

# Carbohydrates

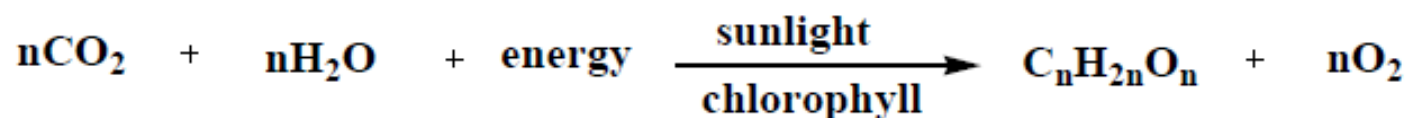


# Carbohydrates

- ❖ Carbohydrates are the most abundant organic compounds in the plant world.
- ❖ They act as storehouses of chemical energy (glucose, starch, glycogen); are components of supportive structures in plants (cellulose), crustacean shells (chitin), and connective tissues in animals (acidic polysaccharides); and are essential components of nucleic acids (D-ribose and 2-deoxy-D-ribose)

# Carbohydrates

- ❖ Carbohydrates make up about three fourths of the dry weight of plants. Animals (including humans) get their carbohydrates by eating plants, but they do not store much of what they consume. Less than 1% of the body weight of animals is made up of carbohydrates.
- ❖ Carbohydrates are the most abundant class of organic compounds found in living organisms. They originate as products of photosynthesis, an endothermic reductive condensation of carbon dioxide requiring light energy and the pigment chlorophyll.



The name carbohydrate means hydrate of carbon and derives from the formula  $\text{C}_n (\text{H}_2\text{O})_m$ . Following are two examples of carbohydrates with molecular formulas that can be written alternatively as hydrates of carbon.

*Glucose (blood sugar):*  $\text{C}_6\text{H}_{12}\text{O}_6$ , or alternatively  $\text{C}_6 (\text{H}_2\text{O})_6$

*Sucrose (table sugar):*  $\text{C}_{12}\text{H}_{22}\text{O}_{11}$ , or alternatively  $\text{C}_{12} (\text{H}_2\text{O})_{11}$

## **Definition:-**

Carbohydrates may be defined chemically as aldehyde or ketone derivatives of polyhydroxy alcohols or as compounds that yield these derivatives on hydrolysis.

## **Carbohydrates are:**

- A major source of energy from our diet.
- Composed of the elements C, H, and O.
- Also called saccharides, which means “sugars”.
- Carbohydrates are produced by photosynthesis in plants.
- Glucose is synthesized in plants from CO<sub>2</sub>, H<sub>2</sub>O, and energy from the sun then oxidized in living cells (respiration) to produce CO<sub>2</sub>, H<sub>2</sub>O, and energy

# Functions of Carbohydrates:

- 1 - Source of energy for living beings, e.g. glucose
- 2 - Storage form of energy, e.g. glycogen in animal tissue and starch in plants
- 3 - Serve as structural component, e.g. glycosaminoglycans in humans, cellulose in plants and chitin in insects
- 4 - Non-digestible carbohydrates like cellulose, serve as dietary fibers
- 5 - Constituent of nucleic acids RNA and DNA, e.g. ribose and deoxyribose sugar
- 6 - Play a role in lubrication, cellular intercommunication and immunity
- 7 - Carbohydrates are also involved in detoxification, e.g. glucuronic acid



# Function of Carbohydrates

## CARBOHYDRATE

### Role & Function in Human Body

#### Use

Glycogen broken down to glucose & used as **fuel** source

#### Storage

Stored in body as **glycogen** in muscle & liver

#### Sources

Sugars, starches & **fibres** found in fruits, grains & vegetables

#### Depletion

Glycogen depletion is a major cause of **fatigue** during exercise

#### Requirements

Dictated by exercise **type**, **intensity** & **duration**

#### Replenish

Required for performance and **recovery** from training & competition

#### Categories

##### Simple/ Free Sugars:

(Sweets, Jam, Fruit Juice)

##### Complex/ Starchy:

(Bread, Rice, Potato)



# Health Benefits of Carbohydrates

Energy for the Body

Uplifts Mood

Helps to Sleep Better

Provides Fiber to the Body

Helps to Prevent Diseases

Prevents Blood Clots

Useful to Control Weight

Improves the Digestive System

Helps to Keep Memory Sharp

Best Nutrient for Athletes





# Sources of Carbohydrates

## **1. Grain Products:**

Grain products are the leading source of carbohydrates in the diet.

Grains naturally contain high concentrations of starch, which our gastrointestinal system breaks down into sugars.

## **2. Starchy Vegetables and Beans:**

Beans and starchy vegetables, such as potatoes, yams, green peas, and corn, contain high levels of complex carbohydrates that our body digests into sugars.

### **3. Fruits:**

All fruit and fruit juices contain carbohydrates in the form of natural sugars, such as glucose and fructose.

### **4. Beverages:**

Dairy milk is the only significant source of dietary carbohydrates not derived from plants. A cup of unflavored milk contains about 11 to 12 grams of carbohydrate in the form of milk sugar, or lactose.

### **5. Sweets and added Sugars:**

Eating candy and desserts markedly boosts the number of carbohydrates in our diet.