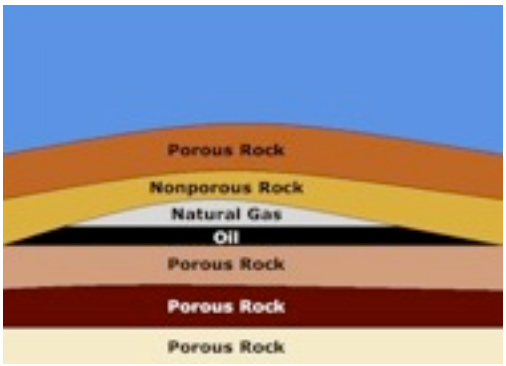
Non-Renewable Energy: How is Natural Gas Formed Laboratory Activity

Think about the energy you use every day to cook, heat or cool or light your home, or to travel from one place to another. For most of us, the main sources of this energy are the **fossil fuels: *coal, oil, and natural gas.*** Whether used directly, as gasoline, heating oil, or natural gas, or to generate electricity (by burning coal), fossil fuels are a large part of the world's energy picture.

But how do fossil fuels form?



The story starts millions of years ago, during the **Carboniferous Period of the Paleozoic Era.** The Earth was warm and was covered with plant-filled swamps and shallow seas teeming with **algae** and **simple animal life forms such as plankton.** When the plants and animals died, their remains fell to the bottom of the swamps and seas and accumulated there. Much of the organic matter decayed before it was buried by more sediment. Some of it, however, was buried before it could decay. Over millions of years, more and more **sediments accumulated and the great heat and pressure changed the plant and animal materials into coal, oil, and natural gas.** These deposits can be trapped between layers of porous and nonporous rock.

Natural gas is found in nearly all petroleum deposits. Coal forms in a similar manner. All three types of fossil fuel are nonrenewable resources because they are used more quickly than they can be replaced.

Objective

In this activity, you will make a **model** of how **natural gas might be formed** from decaying organic material.

Materials:

Two 1-L (1-qt) plastic bags (reclosable or nonreclosable)
Leafy green vegetables, such as lettuce, cabbage, or spinach, at room temperature
Large clear measuring cup, measuring tape
Refrigerator
Notebook, pen or marker, tape, camera

Procedures:

1: Take out your leafy green vegetables. If the greens are cooler or warmer than the room, leave them on a table or shelf long enough for them to come to the temperature of the room.

2: Add the greens to the measuring cup and pack them down as much as possible. Keep adding greens and pushing them down until the level of the greens is at the 250-mL (8-oz, or 1-cup) mark.

3: Fill one of the plastic bags with the greens from the measuring cup, and then repeat the process for the second bag. You should have two bags that each contain 1 cupful of greens.

4: Distribute the greens evenly along the bottom of each bag. Then roll up each bag from the bottom—to press all of the air out—and seal tightly. If the bag is not reclosable, use tape to seal the bag.

5: Once each bag is rolled up, use the measuring tape to find the circumference of the two rolled-up bags. Record this information in your notebook. **Write a description of your greens—how they look and feel— or take a photograph of each rolled-up bag.**

6: Unroll the bags and **put one in a refrigerator.** This will be the "control" bag, where the lower temperature will keep the greens from decaying quickly. Place the other bag on a table or shelf where it can remain at room temperature. *The warmer temperature will cause the greens to decay more quickly.* Be sure the bag is not in sunlight, because this will affect the experiment.

Data Table:

Treatment	Data	Day 1 date	Day 2 date	Day 3 date	Day 4 date	Day 5 date	Day 6 date	Day 7 date	Day 8 date	Day 9 date	Day 10 date
Cool bag (control)	Measurement (cm)										
	Observations										
Warm bag	Measurement (cm)										
	Observations										

7: Once a day for next ten days, gently roll each bag and **measure the circumference.**
Record this information in your data table. Also, look at the greens and ***write down your observations of their appearance.*** You might also find it useful to take a picture of the bags each day.

8: On the tenth day of the experiment, measure a final distance around the two rolled bags. Record these two final measurements in your data table. *Describe how have these measurements changed over the ten days.*

9: After you have made your final measurements, **discard both bags.**

Data Analysis
Discuss: What changes do you see in the warm bag and the cool bag? How can you explain what you see? How do these changes relate to what you know about how decaying material produces natural gas?

Conclusion: Discuss the principles that you learned by doing this activity. What worked? What didn't? How may you change this lab in the future? How can you expand this experiment?