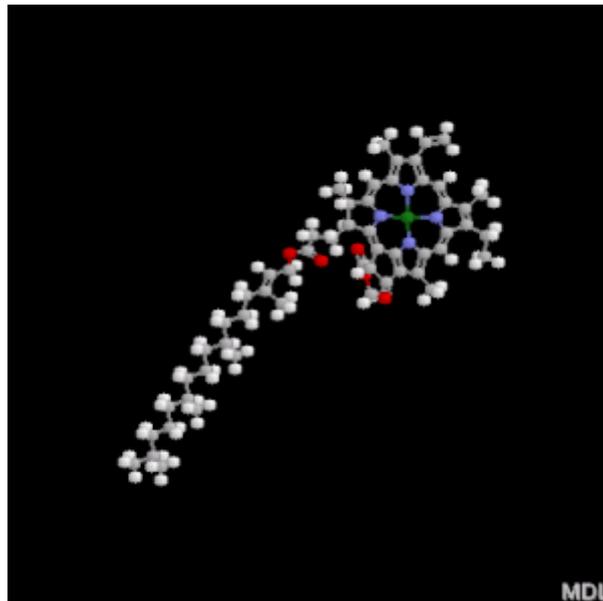


Inorganic Ions

Plants

Plants absorb energy from sunlight through the process of Photosynthesis. Sunlight is 'trapped' by chlorophyll, providing energy to convert carbon dioxide and water into glucose and oxygen. A magnesium ion is at the centre of each chlorophyll molecule. Haemoglobin, a protein found in blood, has a similar structure except that an iron ion is at the centre.



Chlorophyll

Plants also need **nutrients** for healthy growth. Carbon dioxide is obtained from air. Inorganic ions are obtained from the soil where they are dissolved in water.

The three ions required in the greatest amounts are nitrate, phosphate and potassium - sources of nitrogen (N), phosphorus (P) and potassium (K) respectively. Smaller amounts of magnesium (Mg^{2+}), calcium (Ca^{2+}) and some other ions are also required.

Ion		Required for
Nitrate	NO_3^-	growth of stems and leaves
Phosphate	PO_4^{3-}	root growth
Potassium	K^+	healthy leaves and flowers
Calcium	Ca^{2+}	cell wall development
Magnesium	Mg^{2+}	making chlorophyll

Mammalian diets

Inorganic ions have a number of essential roles in the mammalian diet.

Cations

Calcium ions, Ca^{2+} , are the most abundant cations (positive ions) in the body, making up about 1.5% of total body weight. About 99% is found in bones and teeth, largely in combination. They combine with phosphate ions to form calcium phosphate which increases the rigidity and hardness of bones and the enamel in teeth. Calcium ions are also involved in blood clotting, normal muscle contraction and nerve activity.

Sodium ions, Na^+ , are the main cations in extracellular fluids. They affect the transport of water through cell membranes by osmosis. They are also part of the hydrogencarbonate buffer system. Potassium ions, K^+ , are the main cations in intracellular fluids. They contribute to the transmission of nerve impulses and muscle contraction.

Magnesium ions, Mg^{2+} , are important because of their role in the normal functioning of muscle and nerve tissue, bone formation and as a component of many coenzymes.

A normal diet provides sufficient quantities of calcium, sodium, potassium and magnesium ions.

Anions

Anions are negative ions. Chloride ions, Cl^- , are important in the acid-base balance of blood and the water balance of the body, and in the formation of hydrochloric acid in the stomach. They are found in intracellular and extracellular fluids.

Phosphate ions, PO_4^{3-} , have more roles than any other inorganic ions in mammals. They are important for the formation of bones and teeth, as a buffer in blood, their role in muscle contraction and nerve impulses, as a component of many **coenzymes**, for their role in transfer and storage of energy in **ATP**, and as a component of **DNA** and **RNA**.

Test your knowledge

[Take quiz on Inorganic Ions](#)