It's a Gas – Natural Gas

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Lesson Plan – Page 1

PRIMARY STUDENTS

Topic: Natural Gas

Topic Overview: Natural gas comes from the remains of plants and animals.

Activity Overview: Using readily available materials, pupils will investigate the processes involved in the formation of natural gas.

Core Experience and Outcome:

SCN 2-17a : Having explored the substances that make up the Earth's surface, I can compare some of their characteristics and uses.

Learning Intention:

I am learning how natural gas is made.

Success Criteria:

I can explain what happens when natural gas is formed.

Science Skills

Observing, Predicting, Experimenting, Recording, Reporting

Resources

Pupil Role Cards

It's a Gas Experiment Record

Book Reference: *Oil and Natural Gas*, pages 20-23

Materials per Group:

- 1 hard cooked egg
- 2 lettuce leaves
- 500ml plastic bottle
- 1 balloon
- Measuring cylinder
- 50g sand
- 25 ml dirty water (can add soil to clean water)
- Masking tape
- Scale or weights
- Paper to design chart/table

Key Vocabulary

Natural gas – a colourless odourless gas formed over millions of years from decaying ocean plants and animals.

Fossil – the remains or imprint of marine life embedded and preserved in rock layers deep in the Earth.

Fossil Fuels – a hydrocarbon deposit, such as petroleum, coal, or natural gas, derived from living matter of a previous geologic time and used for fuel.

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Teacher Information:

Natural gas is a colourless, odourless gas. From the well site, natural gas is sent by pipelines to a refinery. There it is cleaned, and for safety reasons, an odour is added. This enables people to smell natural gas. It is dangerous to breathe and highly flammable. From the refinery, natural gas is piped to storage facilities until needed by consumers. Public utility companies sell most natural gas to customers. Public utilities buy their natural gas supplies from the private companies that produce it.

NOTE: In this model, lettuce represents the plant material while the egg represents animal material. The sand represents layers of the earth and sediment that provided the pressure necessary for oil and natural gas formation.

Read to students from *Oil and Natural Gas*, pages 20-21:

Thousands of years ago, people in parts of Greece, Persia, and India noticed a gas seeping from the ground that caught fire very easily. These natural gas flames sometimes became the focus of myths or religious beliefs. Natural gas is a mixture of gases, but it contains mostly methane, the smallest and lightest hydrocarbon. Like oil, natural gas formed underground from the remains of tiny marine organisms, and it is often brought up at the same wells as crude oil. It can also come from wells that contain only gas and condensate, or from "natural" wells that provide natural gas alone. Little use was made of natural gas until fairly recently. In the early 20th century, oil wells burned it off as waste. Today, natural gas is highly valued as a clean fuel that supplies a quarter of the world's energy.

Read to students from *Oil and Natural Gas*, pages 22-23:

Natural gas is the cleanest burning of the fossil fuels, and natural gas as become a preferred fuel for electricity generation. Demand is rising so quickly that producers are struggling to keep up. In the future, more and more natural gas will come from unconventional sources. Unconventional natural gas is more difficult and less economical to extract than conventional natural gas. At the same time, unconventional wells are productive longer than conventional wells and can contribute to sustaining supply over a longer period. The gas is essentially the same substance as conventional natural gas, and has the same uses, such as electricity generation, heating, cooking, transportation, and products for industrial and domestic use. New technologies are continually being developed to provide more accurate estimations of the amount of gas in these unconventional reservoirs and to stimulate the reservoirs to produce the gas. What are unconventional today may be conventional tomorrow through advances in technology or new innovative processes.

Establishing Prior Knowledge

- What is a gas?
- What is a fossil?
- How do fossils and gases link?
- How long do you think it takes for natural gas to form? Why?

Concept Introduction

As we journey back in time, let's think about how we can recreate the historical formation of fossils. What eventually happens to sea animals and plants when they die? They fall to the ocean floor. As the plants and animals lie lifeless on the bottom of the ocean, the currents deposit sediments on top of the dead marine life. As these layers increase, the pressure also increases which creates fossils and fossil fuels.

Main Activity

Carry out It's a Gas experiment, following outline below.

Teacher Guide and It's a Gas Experiment Outline:

Put pupils in groups of 4, allow pupils to choose roles, introduce pupils to their *It's A Gas Experiment Record*.

Prior to the start of the experiment, demonstrate to pupils how to measure using a cylinder and how to use scales. Instruct the pupils to carry out the following steps:

1. Measure 20g of egg and place it into the bottle. The egg is an organic substance and represents animal matter.

2. Tear the lettuce into small pieces and place them into the bottle on top of the egg. The lettuce represents plant matter.

3. Using the scales, measure 50g of sand and pour the sand into the bottle so that the sand covers the egg and lettuce. **Do not shake the bottle.**

4. Measure 25ml of dirty water into the cylinder. 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.

5. Stretch the opening of the balloon over the opening of the bottle. Seal with masking tape.

6. Move the bottle to a warm place. Try not to shake the bottle while moving it.

7. On *It's A Gas Experiment Record*, predict what will happen over the next few days.

8. Design a chart or table to record your daily observations. What might you want to include on your chart or table? Record your results for Day 1.

9. Record observations over the next 4 days.

10. On Day 5, complete *It's A Gas Experiment Record* questions and share your observations and conclusions with the class.

Plenary

Present group findings using the key vocabulary terms from Page 1. Use *Suggested Answers* sheet to guide further discussion.

Extension Ideas

When, where and how was natural gas first discovered and where can we find natural gas today?

Home Links

Carry out the Pressure Bottle Activity from the original energy4me materials (on disc) using different objects and sachets.

- Investigate what happens with the different items.
- Take notes.
- How can you explain your results?