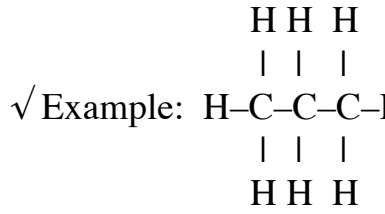
Organic Molecules

Molecules containing carbon atoms

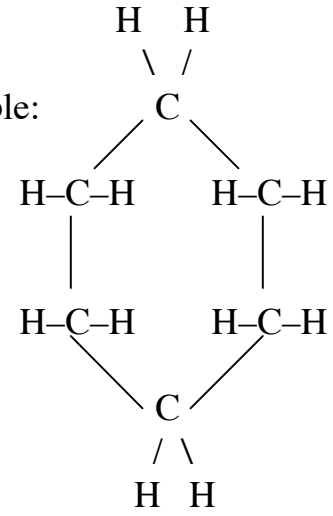
- Non-carbon atoms (for example: hydrogen, oxygen, nitrogen) can also be present in organic molecules
- Other than water molecules, organic molecules are the most abundant molecules in living things
- Organic molecules are often drawn in abbreviated ways:

√ Example:



= $CH_3–CH_2–CH_3$

√ Example:



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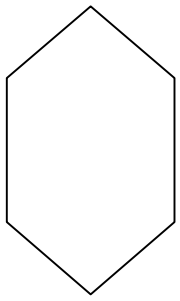

Figs 4.5 and 4.9

Functional groups

Small groups of atoms attached to the carbon atoms of organic molecules

Four important functional groups:

Functional group	Name	Symbols
C—O—H	Hydroxyl or "O.H." (polar)	–OH or HO–
O ‖ C—O—H	Carboxylic acid (polar/ionic) (can release a hydrogen ion)	O ‖ –C–OH or COOH
H / C–N \ H	Amine (polar/ionic) (can absorb a hydrogen ion)	$H_2N–$ or $—NH_2$
O ‖ C–O–P–O⁻ | O⁻	Phosphate (ionic)	$–PO_4^{3-}$ or (P)

Cells frequently carry out chemical reactions where organic molecules are linked together or split apart

Dehydration synthesis

A reaction where two organic molecules are linked together by loss of a water molecule

- Usually each of the two molecules has a hydroxyl functional group

  √ One oxygen atom from the hydroxyls becomes the bridge linking the two molecules

  √ The other atoms (one oxygen and two hydrogens) become a water molecule

Fig 5.2

Hydrolysis reaction

A reaction where two organic molecules are split apart by addition of a water molecule

- Usually an oxygen atom forms the bridge between the two linked molecules

  √ A water molecule combines with the oxygen atom to split the two organic molecules apart

  √ The reaction forms two hydroxyl groups (one on each organic molecule)

Fig 5.2

Biological Macromolecules

Large organic molecules found within all living things

- The four macromolecule types are carbohydrates, lipids, proteins, and nucleic acids
- All four macromolecule types are polymers assembled by linking smaller monomer molecules

Macromolecule type:	Its monomers
Carbohydrates	Monosaccharides
Lipids	Fatty acids and glycerol (usually)
Proteins	Amino acids
Nucleic acids	Nucleotides

Monomers

Small organic molecules

Polymer

A chain of monomers linked together