



Methanogenesis In Earth and Body Lab Activity

Adapted from Centerpoint Energy: <https://safeandsmart.org/middle-school-students/#er>

GRADE LEVEL: 9-12

SUBJECTS: Science, Math, History

Students will recognize that natural gas is a product of decomposing organic material.

Students will identify natural gas as a nonrenewable energy resource.

WONDER WHY...

How is methane produced in the body and on Earth naturally?

CONCEPT:

To demonstrate the processes by which organisms break down natural things and create methane through the process of decomposition in the body and in the environment.

BACKGROUND INFORMATION:

This lab activity accompanies the classroom lesson Methanogenesis in Earth and Body on the 9-12 lesson plans on the Arkansas Energy Rocks site. The students will observe the relationship between the lesson concepts and real-world application of the breakdown of bacterial processes to produce methane and CO₂. You may also use the "It's a Gas" lesson from the elementary lessons on Arkansas Energy Rocks to show the processes.



MATERIALS:

- Two plastic soda bottles (2 liter size) or ½ gallon plastic milk containers
- ½ cup Sand
- ½ cup Soil
- 2 extra large balloons (equal in size and color)
- Plant pieces
(outside plants work best: grass/leaves-both dead and green/hay/stems/green branches)

Procedure:

1. Place a balloon over the top of the first empty bottle with a balloon. The empty container will be the “control” of the experiment.
2. Fill the second bottle 1/3 with plant parts (torn into small pieces).
2. Measure out ½ cup sand (125 grams) and place on top of plant pieces to create a thin layer.
4. Measure out ½ cup soil (125 grams) and place on top of plant pieces to create a thin layer.
5. Place balloon over bottle.
3. Set in a warm sunny location for 1 week or more.

Have students predict and compare any gas collection in balloons. Discuss observations and ideas.



Create a chart for daily observations in gas production.

Relate activity to how natural gas is formed: organic matter decomposes and is buried deep in mud or sand. Intense heat and pressure over much time causes gas (primarily methane) to form.

Discussion Questions:

- 1. Why does the bottle with organic matter fill up the balloon?**
 - **As the organic material decomposes gas is released into the balloon**
- 2. How does this relate to natural gas found underground?**
 - **As plants and animals decompose underground natural gas is released into the ground.**