

## Natural Gas

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### Description:

In this lesson you will learn about natural gas, where it comes from, and what it can be used for. You will complete 3 activities that include modeling natural gas deposits in the earth's crust, combining ingredients to create natural gas (methane), and research the different uses and methods for harnessing natural gas flares.

### Objectives:

- Explore the processes of the earth that creates natural gas deposits.
- Learn what natural gas is made out of.
- Visualize what types of material are ideal for holding natural gas deposits.
- Discover the many uses of natural gas
- Observe one of the processes that produce natural gas.
- Uncover the advantages and disadvantages of "flaring" natural gas.
- Finally, the students will research methods of using and harnessing natural gas flares.

### North Dakota State Standards:

- 9-10.1.1.-Explain how models can be used to illustrate scientific principles
- 9-10.1.4.-Describe the relationship between form and function (e.g., solids, liquids, gases, cell specialization, simple machines, and plate tectonics)
- 9-10.2.1.-Explain how scientific investigations can result in new ideas
- 9-10.2.2.-Use appropriate safety equipment and precautions during investigations (e.g. goggles, apron, eye wash station)
- 9-10.2.3. -Identify questions and concepts that guide scientific investigations
- 9-10.2.4.-Formulate a testable hypothesis for a simple investigation

Schedule:

9:00-9:30 Cultural Connection

9:30-11:00 PowerPoint and Lab #1: “Rocks that trap gas”

11:00-11:30 Lab #2 : “It’s a gas- natural gas experiment”

11:30-12:00 Finish PowerPoint and introduce students to research activity

12:00-12:45 Lunch

12:45-1:45 Lab #3: students research methods of using and harnessing natural gas flares.

1:45-2:45 Students present findings with 1-2 minute papers

2:45-3:00 Wrap-up

### Lab #1:

### “Rocks That Trap Gas”



*lab*

*Safety glasses and lab apron are required when performing this*

#### **Materials:**

- 6 oz. Sand
- 6 oz. Clay
- Two 8-oz. wide-necked glass jars or beakers
- 8 oz. of water in a measuring cup
- Magnifier

#### **Objective:**

Students will learn to recognize that sand is more porous than clay. They will draw parallels between these materials and the types of underground rock layers that allow natural gas to collect. They will understand that sand behaves like reservoir rock—it lets the water pass through it like the reservoir rock allows water to seep into it. And that

clay behaves like cap rock—it stops the water like the cap rock stops the gas from dispersing.

**Pre lab: (answer these questions before continuing with the lab)**

1. Feel the sand and clay with your hands. How do they feel different from each other?

2. Use your magnifier to examine the sand and clay. What differences do you see?

**Procedure:**

3. Fill one jar almost  $\frac{3}{4}$  full with sand and the other  $\frac{3}{4}$  full with clay. (Make sure you leave some space at the top of the jar.)

Are the jars full? What do you think will happen if you add water to them?

4. Fill each jar to the top with water. Where does the water go? Which jar holds more water?

**Analysis:**

In order for natural gas to accumulate underground, there needs to be porous rock for the gas to seep into (called reservoir rock), and a layer of very dense rock (called cap rock) above the reservoir rock to keep the gas from leaking to the surface.

Which of your jars behaves like reservoir rock?

Which behaves like cap rock?

## Lab #2

### It's a Gas - Natural Gas Experiment



*lab*

*Safety glasses and lab apron are required when performing this*

#### Materials

- 1 hard cooked egg without shell
- 2 lettuce leaves
- 1 clear plastic 20 liter bottle
- 1 regular round balloon
- 200 ml beaker
- 100 ml graduated cylinder
- 50g of sand
- 1 tsp Ridex septic treatment
- Masking tape
- Balance scale/weights
- Blender

### Instructions

1. Collect all of the material listed above.
2. Add hardboiled egg and lettuce leaves to a blender and puree.
3. Mix 1 tsp. of Ridex with egg/lettuce puree and pour into the plastic bottle.
4. Using the balance scale, carefully measure 50g of sand into your 200 ml beaker. Remember to take into consideration the weight of the beaker first. Then pour the sand into the bottle so that the sand covers the organic substance and lettuce. Do not shake the bottle.
5. Measure 25ml of water. Slowly pour the water into the bottle. Try to make the water run down the inside of the bottle instead of pouring the water directly onto the sand.
6. Next, stretch the opening of the balloon over the opening of the bottle. Seal with masking tape
7. Carefully move the bottle to a warm place. Try to not shake the bottle while moving it.

### Lab Questions

1. Predict what will happen over the next 3 days.

2. Using a meter stick, record the height and width of your balloon twice a day for three days. Individually design a chart to record your daily observations (changes in the balloon, etc). Fill in the chart below.

	<b>Day 1</b>	<b>Day 2</b>	<b>Day3</b>
<b>Height/ Width A.M.</b>			
<b>Height/ Width P.M.</b>			

### **Lab #3**

#### **Student research**

For your last lab you are going to individually research a use for natural gas or a new method for collecting and transporting natural gas. After you have found some information, you will be presenting your findings in a short 1-2 minute presentation. You can use the remainder of this sheet of paper to record your findings.