



From the Ground to All Around

Discovering How Many Different Products Come From Oil
Time: approximately 1-2 Class Periods

Adapted from Little Bits— An Elementary Earth Science Curriculum, developed for the Oklahoma Energy Resources Board, an agency of the State of Oklahoma.

Grade Level: K-3 (Modifications for K-1 may be necessary)
Subject: Science, Social Studies, Math, Visual Arts

WONDER WHY...

Have you ever wondered what different products come from oil? How is the oil refined, or separated into different substances?

CONCEPT

Once crude oil is heated and separated out, it can be used for many different purposes. Oil can be used to make different types of products we use today such as plastic, make-up, sneakers, soccer balls, toothpaste, petroleum jelly, jet fuel, gasoline, etc.

TEACHER INFORMATION

The following web sites have excellent background materials, graphics and videos that can be used to introduce the lesson. If these are no longer available, use key words and phrases to find current resources.

<http://science.howstuffworks.com/environmental/energy/oil-refining3.htm>

http://www.infomine.com/library/videos/2727c0/refining_of_natural_gas_and_crude_oil_-_part_5_of_6.aspx (A simplified explanation)

One of the first steps in refining crude oil into useful products involves a separation process called distillation. This process requires that a liquid be heated to its boiling point and the produced vapor cooled so that it condenses back to a highly purified liquid form. The distilling of water is a well-known example: water is heated to its boiling point, 212 degrees F, so that it vaporizes, the vapor is cooled, and the resulting condensed water is extremely pure.

Distillation of crude oil is more complicated because it is a mixture of hydrocarbons, each of which has its own boiling-point temperature.

Prepare an overhead visual of the following vocabulary words:

Crude Oil: A liquid mixture of hydrocarbons found in porous rocks that can be extracted and refined to produce fuels such as gasoline, diesel and kerosene.



Refine: To extract or separate different parts of a substance by heating it.

Estimate: to roughly calculate or judge the value, number, quantity of something

Approximate: close to the actual, but not completely accurate or exact

Distillation: the action of purifying a liquid by a process of heating and cooling

MATERIALS:

- 8 different types of black markers: water based
- Coffee filters
- Paper plates
- Pencils
- Pipettes
- Crayons
- Cups
- Water
- **Student Handouts 1-3**

PROCEDURE:

Note: Some modifications may be necessary for K-1

This activity should be done on a table or on a surface that can be wiped down. The markers could stain carpet.

1. Prior to the experiment,
 - Label the black water-based markers 1-8 and place on the materials table, then assemble supplies for each group
 - Discuss how crude oil is refined and explain that many products come from oil. Use one of the videos listed in the Teacher Info section to help students understand the process
 - To summarize and introduce the experiment present the following :

(Show the following illustration as you explain the distillation process:

http://www.thefreedictionary.com/_viewer.aspx?path=hm&name=A4distln

(If this illustration is no longer available, search the internet for a suitable graphic that shows the distillation process.)

One of the first steps in refining crude oil to useful products involves a separation process called distillation. This word means that a liquid is heated to its boiling point and the vapor (steam) that is produced is cooled so that it condenses back to a highly



purified liquid form. The distilling of water is a well-known example: water is heated to its boiling point, 212 degrees F, so that it vaporizes, the vapor is cooled, and the resulting condensed water is extremely pure.

Today we will do an experiment that will show how we can separate the parts of a whole. We will show how the color black can be separated into many colors.

2. Break students into groups of 3-4. Give each group one marker to begin the experiment, 3 coffee filters, 3 pipettes, a cup of water and 3 paper plates.
3. Explain to students how the black markers represent oil. The students will discover the ink in black markers can be separated into the colors that make up black, just as oil can be separated and made into different products such as gasoline, jet fuel, natural gas, and many products we use every day.
4. Have students predict the colors that make up black on **Student Sheet #1**.
5. Place the filter on a paper plate. Color a one inch black dot in the center of the coffee filter:

To help the students **estimate** one inch, hold up a quarter and place it on a ruler to show the students that a quarter is **approximately** one inch. Ask the students to define **approximate** and **estimate**.

6. Use a color crayon to place a number on the coffee filter to match the marker being tested.
7. Have the students put a small amount of water in the pipette and squeeze a few drops in the center of the coffee filter on top of the black dot. The black ink will separate into various colors. Students should observe the colors that appear out of the black dot.
8. Using **Student Handout # 1 and #2**, record their observations.
9. Have students select two additional numbered markers and repeat steps 3-8 for each marker to be tested and record the results.
10. Discuss the students' findings about the separation of the colors. Relate this to how crude oil is separated into parts that are used to make many different products.
11. Go to the following web site to help students identify products we use daily. Afterward review the products and uses of oil and natural gas.

http://www.adventuresinenergy.org/Oil-and-Natural-Gas-in-Your-Life/see_for_yourself/index.html



(If this web site is no longer available , explore the internet for products made from oil and gas.)

12. Hand out **Student Handout #3** and ask students to identify items that are made from crude oil, then draw a picture to illustrate a way we use oil and natural gas products. (Example: gas for our cars, boats, airplanes; fuel for heating our homes and cooking)

EXTENSION

Use a coffee filter and have students make a design on the filter using many different water based colors. Put a wet cotton ball in the center. Watch the colors. Let it dry. Have students use a Sharpie or other permanent marker to draw a picture or a message on the filter. Hang in the classroom as decorations.

VOCABULARY

Crude Oil: A liquid mixture of hydrocarbons found in porous rocks that can be extracted and refined to produce fuels such as gasoline, diesel and kerosene.

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STUDENT HANDOUTS – (See Arkansas Energy Rocks web site for printable Word documents)