

Excretion

Excretion is the removal of the following substances:

- toxic materials
- waste products of metabolism
- excess substances from organisms

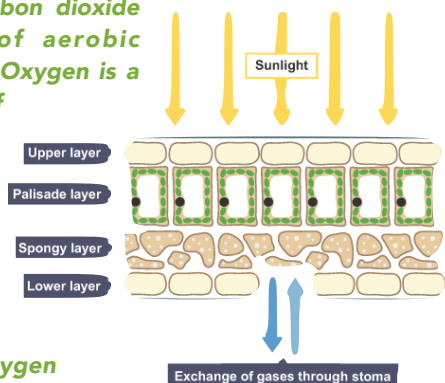
Excretion is not the same as egestion - which is the passing out of undigested food through the anus as faeces.

Plants

Plants need to excrete excess carbon dioxide and oxygen. Carbon dioxide is a waste product of aerobic respiration in plant cells. Oxygen is a waste product of photosynthesis.

The leaf

Unlike animals, plants do not have specialised excretory organs. Excess carbon dioxide and oxygen are excreted from the plant through the stomata in the leaves.



Excretion & Gas Exchange in Plants

Respiration and photosynthesis

Plants respire during the day and night, but they only photosynthesise during the day when it is light:

Remember the equations for aerobic respiration and photosynthesis:

(aerobic respiration)



(photosynthesis)



In terms of reactants and products, they are the reverse of each other. In terms of gas exchange:

Net gas exchange

The net (overall) effect depends on the time of day and the light intensity. Photosynthesis doesn't occur at night. When there is no photosynthesis, there is a net release of carbon dioxide and a net uptake of oxygen.

If there is enough light during the day, then:

- the rate of photosynthesis is higher than the rate of respiration
- there is a net release of oxygen and a net uptake of carbon dioxide

The leaf

The structure of the leaf is adapted for gas exchange. The cells in the spongy mesophyll (lower layer) are loosely packed, and covered by a thin film of water. There are tiny pores, called stomata, in the surface of the leaf. Most of these are in the lower epidermis, away from the brightest sunlight.

The role of stomata

The stomata control gas exchange in the leaf. Each stoma can be open or closed, depending on how turgid its guard cells are.

In the light, the guard cells absorb water by osmosis, become turgid and the stoma opens.

In the dark, the guard cells lose water, become flaccid and the stoma closes.

Diffusion of carbon dioxide, oxygen and water vapour into (or out of) the leaf is greatest when the stomata are open.

