

Biological Molecules - Introduction

[Introduction video](#) - 7 mins

All living things are made up of 5 groups of molecules. They are summarised below.

Name of Molecule	What elements does it contain?	Information
Water	H ₂ O	<p>The 'molecule of life'. Up to 70% of the human body is this substance</p> <p>Water is needed for transport, for chemical reactions and is important in homeostasis.</p>
Carbohydrates	<p>C, H and O.</p> <p>General formula is C_n(H₂O)_n</p>	<p>Carbohydrates are known as polysaccharides.</p> <p>They are made up of individual units called monosaccharides.</p> <p>They are used for energy in the human body.</p>
Lipids	C, H and O	<p>A group that contains fats, oils, waxes and steroid hormones.</p> <p>An important group is the triglycerides which are made of glycerol plus 3 fatty acids</p> <p>They are used for energy storage, insulation and protection in the human body</p>
Proteins	C, H, O and N	<p>The most diverse group of biological molecules.</p> <p>Proteins are polymers (polypeptides)</p> <p>Proteins are made of many individual units called amino acids</p> <p>Proteins can be fibrous e.g. collagen for structure and support or globular e.g. enzymes</p>
Nucleic Acids	C, H, O, N and P	<p>This group includes DNA, RNA and ATP</p> <p>DNA and RNA are polymers made up of nucleotides. DNA carries the genetic code. RNA is involved in protein synthesis.</p> <p>ATP is the universal energy currency and is used to drive chemical reactions in cells</p>

Monomers and Polymers

Before we start looking at these specific groups of molecules, we need to make sure we understand some keywords that will be used in this topic:

Monomer - small individual molecules which can be joined together in a repeating fashion.

Mono is a prefix that means one.

Polymer - many monomers joined together in a repeating pattern

Poly means many.

1. In the table below see if you can complete the missing information about monomers and polymers. Use the table above to help you.

Biological compound	General name of monomer	General name of polymer
Proteins		
Carbohydrates		
Nucleic acids		
Lipids	Does not have monomers and polymers	

2. If 'mono' means one and 'poly' means many. What do you think the prefixes 'di' and 'tri' mean if you see them at the start of a word?

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Answers

Q1.

Biological compound	General name of monomer	General name of polymer
Proteins	Amino Acid	Polypeptide
Carbohydrates	Monosaccharide	Polysaccharide
Nucleic acids	Nucleotide	Polynucleotide
Lipids	Does not have monomers and polymers	

Q2. Di = 2 and Tri = 3

Inorganic ions

Inorganic ions are also often referred to as **minerals**. They are important in many cellular processes, including muscle contraction, nervous coordination and maintaining osmotic pressure in cells and blood.

Inorganic - a molecule or ion that has no more than 1 carbon atom.

Organic - molecules that have a large proportion of carbon and hydrogen atoms.

Micronutrients – needed in minute (trace) concentrations. E.g. copper and zinc.

Macronutrients – needed in small concentrations. You need to know about the roles of Mg^{2+} , Fe^{2+} , Ca^{2+} and PO_4^{3-} .

Magnesium ions (Mg^{2+}) in plants

Mg^{2+} is a component of chlorophyll and so is essential for photosynthesis. If plants have no magnesium in their soil, then they can't make chlorophyll and so their leaves are yellow. This leads to a condition called chlorosis.

3. Explain why a low level of magnesium ions in the soil could lead to plant death (4)

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Answers

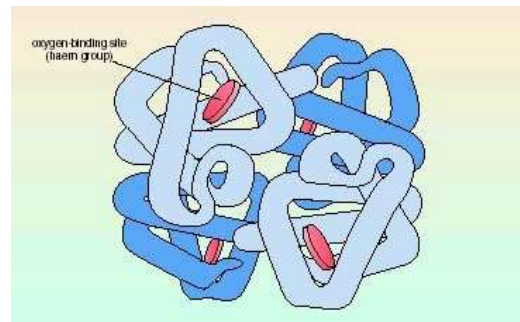
Q3.

- Magnesium ions are a component of chlorophyll.
- Less chlorophyll means lower rate of photosynthesis.
- Less glucose is made
- Lower rate of respiration
- Less ATP is made

Iron ions (Fe^{2+}) in animals

Iron ions are a component of haemoglobin which is found in red blood cells, it is needed to transport oxygen.

Lack of iron in the human diet can lead to anaemia and fatigue.



4. Explain why low Fe^{2+} in the diet can lead to fatigue (3)