**Lesson:** Formation of Coal
**Content Area:** Science
**Grades:** 8-12

**Overview:**

* *This lessons is adapted from* [*http://www.efmr.org/edu/coal2009.pdf*](http://www.efmr.org/edu/coal2009.pdf)
* This lesson could be used as an introduction, or as a supplemental experiment. Procedure A takes two days to complete, with a couple days in between part one and part two. The first day explores the formation of coal; the second day is observing the result of the process. Students can work in groups with own materials (ideal) OR teacher could do a whole class demonstration.
* There is also a second part of the lesson, Procedure B, which also takes several days to complete.
* Both lessons are ways of exploring the formation of coal.

**Resources:**

* <http://www.efmr.org/edu/coal2009.pdf>

**Materials**

* "Background Information" (optional)
* Coal sample
* Ice cream sandwiches
* Wax paper (approximately 30 cm. or 12 inches)
* Construction paper
* Rolling pin
* Oil or nonstick spray
* Plant matter
* Leaves and small twigs
* Clear 2-liter milk carton
* Scissors
* Pie plate
* Sand and soil
* Encyclopedias
* Resource books and/or Internet.

**Objectives:**

1. Students will classify coal as a fossil fuel.
2. Students will explain and demonstrate how coal is formed (coalification).

**Introduction:**

1. Review Coal: A Fossil Fuel in “Background Information.” (PDF version available under “*efmr org lesson resource”)*

**Procedure A:**

**Day 1:**

1. Simulate how coal is formed: On a display table, place a sheet of construction paper on wax paper.
2. Set 3 ice cream sandwiches on top of each other then place on the construction paper.
3. Explain that the ice cream represents moisture and the 12dark wafers represent compressed plant matter.
4. Press the ice cream sandwiches together with an oiled rolling pin.
5. Ask students how this represents the formation of coal. Continue pressing ice cream sandwiches to a depth of approximately 1 cm.
6. Discuss observations.
7. Define coal as a fossil fuel. (It is a sedimentary rock formed by the burial and compression of accumulated plant material.)

**Day 2:**

1. Allow pressed ice cream sandwiches to dry out for several days. Observe changes. (The wafers should be compressed into a dry, firm mass.)

**Closure:**

1. Discuss observations and have students relate activity to the formation of coal, a fossil fuel.

**Extension:**

* Compare and contrast the following fossil fuels: coal, petroleum and natural gas.
* Divide students into groups and assign research on fossil fuels.
* Instruct students to create a diorama depicting how coal is formed. (Students could design a swampy landscape with fallen vegetation being buried.)

**Procedure B:**

1. Demonstrate how coal is formed: Cut a 2-liter soda bottle in half.
2. Coat the inside of the bottle with oil or nonstick spray. Place approximately 50 ml. of water on bottom.
3. Add layer (4-5 cm.) of sand and soil.
4. Add layer (5-6 cm.) of leaves and small twigs.
5. Cover with layer of soil and sand (fill to top of bottle).
6. Poke ten or more holes near bottom of soda bottle
7. Over the next few days, instruct volunteer to press down material in bottle with palm of hand or flat surface. (This will press out excess water.)
8. Allow to set for several days. Invert bottle on pie pan and have students make observations.
9. Facilitate class discussion comparing activity to the coal formation process.

**Closure:**

1. Students write and illustrate steps of activity and compare to coalification.

**Extension:**

* Students can keep a journal and record their observations each day
* At the end of the week, students can discuss what they observed over time