Student Instructions: Carbon and Mercury Cycles

Step 1: The carbon cycle is the natural exchange of the element carbon between the Earth's atmosphere, living matter, the ocean, and geological formations. Carbon is considered to be the building block of life, and it is transformed into many different chemicals or molecules during the carbon cycle.

For example, in the atmosphere carbon primarily exists as carbon dioxide (CO_2), but in living things carbon bonds with many other elements (such as hydrogen and nitrogen), making chemicals like sugars and proteins. Plants, for example, take CO_2 from the air and use energy from the sun to make the molecules they need for living, such as sugars, cellulose, proteins, and other chemicals. Plants also release CO_2 into the air. When other living things eat plants or other animals, their cellular processes break down chemicals to obtain energy (for example, when we eat breakfast, we get energy). Carbon that was captured in the protein or sugar in the food is used to make new chemicals for bodily functions or is re-released via breathing or respiration as CO_2.

But this is only one small part of the cycle. A large amount of carbon is stored in the oceans as a molecule called bicarbonate and within the biomass (or living matter) in the ocean. Carbon is also stored and exchanged in soils (and the microorganisms in soils), rocks (such as limestone), and fossil fuels (such as oil and coal). Carbon stored in fossil fuels is released when burned (for example, coal is burned for electricity, and gasoline runs vehicles).

Using the above description of the carbon cycle as your guide, label the diagram on the next page to complete a visual depiction of the carbon cycle.

Step 2: Read the article "Forest Fire Fallout."

Step 3: Mercury is a potentially toxic heavy metal that has very unique properties. It is the only metal that is a liquid at room temperature and can evaporate into the air. Mercury is a naturally occurring element, and most of it is "bound" by rocks, fossil fuels, or other geological formations. Although mercury is naturally released into the environment by geologic formations and events (like volcanic eruptions), the largest amounts of mercury are released by burning coal for electricity (coal-fired power plants).

Using the information from this lesson and article, show the mercury cycle on the diagram in Step 1. You may want to use a different color of pen to depict the mercury cycle. You may label the diagram to more clearly describe the processes.

Step 4: What questions do you have or additional information do you need to generate a more complete understanding of the mercury cycle?

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Carbon and Mercury Cycle Diagram