

# Breathing and Respiration



## Introduction

All machines need energy to run. All automobiles need petrol or diesel to run. Petrol and diesel are burnt in engine using oxygen present in the air.

We need heat energy for heating and cooking. This energy is obtained by burning coal, LPG, etc. using oxygen of the air.

Our body also needs energy for its various activities. This energy is produced in our body from the food we take. The food we take has stored chemical energy in it. This energy is released when food is digested and the components of the digestive food react with oxygen in the cells. This process is called **respiration**.

Therefore, we respire to produce energy needed by the body for its various activities.

**To get oxygen, we need to** breathe fresh air rich in oxygen and transport the inhaled oxygen from respiratory organs to every cell in the body.



## Respiration

All living organisms need oxygen to produce energy from the food they eat. The needed oxygen comes from the air we breathe in. During slow combustion of food inside the body carbon dioxide and water vapour are produced carbon dioxide and water vapour goes out of our body when we breathe out the air.

The process of taking oxygen into the cells using it for producing energy and removing the gaseous waste products (carbon dioxide and water vapour) is termed as **respiration**. Respiration occurs in the living cells.

# Breathing and Respiration



**Respiration involves two processes. These are:**

**Breathing or external respiration:** The process of inhaling fresh air and exhaling the used air is called breathing or external respiration. During breathing oxygen is taken in or carbon dioxide and water vapour are thrown out of the body through respiratory organs.

**Cellular respiration or internal respiration:** Cellular respiration takes place inside the cells. In this process, glucose obtained during the digestion of the food is oxidised by the inhaled oxygen to carbon dioxide and water, and energy is released.



## Types of Respiration

There are two types of respiration – aerobic and anaerobic respiration.

**1. Aerobic Respiration:** When the breakdown of food substances (like glucose) takes place in the presence of oxygen with the release of a large amount of energy, it is called aerobic respiration. In this process, carbon dioxide and water are released as waste products.

The overall equation for aerobic respiration is:

**Food (glucose) + Oxygen  $\longrightarrow$  Energy + Carbon dioxide + Water**

Most animals including humans and green plants respire aerobically.

**2. Anaerobic Respiration:** Anaerobic respiration is the breakdown of food substances with the release of a small amount of energy in the absence of oxygen. It occurs in certain organisms like yeast and some bacteria. These organisms are called anaerobes.

In the absence of oxygen, glucose breaks down into alcohol and carbon dioxide with the release of comparatively less energy.

# Breathing and Respiration

The equation for anaerobic respiration is:

Food (glucose) In the absence of oxygen → Energy + Alcohol + Carbon dioxide



## Breathing

Breathing is a process during which air rich in oxygen is taken in and air rich in carbon dioxide and water vapour is given out.

- The taking in of the air rich in oxygen is called **inhalation**.
- The giving out of the air rich in carbon dioxide is called **exhalation**.

Breathing is a continuous process and occurs throughout the life of all organisms.



## Breathing Rate

During breathing inhalation and exhalation occur alternately and continuously. Thus, one breathe means one inhalation and one exhalation.

- The number of times a person breathes in 1 minute is called breathing rate.
- Normal breathing rate is 16 - 18 times per minute.
- During running fast or heavy exercise the rate of breathing may go up to 25 times per minute.