

## Topic

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Materials from oil

## Source

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*Oil and Natural Gas*, pages 46-47, 48-49

## Objective

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Students will learn that heat is needed to separate crude oil/petroleum into useable substances to make the products we use every day.

## Lesson Preparations

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

## Vocabulary Word

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**Crude Oil** - unrefined oil or petroleum.

## Materials

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- 400 ml 2% milk
- 100 ml vinegar
- Saucepan
- Spoon
- Hot plate
- Pot holder
- Petroleum products

## Engagement

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We hear about it every day---Oil! What is it? What is it used for? Why is it important to us? How many different products come from one substance called crude oil? How are these products made?

## Exploration

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### Day 1

#### Activity 1: Tower of Power Experiment

1. Display at front of room a number of products made from petroleum. (i.e., petroleum jelly, gasoline, motor oil, plastic items, cosmetics, synthetic rubber, asphalt, nylon, tennis shoes.)
2. Teacher says: "In this activity, we are going to use milk as a model for crude oil." Explain the definition of crude oil. **Crude Oil** - unrefined oil or petroleum.
3. Teacher asks students, "What are some of the products we can make from milk? What are some of the things we must do to milk to get these products?"
4. In a place where all students can see, turn on hot plate. Stir together milk and vinegar in the saucepan over heat. Continue stirring until the substances have separated into curds and whey. (1-3 minutes)
5. Ask the students what was done to the milk and vinegar mixture to separate it?
6. Explain to students how this experiment is similar to the separation of crude oil into usable parts. Crude oil is similar to the mixture in that it must first be heated to separate into different substances before it can be made into products.
7. Read the "explanation" to the students and from the Oil and Natural Gas book.

#### Activity 2: Back to the Future of Oil and Gas

8. Have students work with a partner to generate lists of all the petroleum-based products, appliances, or conveniences their family uses on a daily basis.
9. Once the list is completed, have students list the 10 most important products. Students have now created two groups of products, necessities and luxuries.
10. Have partners present their lists of the 10 most important products and give supporting reasons for their choices.
11. Have the class come to a consensus on one list of the 10 most important products. Write this list of important products on the board.

12. Have students work in partners again. Assign each group one of the 10 products. For each product assigned, have the partners do the following
  - a. Identify better conservation practices in using the product
  - b. Identify what could be used to replace that product, and the cost, effort and time needed to replace the original product with the new product.
  - c. Identify environmental safety issues (safe use of the product).
13. Have students share findings with the class. Discuss the following
  - a. Why is it important to conserve use of oil and natural gas?
  - b. Why are the replacement ideas not readily used?
  - c. Why are better conservation practices not practiced on a regular basis?
  - d. Summarize the environmental issues we need to address when producing and using such products
14. Develop a class definition of what it means to act responsibly when using oil and natural gas

## Explanation

### Teacher Information

The crude oil taken from the ground has limited use in its purest form. It is first treated in a large chemical plant called a refinery. Here, the crude oil is heated until it boils. The vapor rises through towers where it cools and condenses at different temperatures. The substances removed at these various temperatures create the broad categories of by-products from which usable goods are manufactured. The vapor that is left at the top of the tower becomes bottled gas (propane). The sludge left at the bottom of the tower is used for products like asphalt and roofing materials.

The most used by-products of crude oil is gasoline. Many other important products are made from the substances taken from crude oil. They include plastics, paints, make-up and medicines.

Today, about 6,000 products are produced, wholly or in part, from petroleum. Among the major categories derived from petroleum are petroleum gas, gasoline, kerosene, lubricants, fuel oil and bitumen.

Read to students from *Oil and Natural Gas*, page 46

*Oil is not just a source of energy, it is also a remarkable raw material. Its rich mix of hydrocarbons can be processed to give useful substances known as petro-chemicals. Processing usually alters the hydrocarbons so completely that it is hard to recognize the oil origins of petrochemical products. An amazing range of materials and objects can be made from petrochemicals, from plastics to perfumes and bed sheets. We use many oil products as synthetic alternatives to natural materials, including synthetic rubbers instead of natural rubber, and detergents instead of soap. But oil also gives us entirely new, unique materials such as nylon.*

Read to students from *Oil and Natural Gas*, page 48

*Plastics play an incredibly important part in the modern world. They find their way into our homes in many different ways and forms, from boxes used to keep food fresh to TV remote controls. Plastics are essentially materials that can be heated and molded into almost any shape. They have this quality because they are made from incredibly long, chainlike molecules called polymers. Some plastic polymers are entirely natural, such as horn and amber. But nearly all the polymers we use today are artificially made, and the majority of them are produced from oil and natural gas. Scientists are able to use the hydrocarbons in oil to create an increasing variety of polymers-not only for plastics, but also to make synthetic fibers and other materials.*

## Evaluation

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1. Students should complete the exit questionnaire worksheet.

## Elaboration

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1. Have students cut out magazine pictures of products made from refined petroleum. Refer to "Tower of Power" handout. Classify the products according to major by-product categories. Use the pictures to create mobiles or collages showing major by-product categories and representative household items within each category. Display around the room.
2. List things in the classroom made from petroleum products.
3. Visit a local refinery.
4. Write and perform a rap or jingle to inform others about petroleum products.

## Exit Questionnaire Answer Key

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1. What is crude oil? **Unrefined oil or petroleum**
2. The most used by-product of crude oil is \_\_\_\_\_.
  - a. **Gasoline**
3. **Heat** is needed to separate crude oil/petroleum into useable substances to make the products we use everyday
4. List 3 product made from crude oil that you use everyday.  
Examples: **gasoline, plastics, pharmaceuticals**

# Tower of Power

Name: \_\_\_\_\_

## Questions

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1. What is crude oil? \_\_\_\_\_
2. The most used by-product of crude oil is \_\_\_\_\_.
  - a. Gasoline
  - b. Plastic
  - c. Make-up
3. \_\_\_\_\_ is needed to separate crude oil/petroleum into useable substances to make the products we use every day.
4. List 3 product made from crude oil that you use everyday.  
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