

The Carbon Cycle

Ecology

Carbon or not?

- Do you think the object on your desk contains carbon?
- If so, place it in the pile labeled "Carbon"
- If not, place it in the pile labeled "No Carbon"

Carbon is everywhere

Carbon is the fourth most common element in the universe, and the second most common element in the human body. It can be found in the Earth's atmosphere, all water bodies on the planet, in large masses of rock and in the tissues and cells of living things.



Carbon Compounds

- Free carbon exists in a few different forms including diamonds and graphite.
- Close to *ten million* other carbon compounds exist.
- Some of the most important are carbon dioxide, calcium carbonate, carbon monoxide, acetic acid, methane, and sugars.



The Carbon Cycle

- Carbon cycles through all of Earth's four spheres
- Involves biological, chemical and geological processes



Carbon Enters the Biosphere (Terrestrial)

- Carbon enters food webs via photosynthetic organisms, such as plants or algae
- Carbon atoms from carbon dioxide (CO₂) become the atoms of a plant's body
- Once in the food web, carbon atoms become part of the tissue of other living things



Carbon Enters the Biosphere (Aquatic)

- In aquatic ecosystems, living things use carbon compounds to build their shells or other structures
- Crustaceans, mollusks, and shelled protists
- Photosynthetic algae consume oceanic carbon



Carbon Leaves the Biosphere

- Plant and animal respiration
- Decomposition
- Remains of organisms that are buried and compressed without decomposing are converted to fossil fuels



Sticker Question #1

- Which of the following would NOT be a source of methane?
- A dead frog at the bottom of a swamp
 - Photosynthetic algae in the world's oceans
 - A volcanic eruption
 - Your stomach after a big dinner at Buffalo Wild Wings

Carbon Enters the Atmosphere

- Carbon that is dissolved in the oceans also is released by the ocean
- Living things respire, releasing carbon
- Combusting fossil fuels
- Volcanic eruptions



Carbon Leaves the Atmosphere

- Producers take carbon from their environment to photosynthesize
- Carbon dissolves back into the ocean (more CO₂ is absorbed by the ocean than released)



Carbon Enters the Hydrosphere

- As previously mentioned, carbon dissolves into the world's oceans
- Effects the pH of the ocean
- Rocks containing carbon (limestone and dolomite) are also weathered and return carbon to the ocean over time



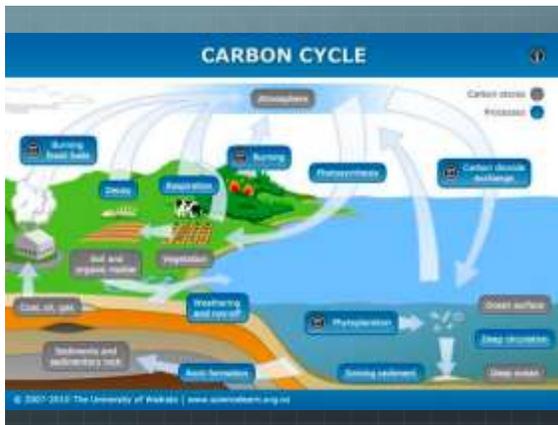
Carbon Leaves the Hydrosphere and Enters the Lithosphere

- Carbon is released back into the atmosphere
- Carbon precipitates out and forms limestone and other carbon-based rock material
- Photosynthetic algae, shelled animals consume carbon
- Shells and hard structures of aquatic organisms sink to the bottom and are compressed to form sedimentary rock



Carbon Leaves the Lithosphere

- Weathering returns carbon to the hydrosphere
- Volcanic eruptions
- Fossil fuels (organic material converted to coal, oil, gas and tar sands) are combusted and return carbon to the atmosphere (in modern times)



Sticker Question #2

- A carbon molecule is moving through the carbon cycle and gets stuck in one part of the cycle for millions of years. Which Earth system is the carbon atom most likely stuck in?
 - The atmosphere
 - The lithosphere
 - The hydrosphere
 - The biosphere

