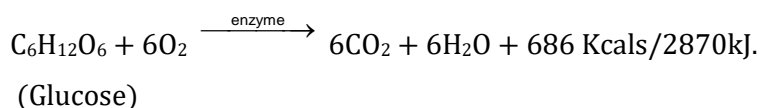


RESPIRATION IN PLANTS

DO PLANTS BREATHE

INTRODUCTION

- All the energy required for 'life' processes is obtained by oxidation of some macromolecules that we call 'food'.
- Only green plants and cyanobacteria can prepare their own food; by the process of photosynthesis they trap light energy and convert it into chemical energy that is stored in the bonds of carbohydrates like glucose, sucrose and starch.
- Ultimately all the food that is respired for life processes comes from photosynthesis.
- Respiration is **Amphibolic, oxidative and exergonic process**.
- **Respiration** – The breaking of the C-C bonds of complex compounds through oxidation within the cells leading to release of considerable amount of energy is called **Respiration**.
- **"Cellular respiration** – The mechanism of breakdown of food materials within the cell to release energy, and the trapping of this energy for synthesis of ATP or it is an enzymatic controlled process of biological oxidation of food material in living cell, using molecular O₂ producing CO₂ and H₂O and releasing energy which store as ATP." ATP is also called energy currency.



- In **prokaryotes**, Respiration takes place in **cytoplasm** while in **eukaryotes**, it takes place in **cytoplasm** and **mitochondria**.
- The carbon skeleton produced during respiration is used as precursors for biosynthesis of other molecules in the cell. That's why we call it an amphibolic pathway as respiratory substrate is breaking down (Catabolism) and the intermediates of the catabolic pathway are used for the synthesis (Anabolism) of other biomolecule.

RESPIRATORY SUBSTRATE:

Organic compounds catabolised in the living cells to release energy are called respiratory substrates
e.g. Carbohydrate, fats, proteins, organic acid.

- Respiration which uses carbohydrates or fats is termed as **floating respiration** whereas which uses proteins is called **protoplasmic respiration**

DO PLANTS BREATHE?

Yes, plants require O_2 for respiration to occur and they also give out CO_2 . Hence, plants have systems in place that ensure the availability of O_2 . Plants, unlike animals, have no specialised organs for gaseous exchange but they have stomata and lenticels for this purpose.

There are several reasons why plants can get along without respiratory organs.

1. Each plant part takes care of its own gas-exchange needs. There is very little transport of gases from one plant part to another.
2. Plants do not present great demands for gas exchange. Roots, stems, and leaves respire at rates far lower than animals do. Only during photosynthesis are large volumes of gases exchanged and, each leaf is well adapted to take care of its own needs during these periods. When cells photosynthesis, availability of O_2 is not a problem in these cells since O_2 is released within the cell.
3. The distance that gases must diffuse even in large, bulky plants is not great. Each living cell in a plant is located quite close to the surface of the plant.
Most cells of a plant have at least a part of their surface in contact with air. This is also facilitated by the loose packing of parenchyma cells in leaves, stems and roots, which provide an interconnected network of air spaces.

TYPES OF RESPIRATION:

It is of two main types

1. Aerobic
2. Anaerobic

1. **Aerobic respiration:**

- It uses oxygen and completely oxidizes the organic food to carbon dioxide and water and, therefore, it releases the entire energy available in glucose.
- It occurs in most plants and animals.

2. **Anaerobic respiration:**

- This accounts only for partial breakdown of glucose to either lactic acid or ethanol and carbon dioxide.
- Less than 7% of the energy in glucose is released by anaerobic respiration.
- It occurs in the absence of oxygen in muscles, bacteria and yeast.