

biological molecules

<i>subtopic</i>	<i>learnt</i>	<i>RAG</i>
3.1.1 Monomers and polymers		
3.1.2 Carbohydrates		
3.1.3 Lipids		
3.1.4.1 General properties of proteins		
3.1.4.2 Many proteins are enzymes		
3.1.5.1 Structure of DNA and RNA		
3.1.5.2 DNA Replication		
3.1.6 ATP		
3.1.7 Water		
3.1.8 Inorganic Ions		

Most carbohydrates are **polymers**;

Polymers are large, complex molecules composed of **monomer subunits** joined together.

e.g.

Polymer: DNA, polypeptide

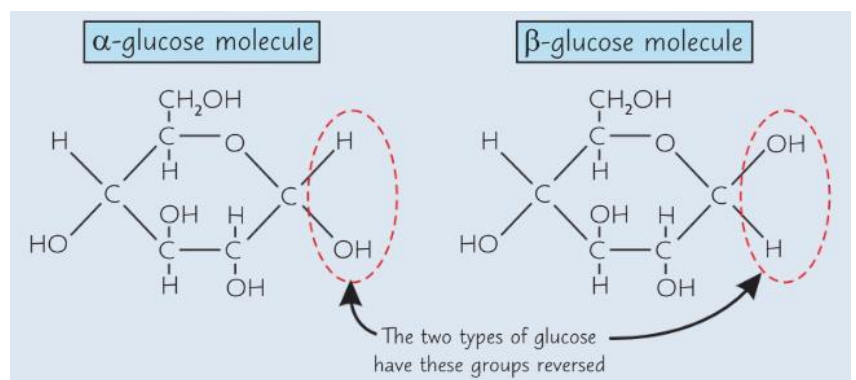
Monomer equivalent: nucleotides, amino acids

carbohydrates as molecules

- The elements **carbon, oxygen, and hydrogen** make up carbs
- These monomers are **monosaccharides**, and are all either:
 - glucose
 - fructose
 - galactose
- These undergo **condensation** reactions to form **disaccharides**
 - glucose + glucose → *maltose*
 - glucose + fructose → *sucrose*
 - glucose + galactose → *lactose*

glucose

- is a hexose sugar – 6 carbon atoms
- two isomers of glucose:
 - α-glucose
 - β-glucose



non-reducing

- 1) if the reducing sugars test is negative, there could be a **non-reducing sugar** present
- 2) to break the disaccharides to monosaccharides, add **dilute hydrochloric acid** in a water bath
- 3) neutralise with **sodium hydrogencarbonate**
- 4) repeat the Benedict's test
- 5) in the presence of the non-reducing sugar (that is now a reducing sugar as it is in a monomer form), there will be an **orange-brown** precipitate

starch

- main storage of glucose (and therefore energy) in plants
- when plants need energy, they breakdown starch to get alpha-glucose molecules needed for respiration
- starch is a mixture of two **alpha-glucose polysaccharides**:
 - **amylose**
 - *unbranched* chain
 - coiled structure therefore compact
 - good for storage
 - **amylopectin**
 - *branched* chain
 - side branches mean enzymes that break down the molecule can get at the glycosidic bonds easily and quickly
 - therefore, glucose can be released quickly
- Starch is **insoluble**, so doesn't affect the water potential of a cell, another reason why it's good for storage
- the **iodine test** is done for the presence of starch

glycogen

- main storage in animals
- made of alpha-glucose monosaccharides
- many, many side branches
 - energy can be released very quickly
- very **compact** molecule
- insoluble and therefore doesn't affect water potential

