

Carbon Dioxide and Sugar

It's All a Big Cycle of Carbon Dioxide and Sugar

Why are plants important to us? How do they produce the oxygen we breathe? How do plants use the carbon dioxide we exhale? With these experiments we'll watch the carbon dioxide-sugar cycle in action! This cart is divided into three parts.

Part One: Human Power! (carbon dioxide)

Take a deep breath in and blow it out. What's the name of the gas that we exhale? That's right! Carbon dioxide!

Materials

- Bromothymol blue
- small drinking glasses or beakers
- Drinking straws
- water

Observations

Look at the bromothymol blue solution. Does it have color or is it clear? Do you think the color will change in the presence of carbon dioxide? If so, how?

Try This!

1. Fill the glass about one-third-full with the water. Place a small amount of bromothymol blue into the water.
2. Ask the guest to bubble air through a straw into the solution. What happens?
IMPORTANT: Do not allow the guest to ingest any of the water with bromothymol blue indicator in it.

Did you know?

Bromothymol blue is an indicator solution that is blue in the presence of bases, pale green when neutral, and yellowish with acids. The bluish water at first will appear to become very pale, to greenish, then yellowish. The carbon dioxide in a human's breath mixes with the water to form carbonic acid, indicated by the yellow color. So we can see that humans exhale carbon dioxide.

We all need oxygen to survive. But the truth is, we need carbon dioxide, too, because plants use this carbon dioxide that we exhale, combine it with ordinary water, and turn it back into...that's right, you guessed it...oxygen! This oxygen is actually a by-product of the really exciting things that plants do, though. Plants make something that we all love... sugar!!! But first, let's see how the sun's energy is important in the making of sugars.

Carbon Dioxide and Sugar

Carbon Dioxide and Sugar

Part 2: Racing the Sun

How do plants make oxygen from carbon dioxide? In photosynthesis there is a process called the Carbon Cycle. In this cycle a plant takes carbon dioxide, water and energy from the sun (with the help of chlorophyll) to make oxygen and sugars. Where did that energy come from, though? The SUN!

Materials

- Solar Racer cars
- Yellow solar racer tracks (optional; if you do not use these, the cars can just run along the cart top)
- Light source, such as a flashlight or utility lamp

Observations

Look at these small race cars. What is different about these cars, compared to other small toy cars? Yes, they have solar panels on the tops of them! Do you think we can use those solar panels to make the car move? Let's find out!

Try this!

1. Place one race track on the cart top.
2. Plug in the light and beam it at end of track facing the car.
3. Watch the car move!

Did you know?

As we shine the light on the racers we are storing the light's energy as electricity. When we release the racers we are allowing that electrical energy to be released as mechanical energy. Sugar with plants works essentially the same way. As the sun shines on a plant the light energy aids in the process of photosynthesis and becomes stored in sugars as one of the products of photosynthesis. These sugars are stored for a later time when the plant needs extra energy, and then the plant burns the sugars releasing the stored chemical energy. The cars move along the cart top because of they utilize the energy from the light and convert it to mechanical energy much like a plant utilizes the energy from the sun to produce sugars.

Part 3: The Sweetest Thing (sugar)

So now that we have all this sugar what can we do with it? Sugar is a great way to store energy, and we can burn sugar for energy.

Materials

- One or two marshmallows
- A beaker or small jar to burn the marshmallow in

Carbon Dioxide and Sugar

- Lighter or source of flame
- One small stick to serve as your marshmallow roaster!

Observations

Take a look at the marshmallow. What is it made of? When you eat one (but not from this cart!) does it taste sweet? Let's burn a marshmallow and see what happens!

Try this!

1. Spear a marshmallow onto the stick.
2. Hold the marshmallow over the beaker.
3. Light the marshmallow on fire with the lighter. Let it burn a small bit.
4. Drop the burning marshmallow into the beaker and watch it burn!

Did you know?

A marshmallow is made of sugars taken from a plant. By burning the marshmallow we see how sugar can actually be burnt. When the fire goes out, the black residue you see left behind is carbon. Sugar is made of carbon, oxygen and hydrogen. When sugar burns, carbon dioxide, water vapor, and a whole lot of other chemicals get released. But some carbon gets left behind; you can see it as this black stuff on the surface of the marshmallow. In this demonstration, the flame isn't hot enough to burn up all the carbon, so some gets left behind. Just like this demonstration our bodies burn the sugar and release carbon dioxide and water vapor. The plants use that carbon dioxide to make sugar... and look, we're right back where we started!

Jason Hugh Smith
Nov 12, '08, 3:50 PM
Added Text

Labs In Life Connection

The Labs in Life researchers do a lot of work on nutrition and its effect on the body. Limiting sugar consumption to a reasonable amount is very important. But having SOME sugar is also important. This activity discusses the importance of sugar in giving us energy.