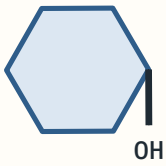
Alpha vs Beta Glucose: Starch vs Cellulose

Alpha and beta glucose differ by one OH, giving coiled stores (starch) or strong straight chains (cellulose).

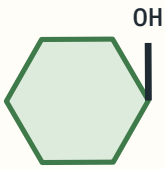
One flipped OH on carbon 1 changes the whole molecule



α-glucose: OH down

coiled / branched, compact

starch, glycogen: stores



β-glucose: OH up

alternate molecules inverted: straight chains

H bonds between chains: cellulose wall

Key terms

isomer	same atoms arranged differently; glucose has two, alpha and beta.
alpha-glucose	the isomer with the OH on carbon 1 down; makes starch and glycogen.
beta-glucose	the isomer with the OH on carbon 1 up; makes cellulose.
starch	plant store from alpha-glucose: amylose (1,4 bonds, coiled, compact) and amylopectin (1,4 and 1,6 bonds, branched); insoluble.
glycogen	animal store from alpha-glucose with 1,4 and 1,6 bonds, even more branched than starch; compact and insoluble.
cellulose	from beta-glucose, alternate molecules inverted, giving long, straight, unbranched chains; hydrogen bonds link chains into microfibrils.

I can...

- [ ] Glucose has two isomers alpha and beta
- [ ] Polysaccharides formed by condensation of many glucose units
- [ ] Glycogen and starch from alpha-glucose
- [ ] Cellulose from beta-glucose
- [ ] Basic structure and function of glycogen, starch and cellulose
- [ ] Structure related to function in animal and plant cells

EXAM TRAP

"Cellulose is made of beta glucose" is not enough. Say alternate molecules are inverted, giving straight chains, and that hydrogen bonds between the chains form microfibrils. Starch is the plant store, glycogen the animal store.

4 marks: what earns them

1. Starch is coiled / helical, so it is compact and stores a lot of glucose in a small space
   Not: starch is small; tightly packed with no reference to coiling
2. Starch is insoluble, so it does not affect water potential / does not diffuse out of the cell
   Not: does not dissolve with no consequence stated
3. Cellulose is made of beta glucose with alternate molecules inverted, giving long, straight, unbranched chains
   Not: cellulose is made of beta glucose alone; straight chains of alpha glucose
4. Hydrogen bonds between the chains form microfibrils, which make the cell wall strong
   Not: hydrogen bonds within a chain; covalent bonds between chains; cellulose is strong with no structure

Remember

Alpha is down, beta is up (OH on carbon 1).
Starch plant, glycogen animal.
Starch = storage; cellulose = support.

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