Career Connection

Rocks rule!

When it comes to oil and gas, rocks tell the story. Before a well is ever drilled, much time must be spent studying geological data and building maps that show the best spots to drill for oil and natural gas. As a **petroleum geologist**, you will study how subsurface rock layers were formed and learn the clues that will help you locate these underground treasures.

Facts *True or False?*

On average, only 10-20% of this oil can be recovered because it adheres tightly to the sand grains.

☑ TRUE.

Graphic Organizers

Comparing and Contrasting the Properties of Oil and Water Using a Vocabulary Book

A vocabulary book can organize the definitions and information about the physical properties of oil and water such as: color, odor, weight (mass), density, melting point, freezing point, and boiling point.

Directions

1. Take two sheets of paper (8 1/2 x 11) and fold each sheet like a hot dog.
2. Fold each hot dog in half like a hamburger. Fold the hamburger in half two more times and crease well. Open up the fold, and the sheet of paper can be divided into 1/16's.
3. On one side only, cut up the folds to the mountain top, forming eight tabs. Repeat this process on the second fold.
4. Take a sheet of construction paper and fold like a hot dog. Glue the solid back side of one vocabulary sheet to one of the inside sections of the construction paper. Glue the second sheet to the other side of the construction paper.

National Standards

Physical Science

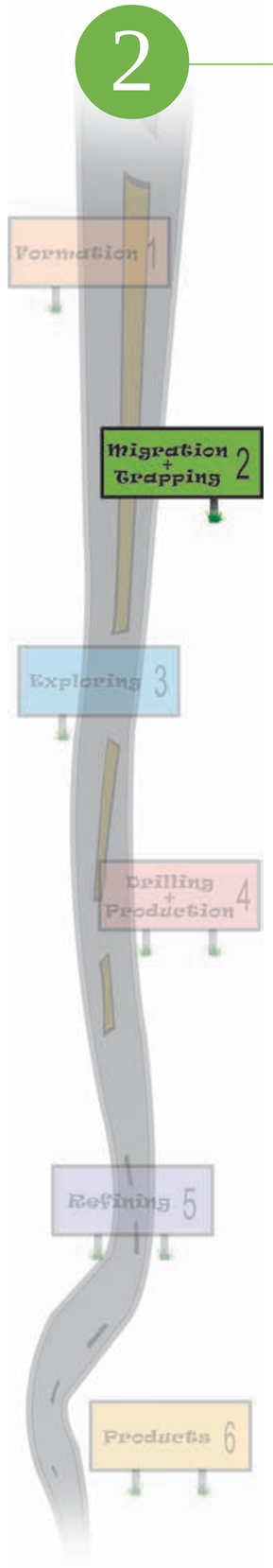
- Explore structure and properties of matter
- Explore the laws of motion and the effects of forces on motion
- Understand gravitational force

Earth and Space Science

- Explore movement of matter between reservoirs

Inquiry Science

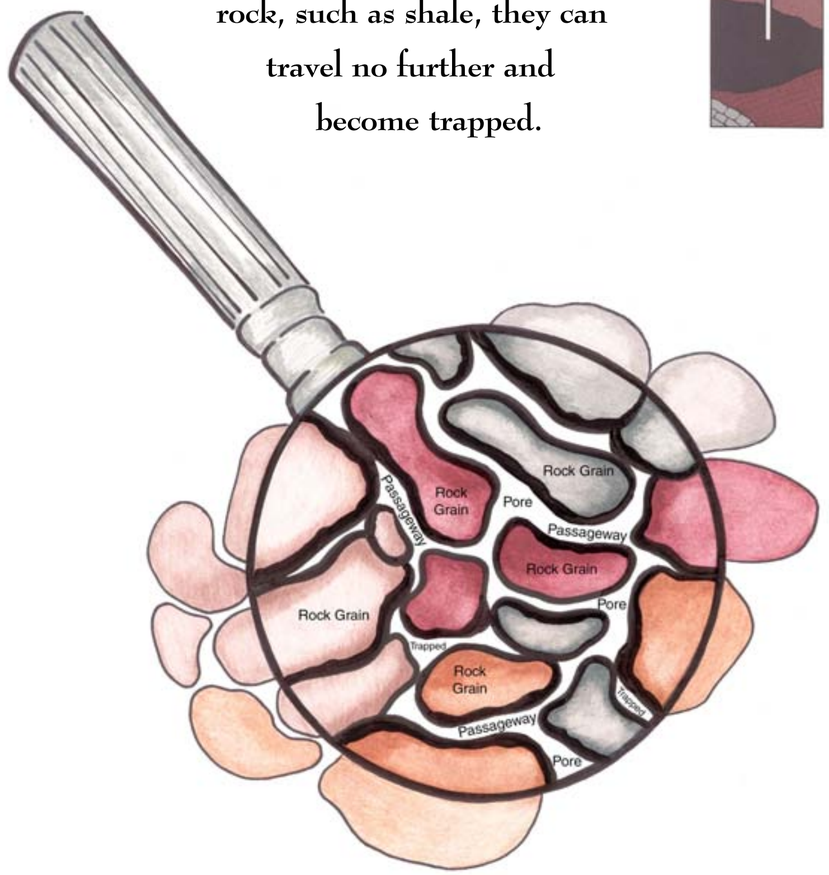
- Formulate scientific explanations and models using logic and evidence
- Conduct investigations and record data



Migration & Trapping

of Natural Gas and Oil

Porous rocks, such as sandstone and limestone, contain hair-size spaces that can hold natural gas, oil, and water, like a sponge. Non-porous rocks, such as granite, do not have spaces. After oil and natural gas are formed, they tend to migrate upward through the rock layers because they are lighter than water. The ability of liquids and gases to move through passageways in porous rocks is called permeability. When the migrating fluids reach a non-permeable layer of rock, such as shale, they can travel no further and become trapped.



OOGEEP
Ohio Oil & Gas Energy Education Program

www.oogeep.org

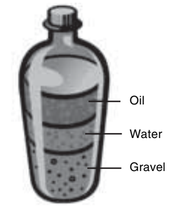
Experiment

Shaking It Up

Observe how the different densities of oil and water cause migration through permeable layers of rock.

Materials:

- Glass or transparent plastic container with tight lid (mayonnaise jar is a good size)
- Gravel
- Vegetable oil
- Permanent marker
- Water



Procedure:

1. Mark the container at the halfway point. Use the marker to divide the two halves in half again, so that the container is now divided into fourths. Label from the bottom, ¼, ½ and ¾.
2. Add gravel to fill the container to the ¼ mark.
3. Add water to fill the container to the ½ mark.
4. Add oil to fill the container to the top.
5. Close the container and make sure that it is tightly sealed.
6. Shake the container about 15 seconds.
7. Put the container down and observe what happens over the next four minutes. Record your observations using drawings or words.
8. Repeat steps 6 or 7 at least three times and note how things change.

Questions and Explanations:

1. Where do the different materials settle?
2. What scientific principles are demonstrated by this experiment?

Reflection:

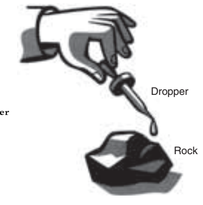
1. What application could this experiment have for the oil and gas industry?

Absorbing Rocks

What happens when you put drops of oil on different rock samples?

Materials:

- 5 rocks (can be collected by students, but should include samples of limestone or sandstone and granite)
- 1 eyedropper or pipette
- About 1/8 cup vegetable oil
- Paper towels
- Pencil and paper for data collection



Procedure:

1. Identify rock samples, if possible.
2. Predict and record a guess about whether each sample will absorb the oil or not.
3. Use the dropper and put 3 drops of oil on each rock.
4. Observe and record data for each rock.
5. Rank order the rock samples from best absorbent to least absorbent.

Note: Your rocks will eventually become saturated with oil. Replace your samples regularly or use water instead of oil.

Questions and Explanations:

1. Why did some rocks absorb it and some did not?
2. Would the same results occur with water instead of oil?
3. Which rock might hold the most oil and why?
4. Where are the best geologic conditions for oil deposits?

Reflection:

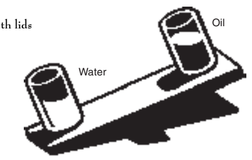
1. How can scientists use geology to help find oil deposits?
2. What other methods are scientists using to find oil?

Getting Physical with Oil

How do the properties of oil and water compare?

Materials:

- 3 clear plastic drink bottles with lids
- 2 clear plastic cups
- Water
- Vegetable oil
- Balance scale
- 2 plastic graduated cylinders
- 2 marbles
- Permanent marker
- Motor oil



Procedure:

Test Viscosity

1. Fill a clear plastic drink bottle with water. Add one marble and seal. Fill another bottle of the same size with motor oil. Add one marble and seal.
2. Invert bottles so marbles settle in caps. Then simultaneously turn the bottles upright and observe the speed at which the marbles sink to the bottom of the bottles.
3. Record observations: which marble travels faster?

Test Density

1. Use graduated cylinder to measure equal parts motor oil and water and pour into a clear plastic drink bottle and seal.
2. Shake the bottle. Observe what happens. Draw a picture of the oil and water in the bottle.

Test Mass

1. Use the graduated cylinder and measure 25 ml of water and pour into one plastic cup.
2. Use the graduated cylinder and measure 25 ml of vegetable oil and pour into a second plastic cup.
3. Predict which has more mass: oil or water? Record your prediction.
4. Use the balance scale to compare the 25 ml of oil and the 25 ml of water. Which is heavier and has more mass? Record your observation.

Questions and Explanations:

1. What are some of the differences between the oil and the water?
2. How does the mass and density of oil compare with water?
3. What would happen if the water and oil were different temperatures?
4. Could water be used to get oil out of the ground?

Reflection:

1. How can information about the properties of oil and gas help the industry?

Safety and Clean-Up

Be careful not to spill the motor oil samples. Once the bottles with oil and water are sealed, they will last for several labs. Any vegetable oil spills can be cleaned up with warm water and dish detergent.

Do not taste any oil products!