

Career Connection

Fascinated by fossils?

Finding new oil and gas deposits is one part technology and three parts detective work. As a **paleontologist**, you will look for clues from tiny marine plant and animal fossils to find rock layers that contain oil and natural gas. You may work in a laboratory or outdoors on a drilling rig as the rock cuttings come to the surface.

Facts True or False?

Crude oil and natural gas were formed naturally as the pressure from many layers of sediments and heat from the earth "cooked" ancient plant and animal life.

TRUE.

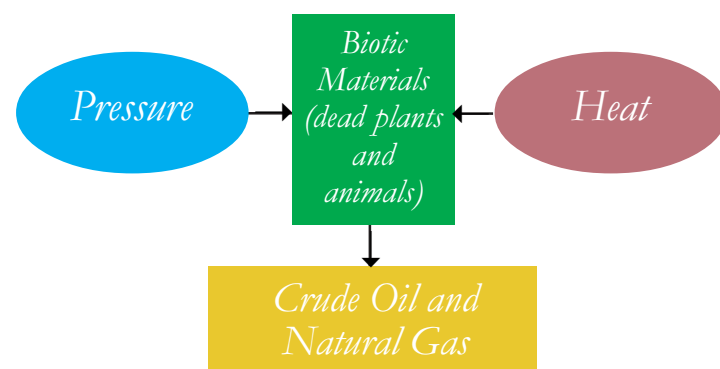
Graphic Organizers

Biotic Materials Flow Chart

The process of turning biotic materials into energy and products can be visually organized by using a flow chart. Students practice creating a flow chart with an experiment.

Directions

1. Choose shapes to represent process and matter.
2. Discuss the meaning of arrows.



National Standards

Earth and Space Science

- EXPLORE EARTH'S SYSTEMS AND GEOCHEMICAL CYCLES
- STUDY ENERGY SOURCES

Physical Science

- IDENTIFY PROPERTIES AND CHANGES OF PROPERTIES OF MATTER
- UNDERSTAND THE TRANSFER OF ENERGY

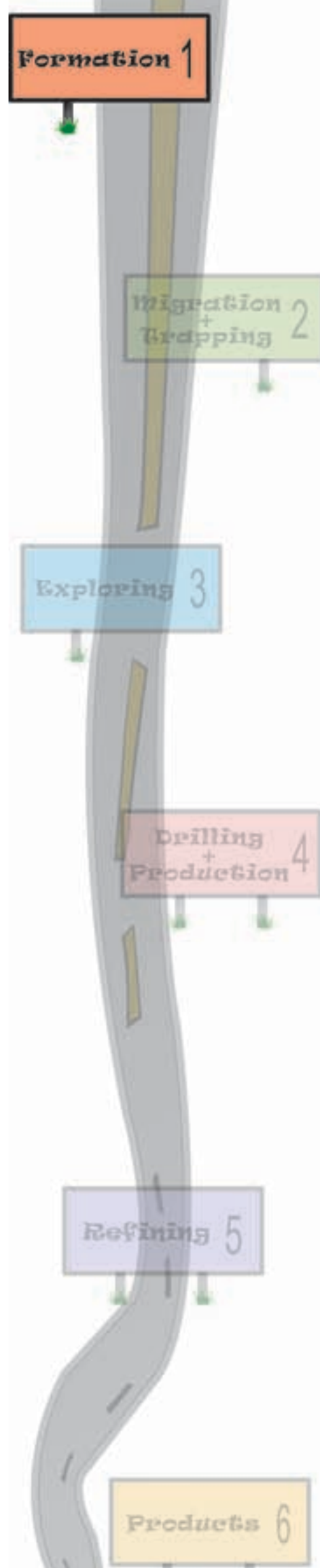
Inquiry Science

- CONDUCT INVESTIGATIONS
- USE TOOLS AND TECHNIQUES TO GATHER AND INTERPRET DATA

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Formation

of Natural Gas and Oil



Crude oil and natural gas are called "fossil fuels" because they were created from biotic materials: tiny marine plants and animals. Millions of years ago, these plants and animals died and were buried by layers of sediment, water, and sand. Microorganisms fed on the decomposing organic material in a process called biogenesis. The pressure from the sediment layers and heat from beneath the earth's crust "cooked" this biotic material within the rock layers and formed oil and natural gas deposits.



Experiment

IT'S A GAS: Gas Formation

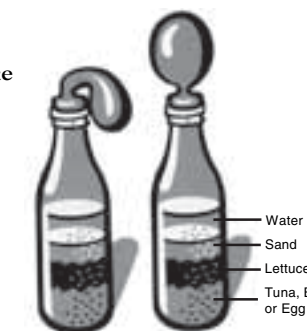
How does biotic material form natural gas?

Materials:

- 10 g of organic substance (tuna, beef, egg)
- A few lettuce leaves
- Drink bottle
- 50 g sand
- Balloon
- Balance scale
- Water
- Masking tape

Procedure:

1. Measure 10g of an organic substance (tuna, beef, or egg) and put into bottle.
2. Tear the lettuce leaves into small pieces and put into bottle.
3. Use the balance scale to measure 50g sand. Carefully pour the sand into the bottle so that it covers the organic substance and lettuce. Do not shake the bottle.
4. Measure 10ml of water. Slowly pour the water into the bottle. Try to make it run down the inside of the bottle instead of pouring it directly onto the sand.
5. Stretch the opening of the balloon over the opening of the bottle. Seal with masking tape.
6. Put the bottle in a warm place (preferably outside as contents could produce a strong odor).
7. Predict what will happen over the next few days.
8. Design a chart and record daily observations (changes in the balloon, etc.).



Questions and Explanations:

1. What scientific principles are demonstrated in this experiment?
2. What happens to the material in the bottle?
3. What effect does heat have on this process?
4. What causes the balloon to expand?

Reflection:

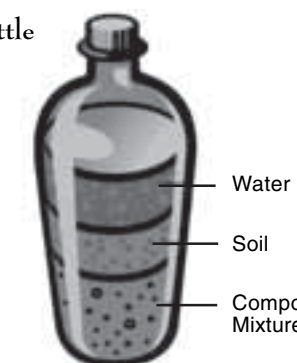
1. Could today's scientists create natural gas?

Biotic Materials: Making Crude Oil

Create a model of how the decomposition of living matter can create the element carbon that is involved in the formation of oil.

Materials:

- Clear plastic one-liter soft drink bottle
- One dowel rod
- Funnel
- Dry soil from a garden
- Pond or creek water
- One hard-boiled egg (2 gm shell and one yolk)
- 10 x 15 cm piece of newspaper, shredded
- Metric ruler
- Masking tape to seal and label bottle



Procedure:

1. Remove any stones or twigs from soil.
2. Prepare a compost mixture by combining shredded newspaper (organic), egg shells (carbonate) and egg yolk (sulfate) with a handful of soil.
3. Use the dowel rod to pack the compost mixture in the bottom of the bottle and remove trapped air. This compacted bottom layer should be about 3 cm deep.
4. Add soil to the bottle using the dowel rod to compact it and remove the trapped air. This compacted layer should be within 5 cm from the top of the bottle.
5. Cover the surface of the soil with pond water, filling to the lower threads of the bottle opening.
6. Seal the top of the bottle tightly and place in a window that receives indirect sunlight.
7. Observe the bottle weekly for a minimum of three months recording observations. *Note: Gas will need to be released as time passes. Remove the lid outside to avoid strong odor. Direct top of bottle away from face when opening.*

Questions and Explanations:

1. What is happening inside the bottle?
2. What kind of bacteria is being produced and why?
3. Are soil and water lifeless parts of the ecosystem? What is biogenesis?
4. What would happen if the bottle was subjected to increased temperature? Decreased temperature?

Reflection:

1. Could today's scientists create petroleum and natural gas?