

Topic: Where does oil come from?

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

Activity Overview: Using readily available materials, pupils will investigate the processes involved in the formation of oil over

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 about the changes that take place when oil is formed.

Success Criteria:

I can identify and sequence the steps in the process of oil formation.

I can demonstrate the process of oil formation through experimentation.

I can explain the process of oil formation using the terms fossil, fossil fuel and sediment.

I can present experiment results in a manner of my choosing.

Resources

Pupil Role Cards

Bread Fossils Experiment Record

Book Reference:
Oil and Natural Gas, pages 18-19

Materials per Group:

- 3 slices of bread (1 each of white, brown, seeded)
- Soft gummy sweets
- Heavy books
- Paper towels
- Magnifying lens
- Apple corer
- Plastic knife

Science Skills

Observing, Predicting, Experimenting, Recording, Reporting

Key Vocabulary

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.

Sediment: Sand-like material and debris that settles or is deposited by water, wind or glaciers over time.

Teacher Information:

Read to students from Oil and Natural Gas, pages 18-19:

'Scientists once thought that most oil was formed by chemical reactions between minerals in rocks deep underground. Now, the majority of scientists believe that only a little oil was formed like this. Much of the world's oil formed, they think, from the remains of living things over a vast expanse of time. The theory is that the corpses of countless microscopic marine organisms, such as foraminifera and particularly plankton, piled up on the seabed as a thick sludge, and were gradually buried deeper by sediments accumulating on top of them. There the remains were transformed over millions of years—first by bacteria and then by heat and pressure inside Earth—into liquid oil. The oil slowly seeped through the rocks and collected in underground pockets called traps, where it is tapped by oil wells today.'

Much of what is the United States today was under ancient seas millions of years ago. Geologists know this because many layers containing fossil remains of marine life have been found throughout the United States. Millions of small marine plants and animals lived in the seas and oceans, eventually died, and then settled on the ocean floor. Sand and other sediment, much like the bread fossil in the experiment, often buried the dead plants and animals. Heat from beneath the earth's crust 'cooked' the plant and animal remains forming oil and natural gas deposits within the rock layers. This is why oil that is produced in the sedimentary rock is called a 'fossil fuel.'

Today, oil and gas companies drill holes in the subsurface rock looking for oil and natural gas deposits. These rock formations are sometimes in depths of five miles (8.05 kilometres) or more. As oil and natural gas are being depleted from existing wells, geologists are constantly searching for undiscovered sources of oil. Many scientists believe that oil and natural gas are possibly forming under the ocean floor. However, the organic matter will not form petroleum until millions of years have passed. That is why oil and natural gas are considered to be non-renewable energy sources.

Establishing Prior Knowledge

- What is a fossil?
- What is fuel?
- How do fossils and fuels link?
- How long do you think it takes for a fossil fuel 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 the 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 the Bread Fossils experiment.

Teacher Guide and Bread Fossils Experiment Outline:

Put pupils in groups of 4, allow pupils to choose roles, introduce pupils to the Bread Fossils Experiment Record.

1. Place paper towel and 5 to 10 sweets on each group's table. Give each group 3 slices of bread (one of each type). Instruct pupils to remove crusts from the bread. What eventually happens to the sea animals and plants when they die? What piece of bread looks like the sandy floor of the ocean? **white**
2. Place a piece of white bread on top of the paper towel. Put sweets on the bread. Explain that ocean currents deposit sediments on top of dead marine life, as they settle on the bottom of the ocean. What layer of bread could we use to represent the sediments? **seeded**
3. Place a piece of seeded bread on top of the white bread layer. As millions of years passed, what continued to cover the dead plants and animals? **more sand and sediments were deposited by wind and ocean currents**
4. Place sweets on seeded bread and cover with brown bread. What does this last layer represent? **more sediment deposits**
5. Fold the paper towel to cover your bread fossil. Now, something is still missing to help our fish fossilise. What else could it be? **pressure** What could we do to put pressure on the 'rock layers' of our bread fossil?
6. Place textbooks or other heavy objects on top of the bread to simulate pressure. Leave your model for one or two days to represent the passage of millions of years.
7. After one or two days, observe the bread fossil. Use apple corer to 'extract' a core sample and observe the layers of your sample.
8. Try to separate the layers of the bread using the plastic knife. Why do you think the layers are difficult to separate? Try to extract a sweet. Can you identify the mould? **impression in the bread** And the cast? **sweet fossil**
9. Compare the coloured residue of the sweets in the bread fossil to the remains of the plants and animals that seep into the rock. The residue left by the sweets represents oil deposits left behind by dead ocean plants and animals. Over millions of years, these remains are pressurised to become oil and natural gas deposits.

Plenary

Present group findings using the key vocabulary terms. Use Key Questions for Discussion on *Bread Fossils Experiment Record* and the *Suggested Answers* sheet to guide further discussion into the topic.

Extension Ideas

What would happen if we changed variables in the experiment? Change variables in the experiment and repeat. Possible variables to change:

- Temperature – should you microwave the bread fossil? Or freeze it?
- Choice of breads and sweets
- Timescale – how long should you leave your bread fossil before checking on it?
- Number of layers
- Level of pressure

Home Links

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