

2.1 Molecules to Metabolism

Metabolic Processes

Define metabolism

The totality of all enzyme-catalysed reactions in a cell or organism

Compare anabolism and catabolism (including an example of each)

Anabolism	Catabolism
<ul style="list-style-type: none">The build up of complex molecules from more simple subunits (i.e. monomers)	<ul style="list-style-type: none">The break down of complex molecules into more simple subunits (i.e. monomers)
<ul style="list-style-type: none">Requires condensation reactions to proceed (water is produced as a by-product)	<ul style="list-style-type: none">Requires hydrolysis reactions to proceed (water is consumed as part of the reaction)
<ul style="list-style-type: none">Example: Photosynthesis	<ul style="list-style-type: none">Example: Cell respiration

Differentiate between organic and inorganic compounds

Organic molecules contain carbon and are synthesised by living organisms (anything else is inorganic)

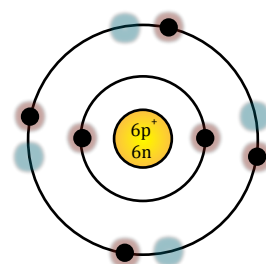
Exceptions include carbides, carbonates, oxides of carbon and cyanides

Explain how the structure of the carbon atom contributes to the formation of organic life

Carbon forms the basis of organic life due to its capacity to form large molecules

Carbon has four valence electrons and can form four covalent bonds

This allows it to function as a stable backbone in a wide variety of compounds



Explain the theory of vitalism and how it was falsified

Vitalism proposed that organic molecules could ONLY be synthesised by living organisms

It was falsified by Frederick Woehler in 1828

He was able to synthesise urea (an organic molecule) from an inorganic salt under laboratory conditions

Biomacromolecules

Define monomer

A recurring subunit within a more complex polymer

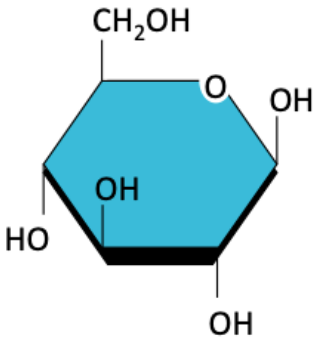
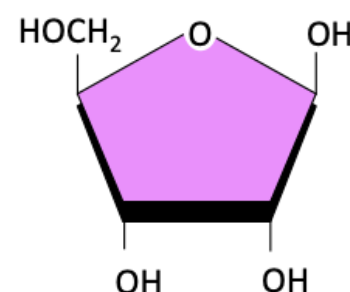
Compare the four different types of biomacromolecules

Macromolecule	Monomer / Subunit	Polymer	Bond Involved
Carbohydrate	Monosaccharide	Polysaccharide	Glycosidic Linkage
Lipid	Glycerol + fatty acids (x3)	Triglyceride	Ester linkage
Protein	Amino acid	Polypeptide	Peptide bond
Nucleic Acid	Nucleotide	DNA or RNA	Phosphodiester bond

Write the chemical formula for an unsaturated fatty acid

$CH_3 - (CH_2)_n - COOH$

Draw molecular diagrams of glucose and ribose

Glucose (α -D)	Ribose
	

Explain how the following may be identified based on their chemical formula

Carbohydrate: Have C,H,O in a common ratio according to formula $(CH_2O)_n$

Protein: May contain sulphur (some amino acids include sulphur)

Nucleic Acid: Will contain phosphorus in relatively large amounts (nucleotides include a phosphate group)