

Blue Flame Energy

Objective

Students will use an inquiry process as they learn about a natural resource, natural gas and energy.

Curriculum Focus

Art
Language Arts
Science
Social Studies

Materials

- Copies of "Only Your Nose Knows" and "Get a Clue!"
- Mercaptan scratch and sniff stickers

Key Vocabulary

Mercaptan
Natural gas

Next Generation Science Correlations

4-LS1 - 2
4-LS1.D
4-ESS3 - 1
4-ESS3.A
4-ETS1 - 1
4-ETS1.A
5-ETS1 - 1
5-ETS1.A
MS-LS1 - 8
MS-LS1.D
MS-ETS1 - 2
MS-ETS1.B



Introduction

We rely on natural gas for our energy needs, ranking it second in use only to oil. About half of the homes in the United States are heated with natural gas. It is also used for cooking, drying clothes and heating water. Natural gas is used by businesses and industries for everything from cooking in restaurants to fueling high temperature blast furnaces for manufacturing steel. In fact, natural gas plays an important role in most of our lives.



Procedure

1. Ask the students what natural gas fuel is. List their responses on the board. Some of the answers you are looking for include: it is a natural resource, a fossil fuel, a source of energy and a nonrenewable resource.
2. Pass out copies of "Only Your Nose Knows." Ask the students if they are familiar with the chemical mercaptan which is added to natural gas to give it an odor. Discuss the handout and pass out mercaptan scratch and sniff stickers. They are available at many natural gas utilities or can be ordered from the National Energy Foundation by visiting nef1.org.
3. Have the students complete the activity at home.



Discussion

Instruct students to make a list of ways natural gas is used in their homes. Discuss, as a class, why one household may use more natural gas than another. Then have students list three ways they can conserve natural gas usage in their homes.



To Know and Do More

Pass out "Get a Clue!" Have students complete the activity in class.



Careers in Energy

There are many new technologies that use natural gas. For example, natural gas can be used in cars instead of gasoline. Have students research a new technology that uses natural gas. Websites such as *aga.org* and *naturalgas.org* may be helpful. Students can also contact the local natural gas company.

If you can, invite a natural gas expert to talk to your students, or have students use the "Ask an Expert" feature found on many websites. Have students make a list of at least 10 questions to ask an expert on natural gas. Have them interview the expert or submit their best questions online.

Now that students know more about new technologies, have them design a product or device that will utilize natural gas more efficiently. Have them try to make a model or illustrate the device on a poster.

Discuss student inventions. What jobs would be created from the new technology and the device created? What careers were interesting from the research done? Would students like to be researchers, designers, engineers or operators of the new devices created? Does a career in the natural gas industry interest your students?

Student Sheet: Only Your Nose Knows



Obtain scratch and sniff mercaptan stickers from your teacher. Scratch and smell the sticker! Can you guess what it smells like? If you guessed rotten eggs, you are correct.

When natural gas is found underneath the ground, it does not smell like rotten eggs. In fact, it is odorless. You cannot smell it at all. Natural gas companies add this unpleasant odor, a chemical called mercaptan, for your safety. You might wonder why they do not add a nice smell, like strawberries or flowers, or even chocolate, but if the smell was pleasant, you would not do anything about it; you might not even notice it.

If you ever smell this strange odor in your house, open windows and doors; tell your mom, dad or another adult; then go outside until your local natural gas company can be called from a neighbor's house. Do not switch any lights on or off or use the phone or garage door opener since an electric spark could cause the natural gas in the air to ignite (catch fire).

Besides being odorless when found underneath the ground, natural gas is also colorless, lighter than air and nontoxic. You cannot see natural gas unless it is mixed with the proper amount of air and burned. It then becomes a beautiful blue flame. You might have seen it on a gas range. If you filled a balloon with natural gas, it would rise like one filled with helium because natural gas is also lighter than air.

Remember, natural gas is a safe, reliable energy source when used correctly. It is important to use caution and follow safety rules when using it!

Take Action!

With a friend, write a commercial that will inform your classmates about four characteristics of natural gas. Remember to tell them what to do if they smell the rotten egg smell! Practice and present your commercial to the rest of the class and perhaps to other classrooms. It might be fun to have another student, or a parent, videotape your commercial!

Student Sheet: Get a Clue!

Read the following story about natural gas, and unscramble the underlined words. (If you need it, the word list is provided at the bottom of this page.)

Natural gas is the familiar fuel we use to cook food, to etah water and to heat homes and other buildings. It is used to perform thousands of useful tasks. As its name implies, untarla ags is not man-made. It is formed from natural materials through natural forces in the earth. We call it a slosif eflu.

Many millions of years ago, tiny marine plants and animals lived in the oceans and seas. As they died, their remains were covered by mud and sand. In time, as the layers built one upon the other, pressure and heat caused this mud and sand to become rock. The plant and animal remains went through a mahceilc change to become natural gas. Many deposits of natural gas are dprapet beneath such rock, which acts as a reservoir for the gas.

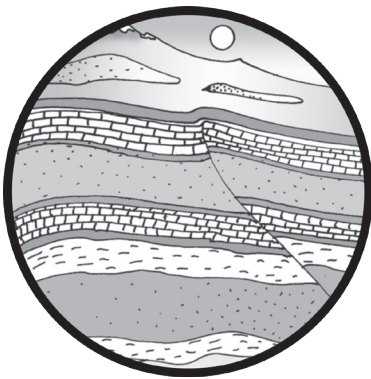
When we find natural gas, it has four characteristics. Natural gas is sldoeros, leclorso, lighter than air and otcnxion. An odorant called cpntaaerm is added to the natural gas so you can smell it in case of a leak. It smells like rotten eggs. This unpleasant odor is added for your safety in identifying leaks and so you won't mistake it for anything else. If you smell the strange odor. You should go outside your house immediately and have an adult call (from outside the home) your local natural gas company. A natural gas company employee should check the problem.

sloteisGog and engineers are the people who help us find natural gas. They look for certain clues in rock formations beneath the surface of the earth. When all the signs are favorable, they begin to lrldi deep into the earth. This process is how a natural gas well is located and created. From there the gas flows into pipelines through a system of valves called a "Christmas tree."

Underground einlppise transport gas across long distances to our cities and homes. A gas emtre on the outside of your house measures the amount of gas that is used by your appliances. A person called a "meter reader" may read your meter once a month to determine how much gas you have used.

Which one of the following captions best represents the picture below?

1. Formation of natural gas
2. Characteristics of natural gas
3. Drilling for natural gas
4. Transporting natural gas
5. Using natural gas



Get a Clue Word List

chemical	colorless
meter	drill
natural gas	fossil fuel
nontoxic	geologists
odorless	heat
pipelines	mercaptan
trapped	