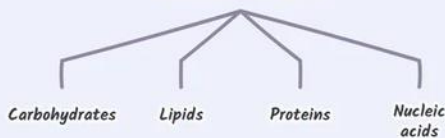


carbohydrates, lipids, proteins, nucleic acids and enzymes, the chemistry a living cell runs on

Biomolecules in the Cell

- chemical analysis of every living organism finds the same common elements
- carbon, hydrogen, nitrogen, oxygen, sulphur, calcium, phosphorus, magnesium and others
- living organisms build three macromolecules, all polymers of simple monomers
- polysaccharides (from monosaccharides), polypeptides (amino acids), polynucleotides (nucleotides)
- lipids are a separate case: water insoluble, small molecular weight
- not built by this same monomer-polymer logic

Biomolecules



the four classes covered in this chapter

Carbohydrates: General

- "hydrates of carbon", also called saccharides; carbon, hydrogen, oxygen only
- general formula $C_x(H_2O)_y$, H to O always 2:1, the ratio of water
- can be oxidised (broken down) to release energy
- classified by sugar unit count into monosaccharides, disaccharides and polysaccharides
- all monosaccharides are reducing sugars: a free aldehyde or ketone group
- reduces Benedict's reagent (Cu^{2+} to Cu^+) by donating hydrogens/electrons

Monosaccharides by Carbon Count

Triose, 3C

e.g. Glyceraldehyde

Tetrose, 4C

e.g. Erythrose

Pentose, 5C

e.g. Ribose (RNA), deoxyribose (DNA)

Hexose, 6C

e.g. Glucose (blood sugar), Fructose (fruit sugar), Galactose

Heptose, 7C

e.g. Sedoheptulose

general formula $(CH_2O)_n$, $n = 3$ to 7 ; classified as aldoses (free $-CHO$, e.g. glucose, xylose) or ketoses (free $-C=O$, e.g. fructose, ribulose)