In large or very active insects, body muscles may contact to compress the trachea forcing air out of them. When the muscles relax the trachea spring back into shape and fresh air that is rich in oxygen is drawn into them, increasing the rate of diffusion.

During increased activity, anaerobic respiration often occurs, producing lactic acid in cells, lowering the water potential of the cells and so some of the water in the ends of the tracheoles moves into the cells by osmosis. This enables more air to move in along the tracheoles and into the cells, speeding up the diffusion of oxygen to the cells.

Gaseous Exchange In Fish

In bony fish gas exchange occurs over the surface of the gills which consists of four pairs of gill arches, consisting of many gill filaments, protected by the operculum.

The gills are adapted for gaseous exchange by:

- large number of gill filaments with lamellae provide a larger surface area
- the blood and water are separated by a thin barrier providing a short diffusion pathway. The thin barrier consists of two cell layers:
  - the epithelial layer of the gill lamellae
  - the endothelial layer of the blood capillaries
- a circulatory system which ensures a continual flow of blood through the respiratory surface to absorb oxygen and remove carbon dioxide and so maintaining a high diffusion gradient
- a ventilation mechanism which provides a continual flow of water over the gills bringing more oxygen and removing carbon dioxide and so maintaining a Hugh diffusion gradient
- a countercurrent system which ensures that blood continually meets water with a higher oxygen concentration so a high diffusion gradient is maintained along the whole length of the lamellae

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Gaseous Exchange In Plants

Plants need carbon dioxide for photosynthesis, which produces oxygen as a waste gas. They need oxygen for respiration which produces carbon dioxide as a waste