



Carbon Sources and Sinks

The carbon cycle is one of Earth's major biogeochemical cycles. Vast amounts of carbon continuously cycle between Earth's atmosphere, oceans and land surfaces. Let's identify the carbon sources and sinks.

Key Concept

As carbon cycles through Earth's system, carbon dioxide is constantly moving into and out of the atmosphere.

What You Should Know

- Processes that release CO₂ into the atmosphere are called *carbon sources*, while processes that absorb it are called *carbon sinks*.
- The amount of carbon in the atmosphere at any one time depends on the balance that exists between *carbon sinks* and *carbon sources*.
- Since the Industrial Revolution roughly 30% more CO₂ is moving into the atmosphere than out of the atmosphere due to the increased burning of fossil fuels (coal, oil and natural gas).

Materials (per student or group of students)

1 set of carbon sources and sink cards (24 cards per set)

Investigation A

Place each card image-side up on a tabletop. Ask students to separate the cards in two piles: one pile representing carbon sinks and a second pile representing carbon sources. If students are unsure about some cards, set them aside.

Discussion

Read the back of the cards in the "uncertain" pile and place the card in the appropriate pile. Verify that each card has been placed in the correct source or sink pile. Count the cards in each group. Are there any cards that do not fit in either category?

Investigation B

Divide the carbon source cards (13) into human-made (anthropogenic) processes and natural processes. Which pile is larger? Which processes in the anthropogenic pile involve fossil fuels?

Discussion

It is important to distinguish between natural and human-made sources. One of the largest natural sources of atmospheric CO₂ is through plant and animal decay. As microorganisms break down the dead material, CO₂ is released into the air. Other naturally occurring sources include erupting volcanoes and animal breathing.

Burning fossil fuels is the primary human caused source of atmospheric CO₂. As the chemical energy in a hydrocarbon-rich fossil fuel is converted to heat, CO₂ is produced as a byproduct. Deforestation and the burning of solid waste and wood products are also anthropogenic sources of atmospheric CO₂.

Investigation C

Choose a carbon sink card and discuss how the carbon sink can become a carbon source.

Discussion

Human activities are interfering with natural carbon sinks. For example, the clearing of tropical rainforests for agriculture and logging represents a significant loss to the earth's ability to absorb and store carbon.

Investigation D

Choose one of the anthropogenic carbon source cards and discuss ways to minimize the release of CO₂.

Discussion

The amount of carbon in the atmosphere has increased by 30% since the Industrial Revolution. There are many actions humans can take to reduce the release of CO₂. Some examples are: cut down on electricity by using natural light, minimize heating and air-conditioning and the use of electronic devices, walk, ride a bicycle, carpool and recycle as much as possible.