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Dinosaur Breath Activity — Student Background Reading: Life of a Carbon Atom – **Answers**

Investigating Questions

1. What does the term “carbon cycle” mean?
2. How do all animals, from dinosaurs to humans, relate to the carbon cycle?
3. Explain how a carbon atom that existed as carbon dioxide (CO₂) during the Carboniferous Period could have ended up at the bottom of a murky swamp.
4. How did this carbon atom eventually form coal? What is coal used for today?
5. Now explain how the same carbon atom (that existed as CO₂ during the Carboniferous Period) could have ended up in a dinosaur’s stomach.
6. How did this carbon atom become re-released into the atmosphere?
7. How did the carbon atom meet a tiny marine organism? What did the carbon atom help the marine organism build?
8. How did the carbon atom become natural chalk?
9. How can we release the carbon contained in the natural chalk, which *could* be from the exhaled breath of a dinosaur?

Answers to Investigating Questions

1. The term carbon cycle refers to the movement of carbon atoms through living organisms, the oceans, the atmosphere and the Earth’s interior and crust.
2. All animals relate to the carbon cycle because all organisms are based on the carbon atom. Also, when animals eat food, they ingest carbon in the form of carbohydrates and proteins. This carbon combines with oxygen to give energy for daily activity.
3. A carbon atom that existed as carbon dioxide (CO₂) during the Carboniferous Period could have ended up at the bottom of a murky swamp if this carbon atom had first been absorbed by a green, leafy plant that used the carbon atom to produce a sugar molecule through photosynthesis. This sugar molecule became a structural part of the one of the plant cells. Eventually, the leafy plant died and sank to the bottom of a murky swamp and became covered by other decayed ferns.

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4. Coal was eventually formed from this carbon atom when the climate changed and became drier and less tropical. Materials such as sand and dust covered the ancient swamp and sealed the decaying plant material under a thick layer of sediment, which hardened and turned into rock. The carbon atom remained in this rock and was turned into coal from the high pressure of other sedimentary layers. Today, coal is burned in power plants to create electricity to fuel industrial civilization.
5. The same carbon atom could have ended up in a dinosaur's stomach if the carbon atom had been absorbed by the leafy fern and then ingested by a hungry dinosaur in the form of carbohydrates and proteins.
6. This carbon atom became re-released into the atmosphere after the dinosaur had eaten the fern, ingesting the carbon atom, and using it to make energy. The carbon atoms was a waste product of this process and left the dinosaur's body when he exhaled.
7. The carbon atom met a tiny marine organism when the carbon atom (as carbon dioxide, CO₂) was floating over a warm ocean surface and was absorbed by the water. Once the CO₂ molecule was dissolved in the ocean water, it was captured by a tiny marine organism. The carbon atom then helped the little sea creature build its shell.
8. The carbon atom became natural chalk after it was captured by the tiny marine creature, who used the carbon to build its shell. When the sea creature died, its remnants (including its shell) sank to the bottom of the ocean floor and formed sediments of limestone and chalk. These sediments were raised above sea level by tectonic activity to create large rock formations, like the White Cliffs of Dover, where a lot of natural chalk is mined today.
9. We can release the carbon contained in the natural chalk, which could be from the exhaled breath of a dinosaur, through a simple chemical reaction with vinegar. The carbon atoms combine with oxygen in the atmosphere to form carbon dioxide.