Cosmo School

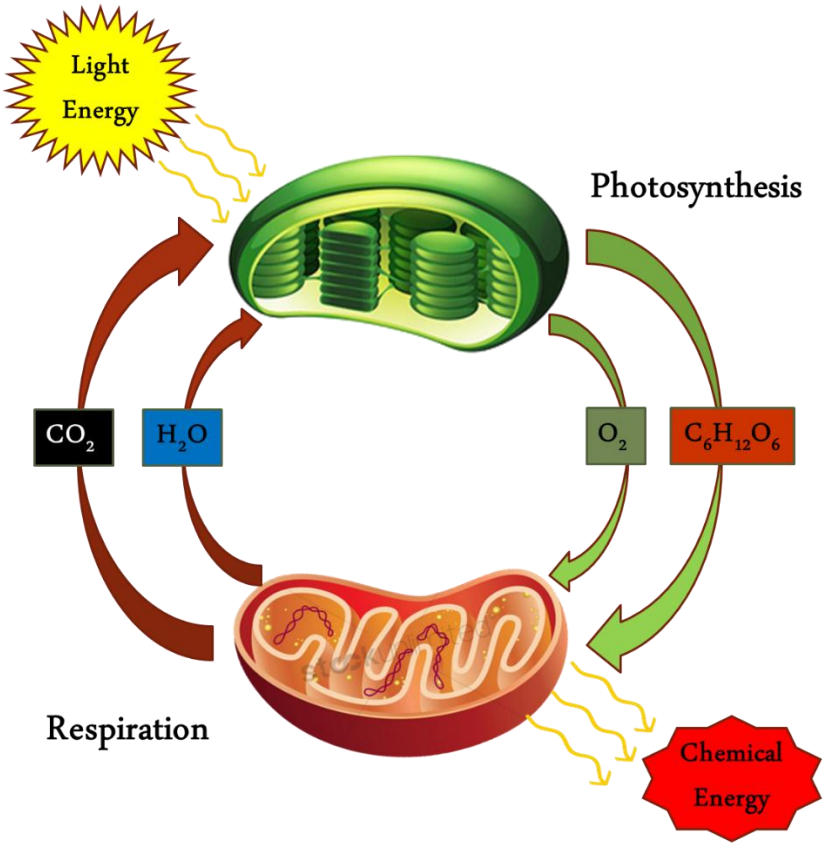
Work Sheet: 02

Biology (Chapter-4: Bioenergetics)

Class: IX

Name of the student: .....*Date:* ...../...../.....

- **Respiration** is a process in living organisms involving the production of energy, typically with the intake of oxygen and the release of carbon dioxide from the oxidation of complex organic substances (cell food).
- **Cellular respiration** is the **catabolic process** in which organic molecules are broken down to create usable energy via an electron transport chain.



$$C_6H_{12}O_6 + 6O_2 \xrightarrow{\text{Different Enzymes}} 6CO_2 + 6H_2O + \text{Energy (686 Kcal/Mole)}$$

- Respiration is done in two steps. Such as—

(a) External Respiration—

i) Inhalation &

ii) Exhalation

(b) Internal Respiration—

i) Gaseous transportation &

ii) Cellular respiration

➢ **Oxidative phosphorylation** is the metabolic pathway in which cells use enzymes to oxidize nutrients, thereby releasing the chemical energy of molecular oxygen, which is used to produce adenosine triphosphate. In most eukaryotes, this takes place inside **mitochondria**.

On the basis of the **availability of oxygen** during respiration, the process is divided into two types. Such as— (1) Aerobic respiration & (2) Anaerobic respiration.

❖ **Aerobic respiration:**

$$C_6H_{12}O_6 + 6O_2 \xrightarrow{\text{Different Enzymes}} 6CO_2 + 6H_2O + \text{Energy (686 Kcal/Mole)}$$

➢ Aerobic respiration is the normal respiratory process of plants and animals.

➢ This respiration process requires oxygen.

➢ Respiratory materials (carbohydrates, proteins, lipids, different kinds of organic acids) are completely oxidized.

➢ In this process CO_2, H_2O and large amount of energy are produced.

Q. What is aerobic respiration?

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❖ **Anaerobic respiration:**

$$C_6H_{12}O_6 + 6O_2 \xrightarrow{\text{Enzymes}} 2C_2H_5OH + 2CO_2 + 6H_2O + \text{Energy (56 Kcal/Mole)}$$

➢ Anaerobic respiration occurs only in some microorganisms such as in bacteria, yeast etc.

➢ This respiration process occurs in absence of oxygen.

➢ In anaerobic respiration, respiratory substances are partially oxidized with the help of enzymes.

➢ In this process different types of organic compounds (ethyl alcohol, lactic acid etc.) CO_2, H_2O and small amount of energy are produced.

Q. What is anaerobic respiration?

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Q. Write five differences between **Aerobic** and **Anaerobic** respiration.

Aerobic respiration	Anaerobic respiration

Energy-rich Compounds:

- ✓ ATP=Adenosine triphosphate (ATP stores energy & supplies energy)
- ✓ NAD=Nicotinamide adenine
- ✓ $NADP^+$=Nicotinamide adenine dinucleotide phosphate
- ✓ NADPH=The reduced form of $NADP^+$
- ✓ GTP=Guanosine triphosphate
- ✓ GDP=Guanosine diphosphate
- ✓ FAD=Flavin adenine dinucleotide
- ✓ CoA=Co enzyme A

❖ Aerobic respiration is generally divided into four distinct stages. Such as—

Stage 1: Glycolysis

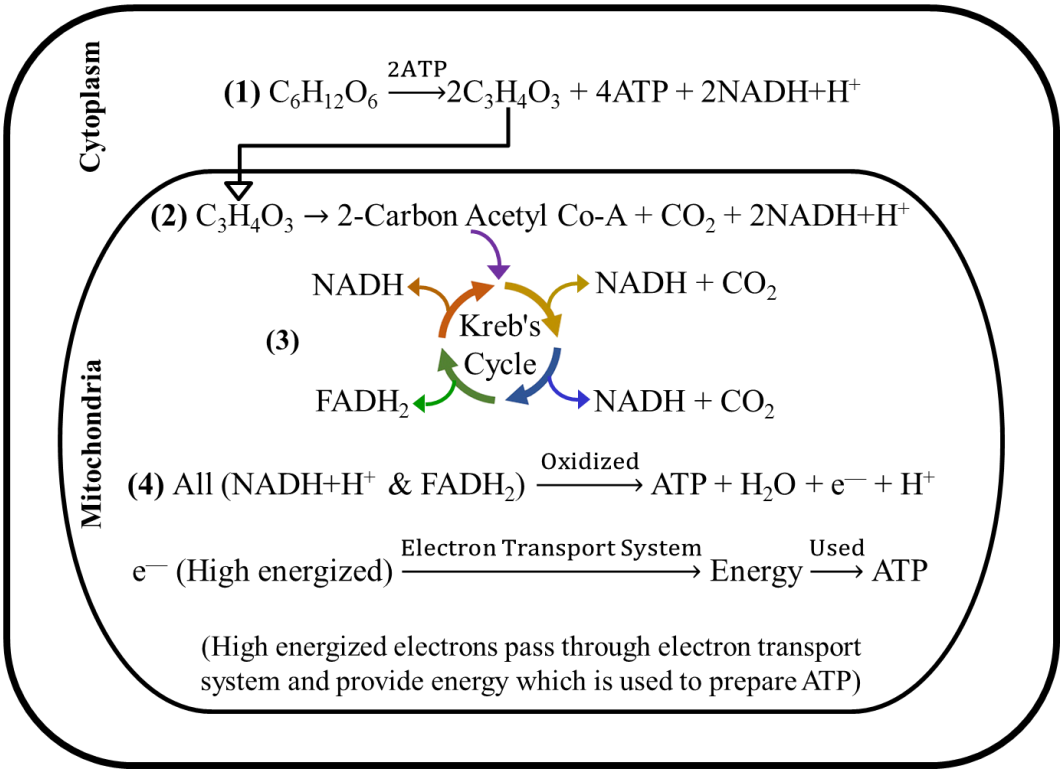
Stage-2: Acetyl co-A formation

Stage-3: Krebs cycle

Stage-4: Electron transport system

❖ Aerobic Respiration:

Steps of Aerobic Respiration



Q. Why is mitochondria called power house of a cell?

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Q. How is energy produced through aerobic respiration? Describe with four stages.

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