# GCSE Biology 1.2 Respiration and the respiratory system knowledge organiser

## Aerobic respiration

A series of **enzyme-controlled** chemical reactions in the mitochondria of cells. Blood carries **glucose and oxygen** to the cells, they **diffuse** in and react releasing the stored energy from the glucose.

**GLUCOSE** + **OXYGEN** → **CARBON DIOXIDE** + **WATER** + **ENERGY**

- **Released as ATP**
- **Released as Heat**

- Thermometer to record temperature changes
- Thermos flask to reduce heat lost through the sides

### Investigating respiration in germinating peas

| | |
|---|---|
| 1 | Peas respire releasing heat and recorded temperature goes up. |
| 2 | Peas are boiled (respiratory enzymes are denatured) no respiration by peas but recorded temperature still increases slightly as peas are covered in respiring microbes. |
| 3 | Boiled and disinfected peas. Temperature does not increase as no respiration occurs. |

## Anaerobic respiration

A **shorter series of enzyme-controlled reactions** that partially breaks down glucose releasing only some of the energy stored. This reaction can occur in the **absence of oxygen**.

**GLUCOSE** → **LACTIC ACID** + **ENERGY** → **Less ATP produced**

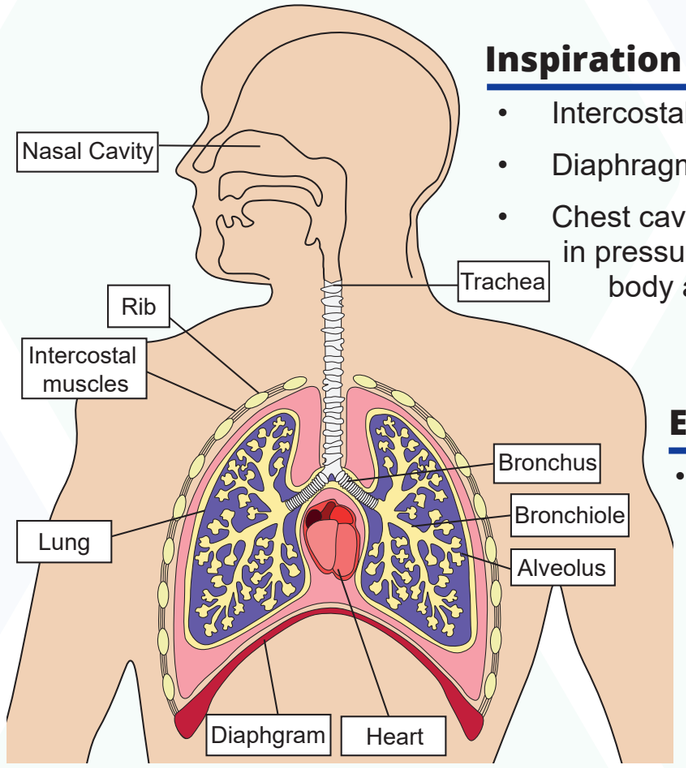
**Partial breakdown of glucose** as **no oxygen** available

Toxic lactic acid produced which needs oxygen to be broken down.

The amount of oxygen needed to remove the toxic lactic acid is the **oxygen debt** and must be paid back when oxygen is readily available.

## The respiratory system

The function of the respiratory system is to obtain sufficient oxygen for respiration and to remove the equivalent volume of waste gases carbon dioxide and water.




### Inspiration

- Intercostal muscles contract lifting ribs up and out
- Diaphragm contracts and flattens
- Chest cavity increases in volume and decreases in pressure below the pressure outside the body and so air is sucked in to equalize the pressure.

### Expiration

- Intercostal muscles relax and ribs move down and in.
- Diaphragm relaxes and domes up.
- Chest cavity decreases in volume and increases in pressure, air is forced out.

## Gas exchange

The alveoli are adapted for gas exchange by:

- Good blood supply
- Large surface area
- Thin walls
- Moist lining

As the red blood cells and plasma in the blood capillary flow around the alveolus oxygen diffuses into the capillary and carbon dioxide diffuses out.