



Biomolecules

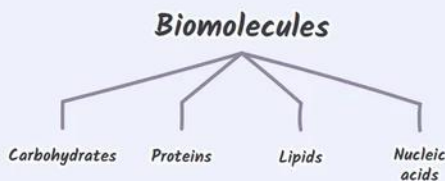


the four macromolecules a living cell is actually built from



Biomolecules, the starting picture *

- any living tissue shows the same short list of elements
- carbon, hydrogen, oxygen, nitrogen; smaller amounts of sulphur and phosphorus
- these elements build small **micromolecules** first: amino acids, monosaccharides, fatty acids, nucleotides
- micromolecules link up into the large macromolecules that do the work
- the link-up reaction is almost always the same: dehydration (condensation), removing one water per bond
- by weight, water is overwhelmingly a cell's largest single component
- proteins are the largest fraction of the dry weight



four macromolecule classes, each built by stringing together its own micromolecule

Four classes, one building block each

Carbohydrates

built from monosaccharide sugar units, joined by a glycosidic bond

Proteins

built from amino acids, joined by a peptide bond

Lipids

mostly fatty acids and glycerol, joined by an ester bond

Nucleic acids

built from nucleotides, joined by a phosphodiester bond

every macromolecule here is a polymer built the same way: small units, one bond type, water pushed out at every join

Carbohydrates

- classified by size: monosaccharides (glucose, fructose, ribose) can't be hydrolysed further
- oligosaccharides carry two to ten sugar units; polysaccharides are chains of hundreds
- a disaccharide like sucrose forms when two monosaccharides join, releasing one water at the glycosidic bond
- polysaccharides serve two different jobs: starch and glycogen are storage forms, cellulose and chitin are structural

