

Card B: Making Starch Molecules

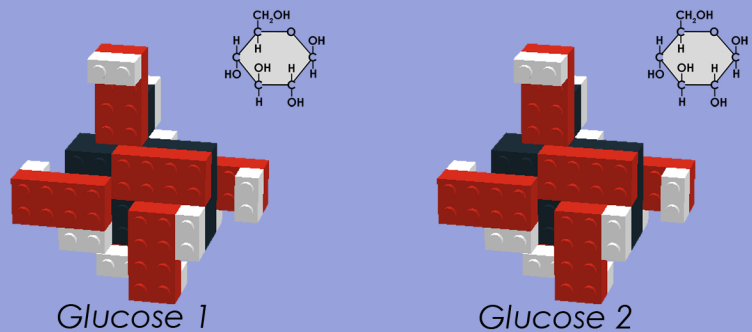
Introduction

Plant cells build starch molecules by linking glucose molecules together. You can model this chemical reaction with LEGO® bricks. First, build two glucose molecules using the instructions from *Card A: Making Glucose Molecules*. Then follow the directions below to construct a short starch molecule.

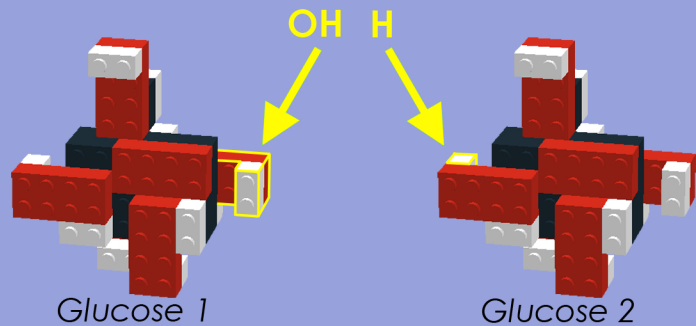
Later, the class will link all the short starch molecules together to create one longer model of starch. Real starch molecules in cells are made of hundreds of glucose molecules joined end-to-end!

Directions:

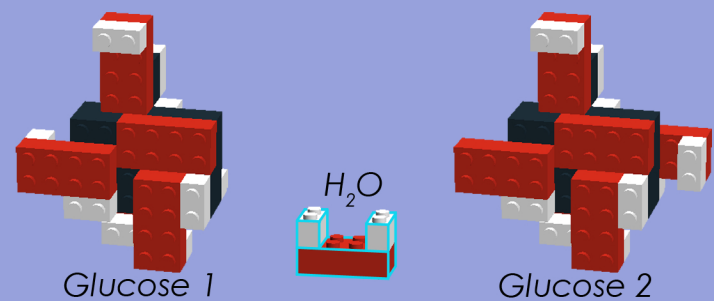
- 1 Begin with two glucose molecules. Stand them upright as shown, with the CH_2OH (head) on top.



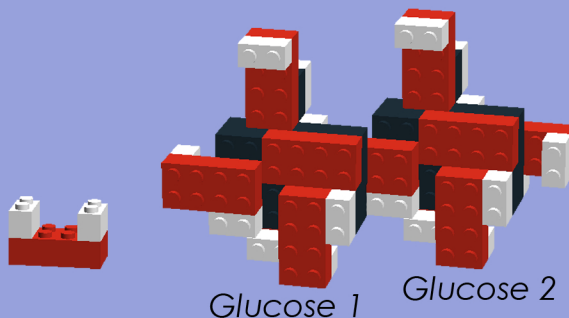
- 2 Remove an OH from the right side of glucose 1 and an H from the left side of glucose 2.



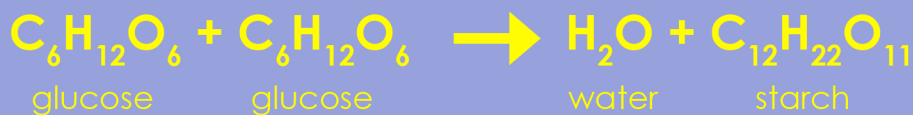
- 3 Use the free OH and H to form a molecule of water.



- 4 Connect the two glucose molecules as shown. The oxygen on glucose 2 (that lost an H) binds with the carbon on glucose 1 (that lost an OH).

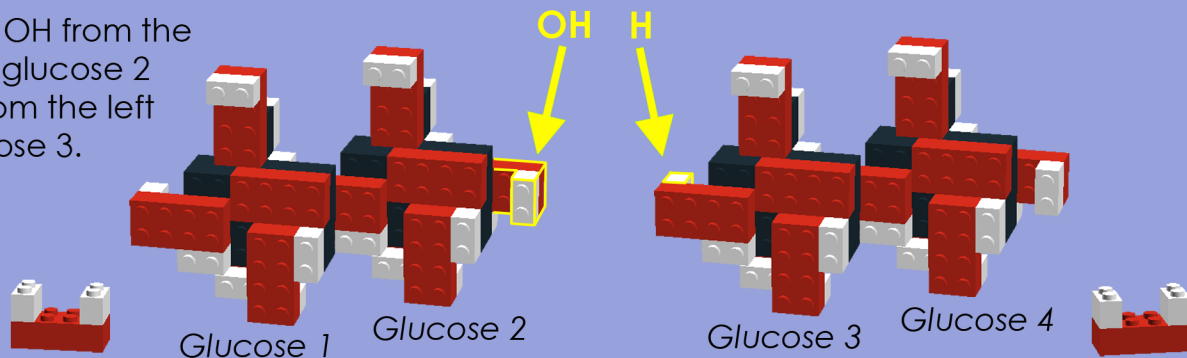


Your last step completed a chemical reaction. Look at this equation and your model. Do the numbers agree with your model?

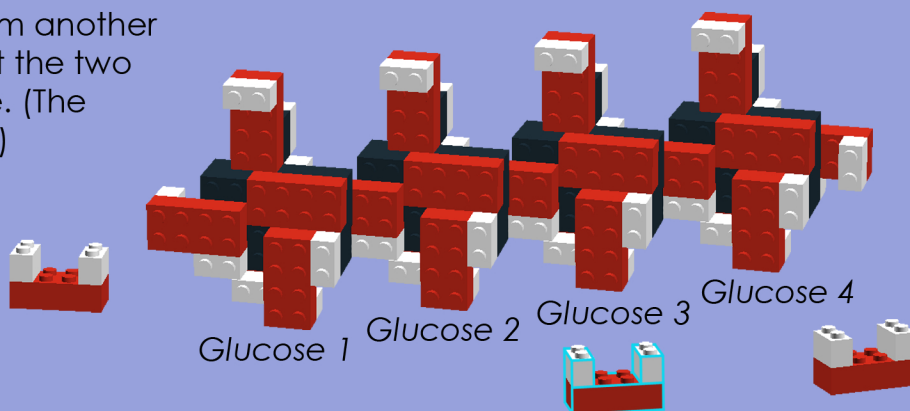


You have completed your team's short starch molecule! Now, using the same steps, connect it to the long starch molecule that the class is building.

- 5 Remove an OH from the right side of glucose 2 and an H from the left side of glucose 3.

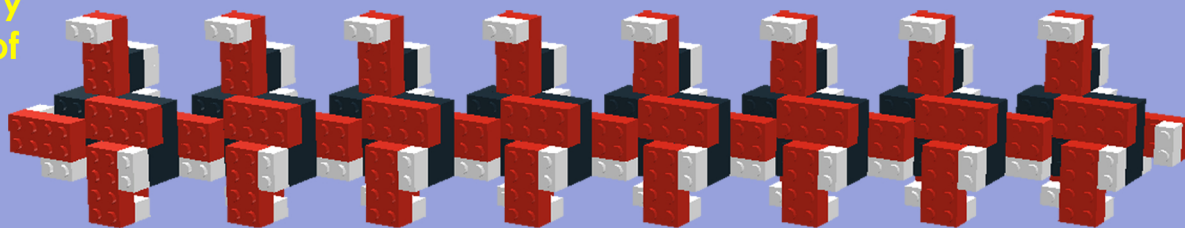
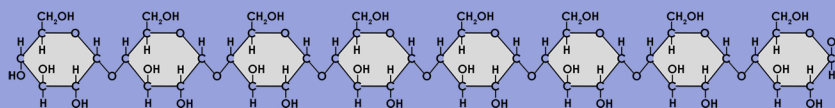


- 6 Use the free OH and H to form another molecule of water. Connect the two glucose molecules as before. (The oxygen binds to the carbon.)



What is the chemical formula for the starch molecule your class made?

Here is a chain of eight glucose molecules. The chains in starch are actually hundreds of molecules long!



Conclusion

Both starch and cellulose are made from glucose molecules. So how is starch different from cellulose? One of the most important differences is how the cell connects the individual glucose molecules. In starch, the glucose molecules are all connected right side up, but in cellulose, every other glucose is connected upside down. Because of this different structure, your body can use the energy stored in starch, but can't digest cellulose.