

Identifying Fuel Products

Fossil fuels are the major energy source for most industrialized countries today. Natural gas, coal, and petroleum are considered nonrenewable energy sources because tremendous time periods were required for their formation. Organic material from plants and other living organisms formed layers on Earth. Over millions of years, great pressure from sediments that accumulated on top of these layers combined with heat from Earth's interior to create fossil fuels. Organically based, fossil fuels have a high concentration of carbon and hydrogen, making them burn well and efficiently. Fuels like methane, propane, and butane are hydrocarbons, compounds that contain only carbon and hydrogen. Cellulose, a component of plants, is composed of hydrogen, carbon, and oxygen. When plant material is burned, hydrocarbons are produced.

In this lab, you will heat plant material to produce and observe the properties of hydrocarbons.

OBJECTIVES

Observe that flammable gases are produced when plant material is heated.

Analyze the properties of hydrocarbons.

Compare the properties of the experimental products to the characteristics of fossil fuels.

MATERIALS

- green plant material
- hammer
- hot plate
- large nails
- large slotted screwdriver
- matches (long, kitchen type)
- metal paint can (new, clean, and dry, with lid)
- tongs
- watch glass
- wood chips
- wood splint



Procedure

1. Obtain a new, clean, dry paint can, and put the lid firmly on the can. Place the large nail in the center of the lid. Make a hole in the lid by using the hammer to tap gently on the nail. Add a small amount of wood chips and plant material to the can, and replace the lid tightly by gently tapping with the hammer.

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2. Place the can on a hot plate and turn it on “high.” Make observations using your sense of smell.

3. At intervals of three minutes, light a match and hold it about 15 cm over the hole in the lid. Describe your observations. What type of gas do you think is being produced?

4. After 15 minutes of heating, use tongs to remove the can from the hot plate, and allow it to cool. Remove the lid from the can (using the large slotted screwdriver) and observe the residue inside. Describe the residue. Hint: Pry off the lid by gently going around the perimeter in several places. Do not attempt to pry the lid in only two or three places; this will only damage the lid.

5. Use the wood splint to scrape a small amount of the residue from the inside of the can. Place it on the watch glass. Use a lit match to determine if the residue will burn. Describe what occurs.

6. **Disposal** Dispose of all materials according to your teacher’s instructions.

Analysis

1. **Describing Events** Compare what happened when you attempted to ignite the vapors coming from the can and the residue left in the bottom of the can.

2. **Explaining Events** What elements were present in the gases that were produced when the plant material was heated? What elements were part of the residue that was left in the bottom of the can?

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Conclusions

- 3. Interpreting Information** Compare the gases and the residue produced in the experiment to specific fossil fuels used today.

- 4. Drawing Conclusions** Describe the properties of hydrocarbons.

Extension

- 1. Research and Communications** When fossil fuels are burned, various compounds are released into the atmosphere. Use library resources to discover the names of these gases, and describe possible effects they have on the atmosphere.