

Topic

Where oil comes from

Source

Oil and Natural Gas, pages 18-19

Objective

Students will gain an overall picture of the sequence of processes that leads to the formation of sedimentary rocks and fossil fuels. Oil is formed from the remains of plants and animals.

Lesson Preparations

1. Collect materials from the list provided
2. Make copies of the lab packets, one for each student
3. Make copies of the exit questions, one for each student
4. Read through the "Teacher Information" section

Vocabulary Words

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.

National Science Education Standards

Earth/Space Science
(Grades K-4)

Science in Personal
and Social Perspectives
(Grades K-4)

Materials

- 3 slices of bread (one slice each of white, wheat, and rye)
- Gummy candy fish (or other gummy sea animals or plants)
- Heavy books
- Paper towels
- Magnifying lens
- Clear drinking straws
- Plastic knife

Engagement

Do you have dinosaurs in your gas tank? Did you ever hear that oil and natural gas are **fossil fuels**? Do you think oil and natural gas can be made from old **fossils**? How long do you think it takes **fossil fuel** to form?

Exploration

Day 1

1. Split the students into groups of four. Assign each student a job from the list below.
 - Recorder: the student who writes down the information from the experiment
 - Reporter: the student who presents their group's findings to the class
 - Material Getter: the student who gathers and puts away the materials for the experiment
 - Facilitator: the student who oversees the experiment and ensures their group stays on task.
2. Pass out one "Fish, Fossil and Fuel" lab packet to each student. Have students read through the lab instructions once.
3. Teacher says: "We are going to learn what eventually happens to animals and plants when they die." Ask the students to perform step one and step two of the experiment.
4. Teacher says: "As the plants and animals lay lifeless wind and ocean currents deposit **sediments** on top of the dead marine life." Explain the definition of sediments to the students. Have the students complete step three of the experiment.
5. Teacher asks: "As millions of years passed, what continued to cover the dead plants and animals?" (**More sediments deposited by wind and ocean currents**). Ask students to complete step four of the experiment.
6. Teacher says: "Something is still missing to help our fish fossilize. What is it?" (**Pressure**) Students should now complete steps five, six and seven of the experiment.
7. Have students individually answer the lab questions on Lab Worksheet, page 1. Have the students turn in the lab packet.

Day 2

8. Explain to the students that during this experiment each day represents 1 million years. By the end of the experiment Day 3, 3 million years have passed.
9. Split the students into the same lab groups as Day 1. Provide the lab packets to the students. Have the students retrieve their group's bread fossil and complete Day 2 of the chart on Lab Worksheet, page 2. After the charts are completed, have the students turn in their packets.

Day Three

10. Split the students into the same lab groups as Days 1 and 2. Provide theab packets to the students.
11. Have the students complete the Day 3 of their chart on Lab Worksheet page 2.
12. Have the students complete steps 1 through 4 on Lab Worksheet, page 3.
13. Have students answer the “lab questions” on Lab Worksheets, pages 3 and 4 individually. Observe the students during this activity.
14. Have the reporter of each group stand up in front of the class and present their findings.
15. At the end of the lab, lead a discussion with the students. Compare the colored residue of the gummy fish in the bread fossil to the remains of the plants and animals that seep into the rock. The residue left by the gummy fish represents oil deposits left behind by dead plants and animals. Over millions of years, these remains are pressurized to become oil and natural gas deposits.

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 lay lifeless, wind and currents deposit **sediments** on top of the dead. As these layers increase, the pressure also increases creating **fossils** and **fossil fuels**. What has changed about our “bread fossils?” What happened to the layers?

Explanation

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, 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 kilometers) 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.



Evaluation

1. Students should complete the exit questionnaire worksheet individually.
2. Have the students record in a journal the life cycle of a fish until it is found as a fossil. The students should be able to tell you about the life of a fish from birth to death and then what happens after they have fallen on the ocean floor to a fossil and then become a fossil fuel.

Elaboration

1. Create a fossil by making a clay imprint of a hand or an object of choice. Let it dry, and bury it somewhere on school grounds or your backyard for you or someone to find a year from now, or millions of years from now.
2. Compare actual fossils (collected by teacher and/or students) and classify by properties.
3. Create comic strips, journal entries or models to demonstrate the process of fossil fuel formation.

Lab Question Answer Key

1. What piece of bread looks like the sandy floor of the ocean? **White**
2. What layer of bread could we use to represent the sediments? **Rye**
3. What does the last layer of bread represent? **More sediment deposits**
4. What was used in your experiment to put pressure on the "rock layers" of the "bread fossil?" **Books or a heavy object**

Exit Questionnaire Answer Key

1. What was applied to the organisms that caused them to transform into oil?
a. Heat and pressure
2. Scientist once thought that oil was formed by chemical reactions between minerals in rocks deep underground. Now, scientists believe fossil fuels are formed from the remains of living organisms buried in the ground. Fossil fuels formed over a long period of time because **heat** and **pressure** were applied to **sediments** that were **deposited** in the ground.
3. Is oil considered to be a renewable or non-renewable energy source?
Oil is a non-renewable resource because it cannot be replenished, or made again, in a short period of time

Bread Fossils: Discover the Origin of Fossil Fuels Lab Packet

Reporter _____

Recorder _____

Material Getter _____

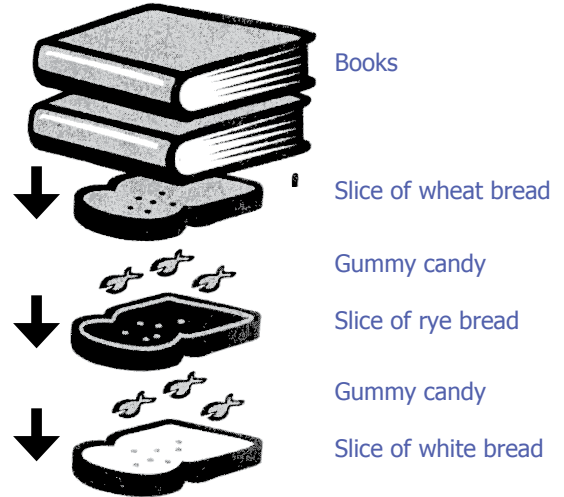
Facilitator _____



Bread Fossils: Discover the Origin of Fossil Fuels

Materials

- 3 slices of bread (one slice each of white, wheat, and rye)
- Gummy candy
- Heavy books
- Paper towels
- Magnifying lens
- Clear drinking straws



Instructions

1. Carefully pull the crust from the three slices of bread.
2. Place a piece of white bread on top of the paper towel. Put two or three gummy candies on top of the white bread.
3. Place a piece of rye bread on top of the white bread layer. Put two or three gummy candies on top of the rye bread.
4. Place a piece of wheat bread on top of the rye bread layer.
5. Fold the paper towel to cover your bread fossil.
6. Place two textbooks or a heavy object found in the room on top of the bread. Place your bread fossil with the pressure source in a secure area of the classroom.
7. Turn to page 2 of your lab packet and complete the table for Day 1. Answer the lab questions below. Each student in your group will complete their own chart and lab questions..

Lab Questions

1. What piece of bread looks like the sandy floor of the ocean? _____
2. What layer of bread could we use to represent the sediments? _____
3. What does the last layer of bread represent? _____
4. What was used in your experiment to put pressure on the "rock layers" of the "bread fossil?" _____

Fish, Fossils and Fuel

Day 1 Written Description	Day 1 Drawing
Day 2 Written Description	Day 2 Drawing
Day 3 Written Description	Day 3 Drawing

Materials

Clear straw, plastic knife

Instructions

1. Unfold your "bread fossil." Place the straw in your fossil into the middle of the bread fossil to "extract" a core sample.
2. Remove the core sample and observe the layers through the straw. Record your observations in words and draw a picture on the chart for day 3 on page 2 of this packet.
3. Take your knife and cut the bread fossil in half. Look at the layers of your fossil. Record your observations.
4. Pick up your bread fossil and try to separate the layers of the bread. Try to extract the fish.

Lab Questions

1. What do you see in the straw?

2. What do you see when you cut into the bread fossil?

3. Are there any similarities and differences in the straw sample and the bread fossil?

4. Describe how the core sample of the "bread fossil" looked.

Lab Questions (continued)

5. Why do you think the layers are difficult to separate?

6. Can you identify the mold and the cast of the gummy fish?

7. Draw what you see in your core sample taken from the straw.

8. Draw what you see as you cut into the bread fossil.

Name: _____

Questions

1. What was applied to the organisms that caused them to transform into oil?
 - a. Heat and pressure
 - b. Carbon filtered through limestone
 - c. Bacteria on top of the mud
 - d. Nitrogen mixed in the water

2. Scientist once thought that oil was formed by chemical reactions between minerals in rocks deep underground. Now, scientists believe fossil fuels are formed from the remains of living organisms buried in the ground. Fossil fuels formed over a long period of time because _____ and _____ were applied to _____ that were _____ in the ground.

3. Is oil considered to be a renewable or non-renewable energy source? _____
Why?
