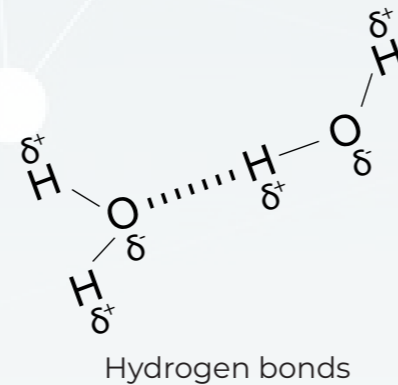


Chemical elements are joined together to form biological compounds

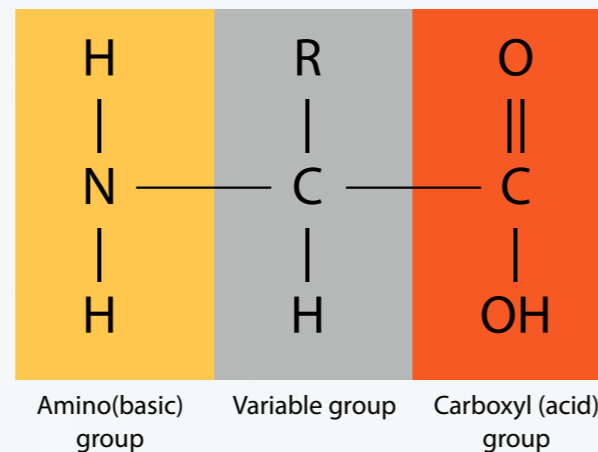
Water - a polar molecule which allows hydrogen bonds between molecules giving water important properties.

Property	Function
Solvent	Polar molecules dissolve in water and are able to be transported.
Metabolite	Water is a reactant in photosynthesis and hydrolysis, produced in aerobic respiration and condensation.
High specific heat capacity	A lot of energy is required to change the temperature of water so aquatic/cellular environments remain stable.
High latent heat of vapourisation	Evaporative cooling.
Surface tension	Support and buoyancy.



Proteins

Proteins are constructed from **20 types** of amino acid. The general form of an amino acid is shown here. The R group is different in each of the 20. Two amino acids linked form a **dipeptide**. A polymer is called a **polypeptide**.



Primary Structure

The sequence of amino acids as coded by the DNA. Amino acids are linked together by **condensation** reactions that form **peptide bonds**.

Secondary Structure

Hydrogen bonds formed between the amino acids in the chain cause it to fold into an **alpha helix** or **beta pleated sheet**.



Tertiary Structure

Hydrophobic interactions between the variable groups within the secondary structure forms and **disulphide** and **ionic bonds** forms a very specific folded structure e.g. the active site of an enzyme.

Quaternary Structure

More than one polypeptide chain linked to form a molecule.

Fibrous proteins	e.g keratin- structural function
Globular proteins	e.g enzymes- metabolic function

Test for proteins

Biuret solution -blue

Positive reaction – **A purple/violet** colour is seen.

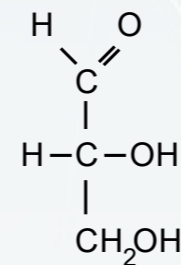


Carbohydrates

Monosaccharides

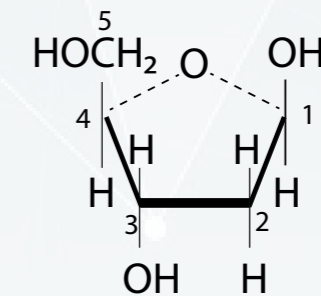
Triose

3C important in respiration and photosynthesis.



Pentose

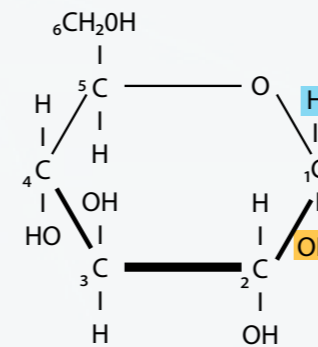
5C Important in nucleotides.



Hexose

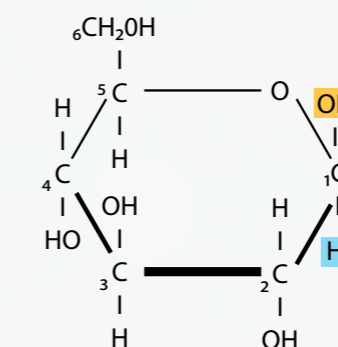
6C Glucose is a really important hexose sugar. It is used in respiration.

Monosaccharides are linked to make dimers and polymers. There are two isomers of glucose.



α glucose

or



β glucose

α-glucose OH group points up on carbon 1 but on β-glucose it points down.

Disaccharides

Sucrose	Glucose and fructose linked in a condensation reaction where one molecule of water is lost and a glycosidic bond is formed.
Maltose	As above but the monosaccharides linked are α-glucose and α-glucose .
Lactose	A dimer formed from glucose and galactose .

Polysaccharides

Starch	A polymer of α-glucose (composed of straight-chain amylose and branched amylopectin) Compact energy storage in plants with little osmotic effect.
Glycogen	A polymer of α-glucose , energy storage in animals.
Cellulose	A polymer of β-glucose , adjacent monomers twisted through 180° to each other, allowing hydrogen bonds between chains, forming microfibrils. A strong structure for plant cell walls.
Chitin	As cellulose but with some -OH groups replaced by nitrogen-containing acetylamine groups. Strong, lightweight and waterproof for exoskeletons.

