

## Activity 5.4: Explaining Combustion of Cellulose

Read about cellulose, then answer the questions below.

**1. Explaining how cellulose burns.** Write a paragraph about how the cellulose in a log burns in a campfire. Be sure to answer the four numbered questions on your Three Questions handout.

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**2. A tree that doesn't grow?** A team of astronauts is preparing for a mission to Mars that will take 5 years. But they can't carry enough oxygen to breathe for 5 years. They thought about taking plants with them, since plants take in carbon dioxide and emit oxygen as they grow. But they figured out that the plants would grow too much—they wouldn't have enough space for all those plants.

Then, a plant breeder proposed with a solution. Here's what she said: "I will develop a new kind of tree, the smorgas board tree. The smorgas board tree will breathe in  $\text{CO}_2$  and breathe out  $\text{O}_2$  without growing. So you can take smorgas board trees to Mars with you, and they will keep producing oxygen without growing too big."

Should the plant breeder get a contract to breed smorgas board trees? Here are some different ideas:

- Francois claims: "A tree like that is impossible. There are carbon atoms moving into the tree, so it has to grow."  
Circle one: AGREE    DISAGREE
- Jamie claims: "Trees normally turn  $\text{CO}_2$  into  $\text{O}_2$ . It should be possible to breed a tree that does this without growing."  
Circle one: AGREE    DISAGREE
- Robin claims: "It should be possible for something to turn  $\text{CO}_2$  into  $\text{O}_2$  without gaining mass, but there aren't any plants with the right genes, so the breeder won't succeed."  
Circle one: AGREE    DISAGREE

Explain your reasoning for your choices.

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Choose ONE claim above that you agree with. Explain how this claim could be further tested to offer evidence that better supports the claim.

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**3. What happens to matter when cellulose burns?** Wood is a mixture of different organic compounds, including cellulose (about  $C_{6000}H_{10000}O_{5000}$ ). Choose whether each of the following can happen in a campfire where wood (with cellulose in it) is burned.

- |   |   |   |
|---|---|---|
| T | F | Some of the atoms in the cellulose are incorporated into carbon dioxide in the air.     |
| T | F | Some of the atoms in the cellulose are converted into energy that is used in the fire.  |
| T | F | Some of the atoms in the cellulose are burned up and disappear.                         |
| T | F | Some of the atoms in the cellulose are converted into heat.                             |
| T | F | Some of the atoms in the cellulose are incorporated into water vapor in the atmosphere. |

Explain the pattern in your answers. What happens to the cellulose when it's burned in a campfire?

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**4. Something interesting about cellulose**

What is something interesting that you learned about cellulose?

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