**Human Involvement in the Carbon Cycle**

This student activity can be found in the Tennessee Academics for Science Biology Teacher Training Manual, Summer 2018, p. 69 (p. 62-73). You could choose to use it as a whole-class demonstration or have students complete it in their lab groups.

Materials per group:

* Test tube with stopper
* Test tube rack
* Straw(s)
* Aquatic plant (Elodea, Anacharis, or Myriophyllum)
* Bromthymol Blue (BTB) Solution
* White notecard or paper (to serve as a light backdrop)

Prior Knowledge:

Students should already understand that carbon dioxide is just one of the greenhouse gasses, and that it traps heat in the atmosphere. They should understand that carbon dioxide is necessary for life. They should understand the carbon cycle.

BTB is a pH indicator. When carbon dioxide is added to water, carbonic acid results. BTB will change colors in the presence of the acid, this color change is a visual means of detecting the presence of carbon dioxide.

Procedure:

1. Fill two test tubes (approximately 1/3 full with BTB solution. Record observations of the solution in the test tubes.
2. Place a straw into each test tube. Gently blow into the straw. Discuss and record observations (color change).
3. Make predictions about what will happen if an aquatic plant is added to the test tube and left overnight.
4. Add an aquatic plant to only of the test tubes. Do not add anything to the other test tubes but keep a stopper in both test tubes.
5. Place both test tubes in the light overnight. (Be sure to stopper both test tubes.)

The next class period,

1. Observe and record any color changes.
2. **Discuss observations. \*\***
3. If you are using a model wall (graffiti wall), students will revise their models and then redraw on the wall or on paper to tape to the wall.

Students will notice that in the test tube with the plant, the plant removed the CO2 from the water, so the color changed to its original (or very close). There should have been minimal to no color change in the other test tube.

\*You might set up one demonstration where you place both test tubes in a dark cabinet rather than placing them under light overnight.

**Human Involvement in the Carbon Cycle**

Carbon cycles through our biosphere and is present in all living things. Humans are impacting the carbon cycle in a variety of ways.

1. Create sketches, make predictions, and support your predictions with evidence below. Be sure to label movement of carbon in each sketch.

Sketch 1: Test tube with Bromothymol Blue (BTB)

Sketch 2: After blowing in with a straw

Sketch 3: After 24 hours without a plant.

Sketch 4: after 24 hours with an aquatic plant.

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| --- | --- | --- | --- |
|  | Prediction  Evidence | Prediction  Evidence | Prediction  Evidence |
| Sketch 1 | Sketch 2 | Sketch 3 | Sketch 4 |