

Polysaccharides

Starches

Starches are glucose polymers in which glucopyranose units are bonded by *alpha*-linkages. [Amylose](#) consists of a linear chain of several hundred glucose molecules. [Amylopectin](#) is a branched molecule made of several thousand of glucose units. [Starches](#) are [insoluble](#) in [water](#). They can be digested by hydrolysis catalyzed by enzymes called [amylases](#), which can break the *alpha*-linkages. Humans and other animals have amylases, so they can digest starches. [Potato](#), [rice](#), [wheat](#), and [maize](#) are major sources of starch in the human diet.

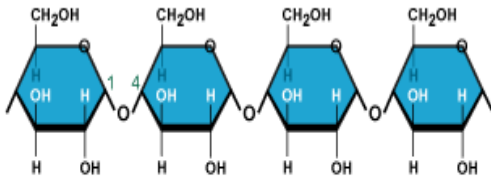
Glycogen

[Glycogen](#) is the storage form of glucose in [animals](#). It is a branched polymer of glucose. Glycogen can be broken down to form substrates for respiration, through the process of [glycogenolysis](#). This involves the breaking of most of the C-O-C bonds between the glucose molecules by the addition of a phosphate, rather than a water as in [hydrolysis](#). This process yields phosphorylated glucose molecules, which can be metabolized with a saving of one [ATP](#) molecule.

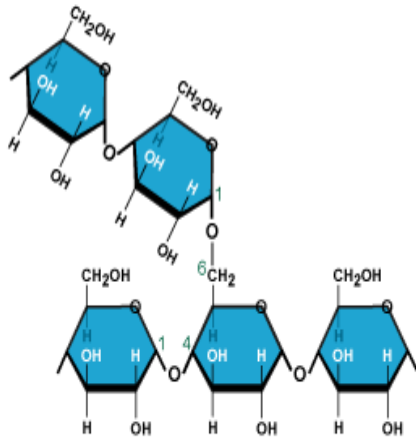
Cellulose

The structural components of [plants](#) are formed primarily from [cellulose](#). Wood is largely cellulose and [lignin](#), while [paper](#) and [cotton](#) are nearly pure cellulose. Cellulose is a [polymer](#) made with repeated glucose units bonded together by *beta*-linkages. Humans and many other animals lack an enzyme to break the *beta*-linkages, so they do not digest cellulose. Certain animals can digest cellulose, because bacteria possessing the enzyme are present in their gut. The classic example is the [termite](#).

α -glucose subunits

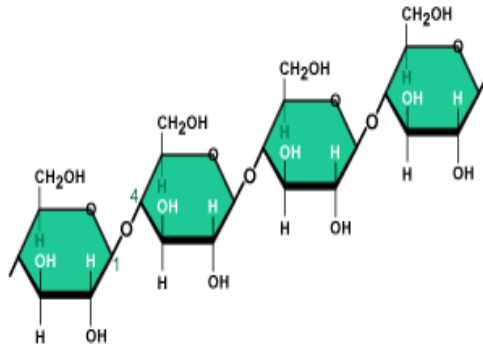


Starch: Chain of α -glucose subunits



Glycogen: Branched chain of α -glucose subunits

β -glucose subunits



Cellulose: Chain of β -glucose subunits