

# THE CHEMISTRY OF LIFE GRADE 10

Video LINK  
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[https://youtu.be/G-1TOENCY2Q?list=UUxiZFebGmeJYi4hYQWESE\\_g](https://youtu.be/G-1TOENCY2Q?list=UUxiZFebGmeJYi4hYQWESE_g)

## Molecules for life

### Organic

Carbohydrates

Lipids

Proteins

Enzymes

Nucleic acids

Vitamins

### Inorganic

Water

Mineral salts

Macro elements

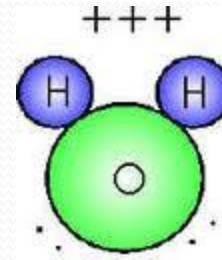
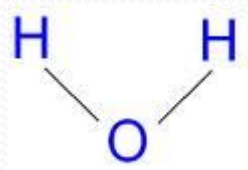
Micro elements

# INORGANIC COMPOUNDS

- made by natural **geo-physical processes** in the environment.
- They form in living organisms as part of **metabolism**.
- **Examples are:**
  - water,
  - carbon dioxide
  - oxygen
  - sulphur dioxide gas
  - and sodium chloride (table salt).

# water

One molecule of water is made up of **two hydrogen atoms** and **one oxygen** in the arrangement shown below.



The **human body** is made up of **60-75%** **water**.

- **70-95%** of the **cell** is made up of **water**.
- Water makes life on Earth possible.

# Water (H<sub>2</sub>O) is used:

- to dissolve substances (**universal solvent**)
- to **transport** substances in the external and internal environments
- as a substance (**medium**) for chemical reactions to occur in
- to **control temperature** of the body
- for **support and structure**
- used in **reproduction**.

# Mineral elements for animals and humans

- Macro mineral elements
  - – those needed in large quantities
  - Eg : sodium (Na), potassium (K),
  - calcium (Ca) and phosphorus (P)
  
- Micro mineral elements
  - – those needed in small quantities
  - Eg : iron (Fe), iodine (I)

# Mineral elements needed by plants

- taken up as **salts (ions)** from the soil
- **Macro mineral** elements:
- nitrogen (N), phosphorus (P), potassium (K), calcium (Ca), magnesium (Mg), sulphur (S) and iron (Fe)
  
- NOTE: **Nitrogen** enters roots as **nitrate** in soil
- From humus, animal faeces and urine, etc.
- **Phosphorus** enters roots as **phosphates**
- from humus, animal faeces and urine, mineralisation (rock), etc

## Micro mineral elements needed by plants

- **Micro mineral** elements needed by plants:
- boron (B), copper (Cu), iron (Fe), chlorine (Cl), manganese (Mn), molybdenum (Mo) and zinc (Zn).



# Functions of some minerals and their deficiency diseases.

Mineral	Function		Deficiency
Sodium (Na)	plants	Maintains <b>osmotic balance</b> in plants	Reduced plant <b>growth</b>
	animals	Has a role in the functioning of <b>nerves and muscles</b> Regulates the secretion of <b>HCl</b> in the stomach	Muscle cramps
Potassium (K)	plants	Needed for: <b>Photosynthesis</b> <b>Protein synthesis</b> , activation of plant <b>enzymes</b> Regulation of the <b>stomata</b>	Lower drought resistance Excessive water loss disease
	animals	Regulation of : Blood pressure, nerve functions, muscle control, cellular respiration	Low oxygen levels Muscular cramps Lung failure

# Functions of some minerals and their deficiency diseases cont....

Mineral		Function	Deficiency
Calcium (Ca)	plants	Used for the formation of the middle lamella of cell walls Also maintains the permeability of cell walls	Poor plant growth Growing parts of plant die
	animals	Required for bone and teeth formation. Used in blood clotting	In children causes rickets
Phosphorous (P)	plants	needed for cell membrane formation and for the formation of nucleic acids Used for the formation of ATP	Leaves fall off prematurely Brown spots develop on leaves
	animals	Used for the formation of cell membranes, nucleic acids, ATP and bone and teeth	Rickets in children

# Functions of some minerals and their deficiency diseases **cont....**

Mineral		Function	Deficiency
Iron (Fe)	plant	Used in the formation of <b>chlorophyll</b>	Leaves become <b>yellow due</b> to the lack of chlorophyll. This is called chlorosis
	animals	Used for the formation of haemoglobin	anaemia
Iodine (I)	plants	Used in <b>photosynthesis</b>	Photosynthesis decreases causing a decrease in <b>growth and death</b> of the plant
	animals	Used in <b>thyroxin</b> formation	Causes enlargement of the thyroid gland. This disease is called <b>goitre</b> .

# Functions of some minerals and their deficiency diseases cont....

Mineral		Function	Deficiency
<b>Nitrogen (N)</b>	plants	Used by plants for the formation of amino acid, nucleic acids and chlorophyll	chlorosis
	animals	Required for protein synthesis and nucleic acids	Kwashiorkor in children
<b>Magnesium (Mg)</b>	plants	Used to make the central atom of chlorophyll molecule	Chlorosis
	animals	Used for bone and teeth formation and for nerve and muscle functioning	Muscle cramps

# FERTILISERS

- supply plant nutrients or they correct soil fertility
- improve crop yields, quality of food and fodder
- major nutrients in fertilisers are **nitrogen**, **phosphorus** and **potassium**
- Too much inorganic fertiliser can harm a humus-depleted soil. becomes overloaded with **urea**, **nitrates** and **phosphates**
- **NOTE:** **Huge amounts** of fertiliser are lost through surface run-off and **leaching** into ground water.

# Eutrophication

- occurs when **nitrogen-rich** compounds in fertiliser run off and cause **lack of oxygen** in water bodies, especially coastal zones.
- Without dissolved oxygen they **cannot support plant and animal** life
- The water also becomes **cloudy** and **discoloured** causing decreased photosynthesis and cold temperatures
- animals and plants in the water **die**

# NEXT CLASS

# ORGANIC COMPOUNDS