

Points to Remember

Tissue System

Tissues are the group of cells that are similar or dissimilar in structure and origin, but perform similar function.

Dermal / Epidermal tissue system It consists of epidermis(protects the inner tissues), stomata (helps in transpiration), Cuticle(checks evaporation of water), Root hair (absorption of water of minerals).

Ground tissue system It includes all the tissues of the plant body except epidermal and vascular tissues.
i) Cortex ii) Endodermis iii) Pericycle iv) Pith

Vascular tissue system
Vascular bundles : Xylem and Phloem in the form of bundles.
Xylem conducts water and minerals and phloem conducts food materials.
(i) Radial Bundles : Bundles are in different radii, alternating with each other. *Ex* : *Roots*
(ii) Conjoint bundles : Xylem and phloem lie on the same radius.
a) Collateral : Xylem towards the centre and Phloem towards the periphery.
• If cambium is present it is called open. *Ex*: *Dicot stem*
• If cambium is absent it is called closed. *Ex*: *Monocot stem*
b) Bicollateral : Phloem is on both outer and inner side of xylem. *Ex*: *Cucurbita*
(iii) Concentric Bundles : Xylem completely surrounds the phloem or viceversa.
a) Amphivasal: Xylem surrounds phloem. *Ex*: *Dracaena*
b) Amphicribal: Phloem surrounds xylem. *Ex*: *Ferns*
Endarch: Protoxylem towards centre; metaxylem towards periphery. *Ex*: *Stem*.
Exarch : Protoxylem towards periphery; metaxylem towards centre. *Ex*: *Roots*.

Plastids

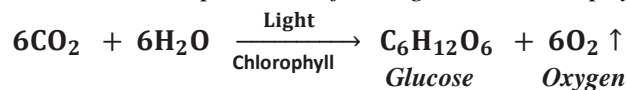
Plastids are double membrane bound organelles that are responsible for preparation & storage of food.

Types

- 1) Chloroplast - Green coloured plastids (green pigment – chlorophyll).
- 2) Chromoplast - Yellow, red, orange coloured plastids.
- 3) Leucoplast - Colourless plastids

Photosynthesis

Carbon dioxide combines with water in the presence of sunlight and chlorophyll to form carbohydrates.



Photosynthetic Pigments
Pigments involved in photosynthesis are called **Photosynthetic pigments**.
i) Primary pigments / Reaction centre: 'Chlorophyll a' – It traps solar energy and converts it into electrical and chemical energy.
ii) Accessory pigments / Harvesting centre: chlorophyll b and carotenoids - They pass on the absorbed energy to 'chlorophyll a'

Role of Sunlight in photosynthesis
1) Light dependent photosynthesis (Hill reaction / Light reaction)
Photosynthetic pigments absorb light & convert it to chemical energy ATP & NADPH₂
2) Light independent reactions (Calvin cycle / Dark reaction / Biosynthetic phase)
CO₂ is reduced into Carbohydrates with the help of ATP and NADPH₂.

Factors affecting photosynthesis
a) Internal Factors:
i) Pigments ii) Leaf age iii) Accumulation of carbohydrates iv) Hormones
b) External Factors:
i) Light ii) Carbon dioxide iii) Temperature iv) Water v) Mineral elements

Mitochondria (Power house of the cell)

Mitochondria are filamentous or granular cytoplasmic organelles present in cells.

Structure of Mitochondria

It consists of two membranes called inner and outer membrane.
***Outer membrane** : Smooth & freely permeable. Porin molecules forms passage channel.
***Inner membrane** : Semi-permeable membrane. Regulates the material passage
Cristae finger like projections that holds variety of enzymes.
Oxysomes : Tennis racket shaped particles that involve in ATP synthesis.
Mitochondrial matrix - It is a complex mixture of proteins and lipids.

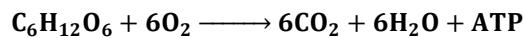
Functions of Mitochondria

- It acts as the ATP factory of a cell.
- It helps the cells to maintain normal concentration of calcium ions.
- It regulates the metabolic activity of the cell.

Respiration

Respiration involves exchange of gases between the organism and the external environment.

Organic food is completely oxidized with the help of oxygen into CO₂, water & energy.



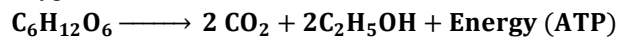
Stages of Aerobic respiration :

1) Aerobic respiration

- Glycolysis (Glucose splitting)**: It takes place in cytoplasm. Glucose → Pyruvic acid
- Krebs Cycle/ Tricarboxylic Acid Cycle (TCA)**: Occurs in mitochondria matrix.
Pyruvic acid → CO₂ & H₂O
- Electron Transport Chain**: Through a system of electron carrier complex.
NADH₂ & FADH₂ → NAD⁺ & FAD⁺

2) Anaerobic respiration

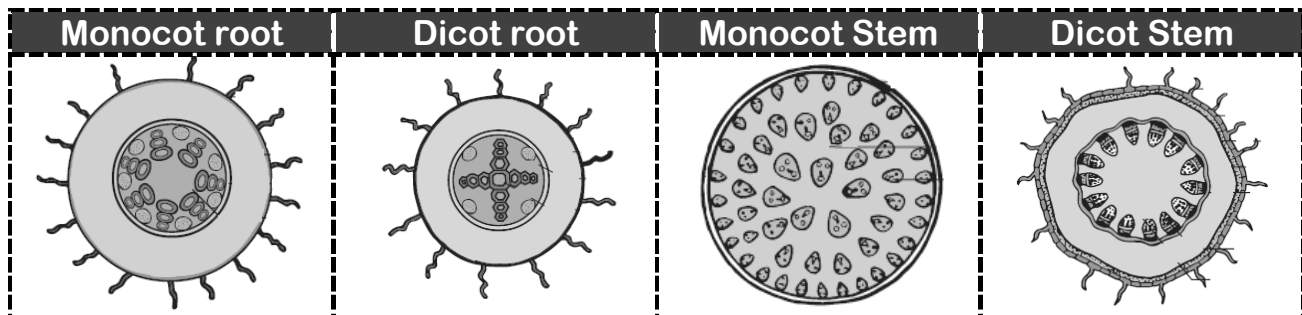
It takes place without oxygen. Glucose is converted into ethanol or lactic acid.



Respiratory Quotient (R.Q)

Ratio of volume of carbon dioxide liberated to the volume of oxygen consumed during respiration to release energy via electron.

$$RQ = \frac{\text{Volume of CO}_2 \text{ liberated}}{\text{Volume of O}_2 \text{ consumed}}$$



Vascular Tissue System

- ★ **Dicot Root** – Radial, Xylem is Exarch and Tetrach. *Ex : Bean*
- ★ **Monocot Root** – Radial, Xylem is Exarch and Polyarch. *Ex : Maize*
- ★ **Dicot stem** – Conjoint - Collateral, Endarch and Open. *Ex : Sunflower*
- ★ **Monocot Stem** – Conjoint – Collateral, Endarch and Closed. *Ex : Maize*
- ★ **Monocot(Grass) & Dicot Leaf(Mango)** – Conjoint - Collateral and Closed