

Carbon Cycle Part 2 - Modeling the Carbon Cycle

Summary

Students will model the carbon cycle with subjects and processes, and discuss the cycling of carbon through Earth's ecosystem. This is the second lesson in a series of lesson concerning the carbon cycle.

Time Frame

1 class periods of 45 minutes each

Materials

powerpoint (carbon cycle), optional

Items representing atoms of carbon that can be passed between students, i.e. frisbee discs

Background for Teachers

Carbon atoms have cycled through Earth's ecosystem for millennia, moving through the land, ocean, atmosphere, and the Earth's core via chemical reactions. Carbon is not created or destroyed! The global carbon cycle can be categorized two ways: long-term, or geological, over millions of years and short-term, or biological, over days to thousands of years. Fossil fuels like coal and oil are examples of carbon sinks (i.e., places where carbon builds up) that were formed over millions of years. Photosynthesis is an example of a biological process that occurs on a much shorter timescale. Important processes in the carbon cycle include photosynthesis (autotrophs taking in CO₂ gas and converting the carbon into sugars), respiration (aerobic or anaerobic, converting sugars back into CO₂), combustion (chemical reaction turning pure carbon like coal into energy and CO₂), assimilation (secondary consumers ingesting primary consumers) and decomposition (breakdown of organisms). This lesson will outline two ways to model the carbon cycle with your classroom, by discussing how a single carbon atom moves through Earth's ecosystem. The powerpoint included in this lesson plan contains different pictures/models of the carbon cycle.

Student Prior Knowledge

This lesson follows the "What is Carbon?" lesson plan. Students should be familiar with concepts like photosynthesis, respiration and fossil fuel combustion.

Intended Learning Outcomes

3. Understand Science Concepts and Principles

- a. Know and explain science information specified for the grade level.

Instructional Procedures

Begin lesson by reviewing the four important facts about carbon with students, from the end of "What is Carbon?" lesson.

Introduce the concept of a model. A model is designed to simulate an often difficult to see process. Since it is very difficult, time-consuming and expensive to track an atom of carbon (scientists do this!!), the class will instead model how an atom of carbon cycles through Earth's ecosystem by acting out and/or drawing boxes and lines in their science notebooks.

Below is a list of boxes (subjects) that students will need to have in their carbon cycle model. Provide this list to the students:

Atmosphere
Soil

Producer
Consumer
Fossil Fuel

At this point, there are two ways to proceed with the lesson. For a more interactive lesson, continue reading this paragraph. If you rather not have an interactive lesson, skip down to the next step. For an interactive lesson, have print outs of each of the subjects listed above. Break students up into five groups, or have five students volunteer to help. Next, using Frisbee discs or other items to represent carbon, model the carbon atom move through its cycle starting in the atmosphere. Be sure to highlight the FORM carbon takes at each subject, and be sure to classify the process that must occur when carbon "moves" to the next subject.

Now have students take out their science notebooks and draw the carbon cycle model together. Start the model by drawing the Atmosphere box at the top of the page. Ask students what form carbon takes in the atmosphere (carbon dioxide). Continue to add to your model by adding boxes, labeling the subjects, and also adding lines (processes). Be sure to highlight the FORM of carbon at each box, to help students identify the process that must occur for carbon to continue moving through the system.

Once the model is complete, have students count the number of lines/processes in the model. Where do they go? Are there any patterns regarding where the lines go? Lead students to see that only ONE line leaves the atmosphere, whereas 4-5 lines enter the atmosphere. Discuss the importance of having a balanced or unbalanced cycle, and what implications this had for Earth (i.e., human use of fossil fuels have greatly offset the balance of the carbon cycle).

Strategies for Diverse Learners

This lesson includes whole classroom discussion as well as think-pair-share strategies. This lesson can also include role-playing when modeling a single carbon atom through the carbon cycle.

Assessment Plan

Students will take notes in their science notebooks throughout the class period. Notebooks will be collected once a week and assessed based on a rubric.

Rubrics

[Science Notebook](#)

Bibliography

- [Carbon Cycle article by NASA](#)

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