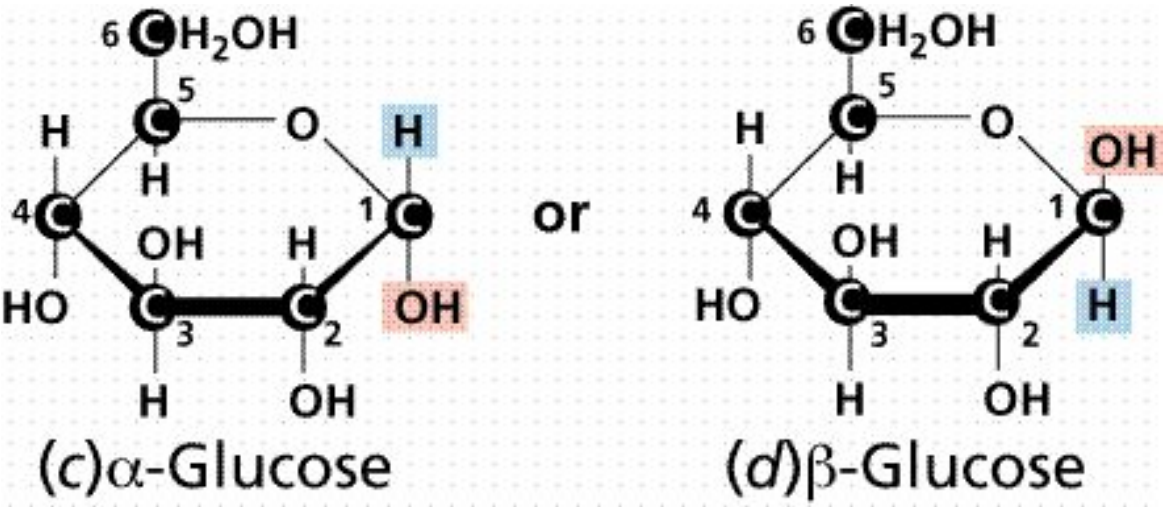
Carbohydrates

Elements - C,H,O

Monomer (page 8) - monosaccharide

E.g. glucose, galactose and fructose



(see figure 1 in textbook)

Molecular formula: $C_6H_{12}O_6$

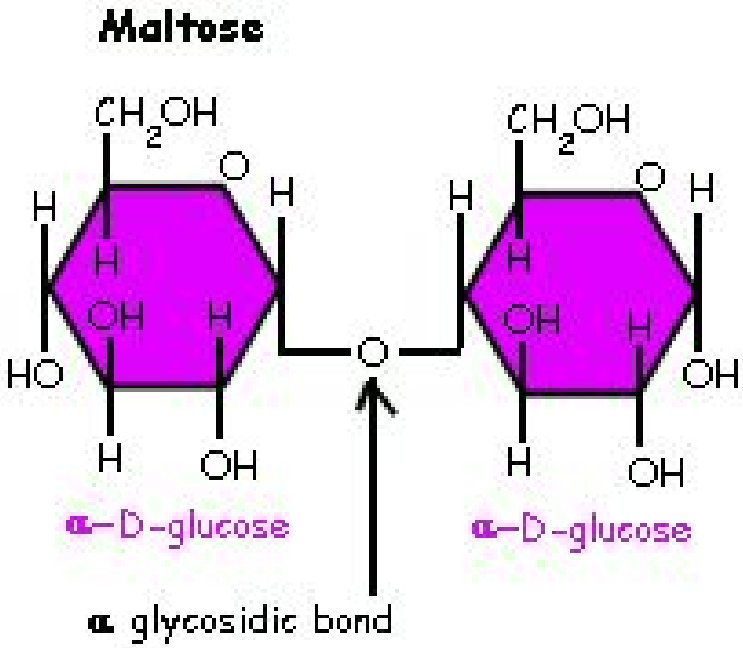
Glucose, galactose and fructose all have the same molecular formula = isomers of each other

Self-study: Test for reducing sugars (page 8/9) and non-reducing sugars (page 10)

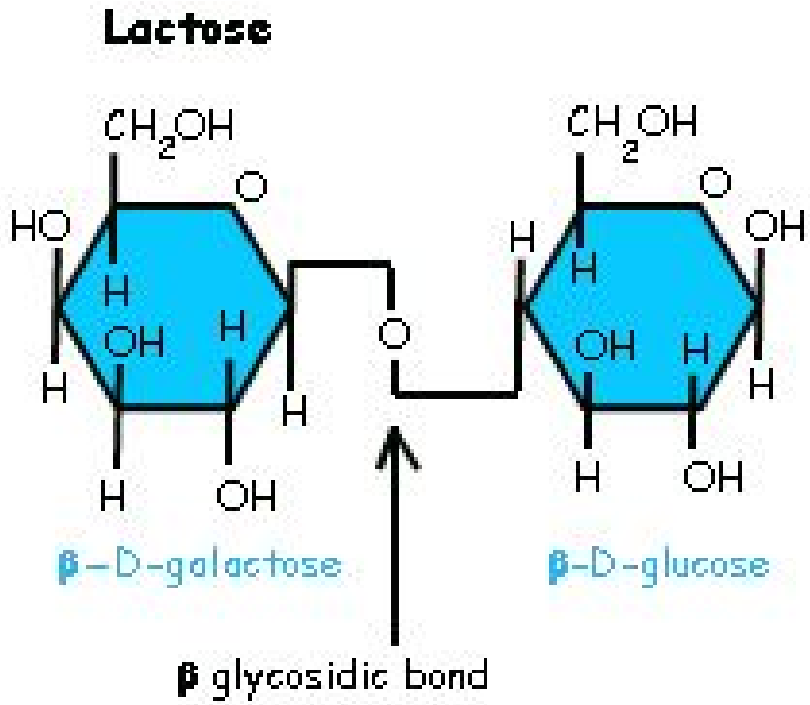
Disaccharide (page 10)

Two monosaccharides joined together by condensation

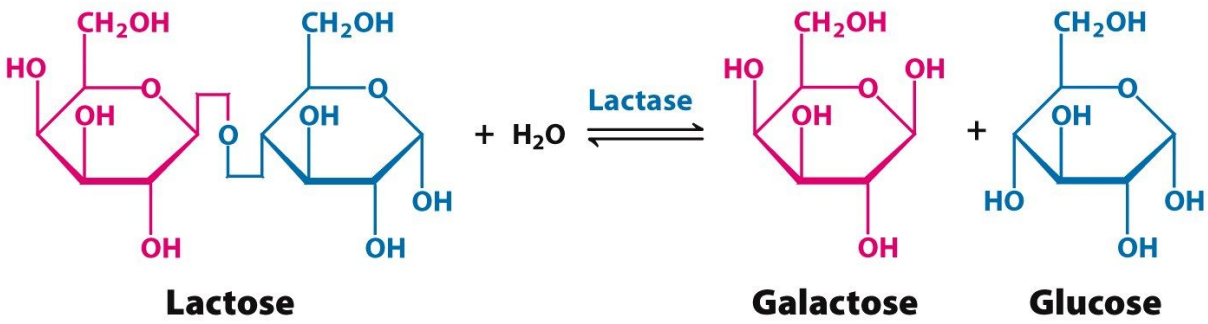
E.g. Maltose = glucose + glucose (malt)
Sucrose = glucose + fructose (plant)
Lactose = glucose + galactose (milk)



Bond = 1->4 glycosidic bond



Hydrolysis of disaccharide



Lactase = breaks down lactose (used to make lactose-free milk)

Maltase = breaks down maltose in barley (brewing)

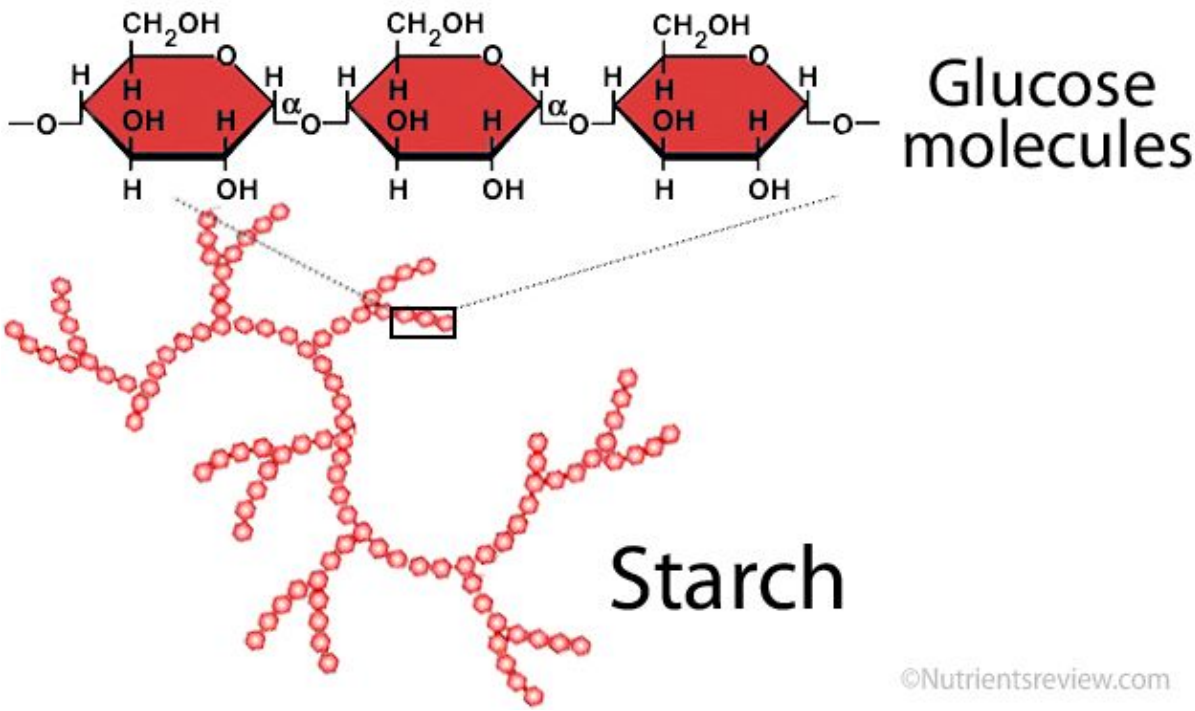
Amylase = breaks down starch into maltose

Polysaccharide

Starch = polymer of α-glucose
Glycogen = polymer of α-glucose
Cellulose = polymer of β-glucose

Starch

Found in: plants (page 13)
Made from: α-glucose (1->4 glycosidic bonds and 1->6 glycosidic bonds)
Role: storage - small, compact, insoluble - does not change Ψ of the cell

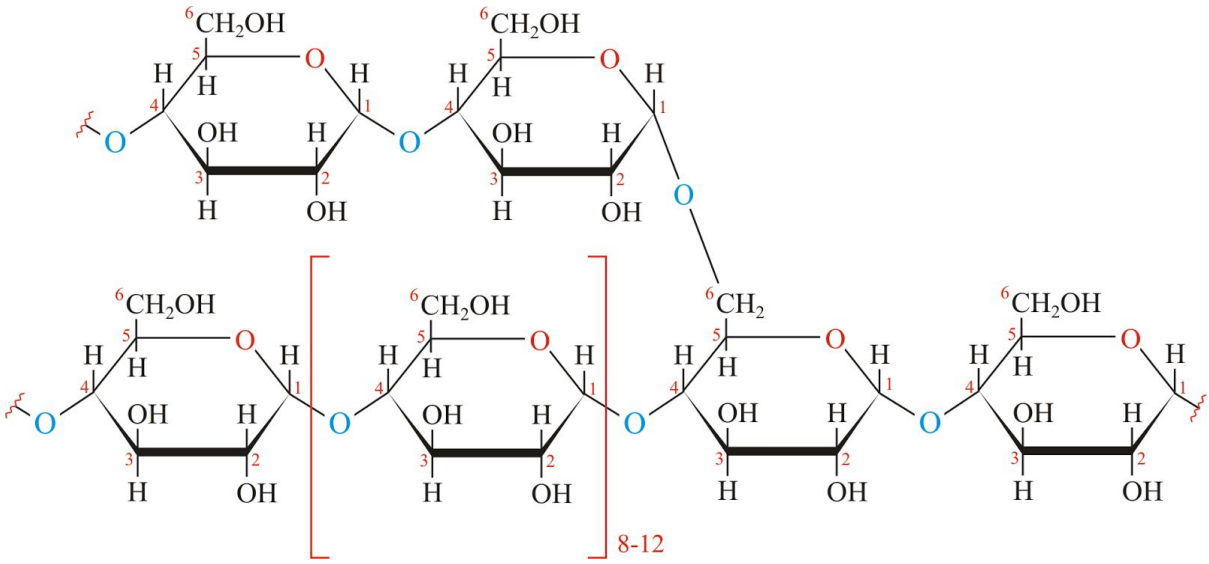


Glycogen

Found in: animals (pg 14) -liver & muscle

Made from: α-glucose (1->4 glycosidic bonds and 1->6 glycosidic bonds)

Role: storage - small, compact, insoluble - does not change Ψ of the cell



Glycogen has more side chains (1->6 bonds) compared to starch - broken down more rapidly. Useful, because

- animals have a higher metabolic rate
- Rapid burst of energy needed for activities like sprinting & weightlifting

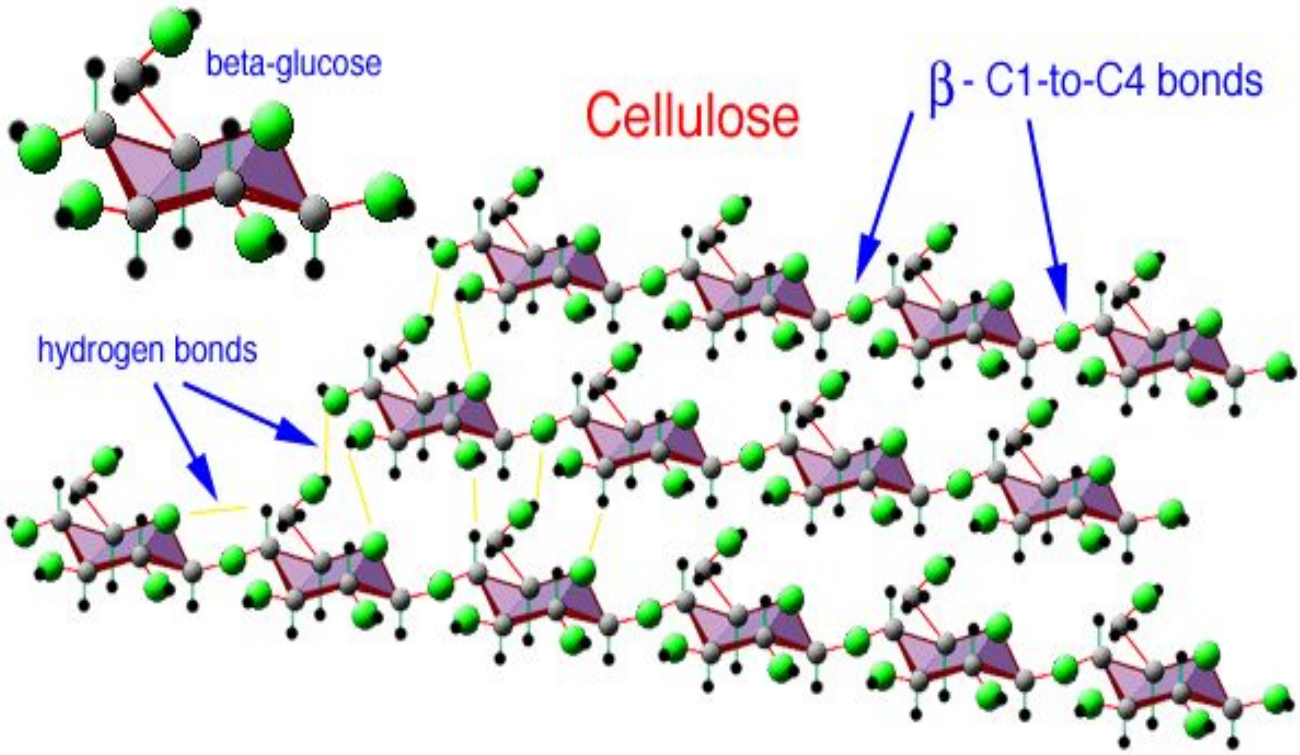
Cellulose

Found in: plant cell walls (page 14)

Made from: β-glucose (1->4 glycosidic bonds only)

Role: structural, linear unbranched chains which can cross link using hydrogen bonds - gives rigidity to cell wall

Chains ->Microfibrils -> Fibres



Self-study: Test for starch (page 12)