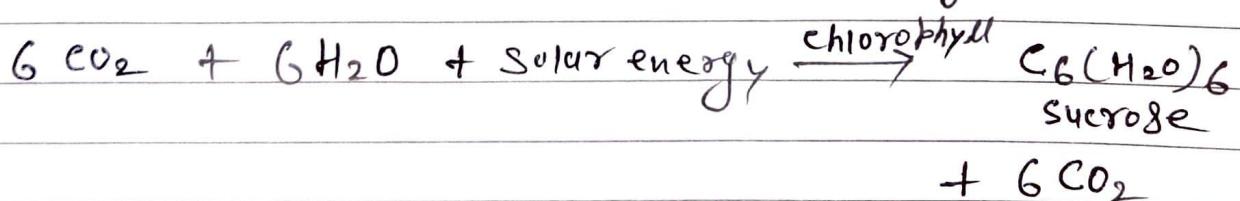
# Carbohydrates

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The carbohydrates are an important class of naturally occurring organic compounds. They are all composed of carbon, Hydrogen and oxygen. These compounds may be represented by the general formula  $C_x(H_2O)_y$ , where x and y may be same or different. e.g.  $C_6H_{12}O_6$ ,  $C_{12}H_{22}O_{11}$ . In early days, these compounds were considered to be hydrates of carbon and for this reason these were called carbohydrates. Carbohydrates are highly essential for the maintenance of life in both plants and animals. They provide raw materials for many important industries.

Structurally, carbohydrates are polyhydroxy aldehydes or ketones or compound which produce them on hydrolysis.

The formation of carbohydrates in nature occurs in green plants by process known as photosynthesis. These plants contain the green pigment chlorophyll which catalyses the conversion of  $CO_2$  and water into sugar.



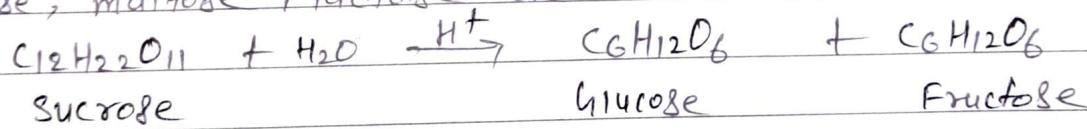
While plants buildup carbohydrates from  $CO_2$  and  $H_2O$ , animals degrade carbohydrates by eating plants and combine the carbohydrates with oxygen from the air to carry out the reverse of photosynthesis.

## Classification of carbohydrates :-

The carbohydrates are divided into three major classes :— Monosaccharides, oligosaccharides and polysaccharides.

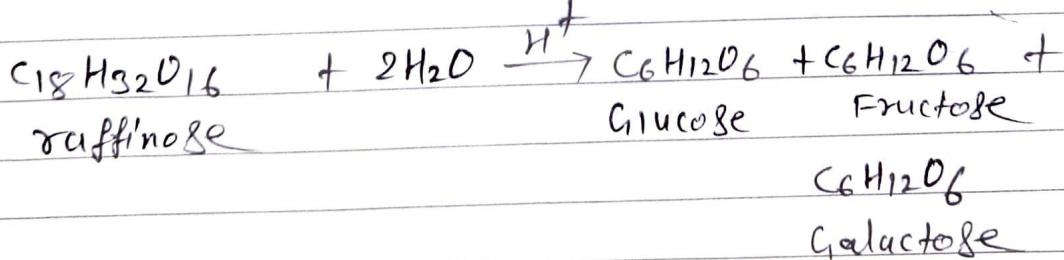
Monosaccharides! — The monosaccharides are simple unit of carbohydrates which can not be decomposed further by hydrolysis to give simpler carbohydrates. For example - glucose and Fructose both have molecular formula  $C_6H_{12}O_6$ .

oligosaccharides! - Those carbohydrates which yield a definite number (2-10) monosaccharide molecules or simple sugar on hydrolysis are called oligosaccharides. They include, disaccharides, which yield two monosaccharide unit on hydrolysis. For example sucrose, maltose, lactose etc.



Those oligosaccharide containing three monosaccharide molecules upon hydrolysis is called Tribosaccharide.

e.g. - Raffinose ( $C_{18}H_{32}O_16$ )



Poly saccharides | — The Poly saccharides are carbohydrates of high molecular weight which yield many mono saccharide molecules on hydrolysis.

e.g. | — Starch and cellulose both have molecular formula  $(C_6H_{10}O_5)_n$ .

