What's Hazardous About Household Products?

CONTENT AREAS

- **Science**
  classification, chemical safety codes
- **Home Economics**
  safe, alternative products

OBJECTIVES

Students will…

- learn the characteristics of hazardous materials and use them to classify some common household substances
- become aware of the safe use and disposal of hazardous household materials

MATERIALS

For each student

- sealed samples of common household products
- Classifying Household Waste data sheet
- safety glasses

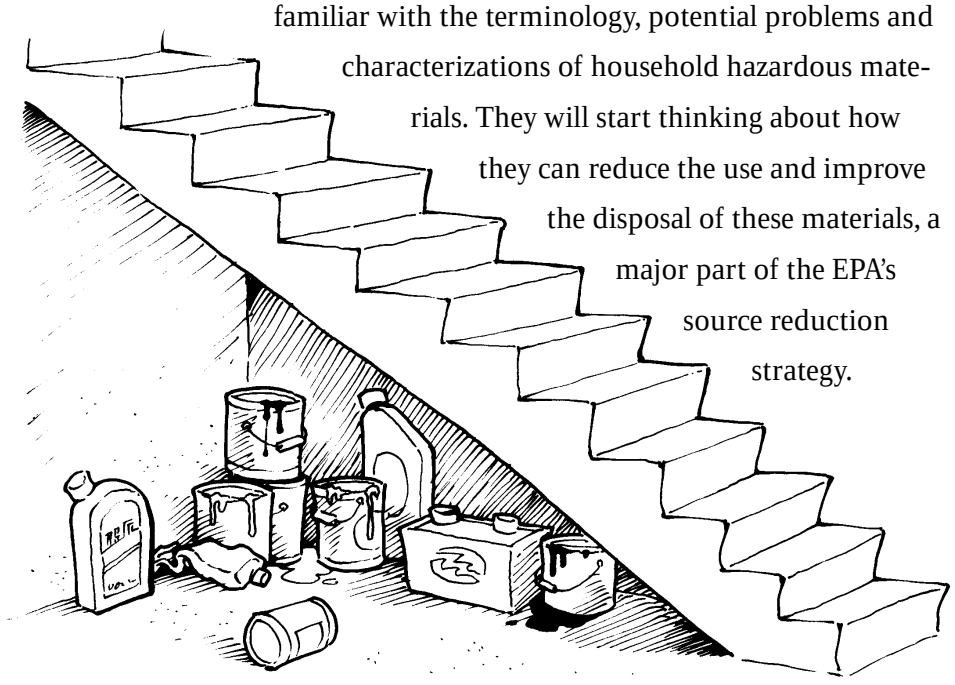
TIME

Two periods
45 minutes each

EPA (Environmental Protection Agency) officials have stated that the biggest problem with landfills isn't that they are filling up, but that they contain hazardous and toxic wastes. Over time, these wastes can leach into soil and groundwater, creating all sorts of health and environmental problems. Many of these wastes come from homes, not just from factories. It has been estimated that many American homes contain three or more gallons of hazardous waste.

We use hazardous products every day in the kitchen, bathroom, basement, workshop, garden, yard and garage. Many are safe if used, handled, and disposed of according to directions. However, if proper procedures are not followed, these substances can cause a variety of environmental, health and safety problems.

In this activity, students classify hazardous waste and become familiar with the terminology, potential problems and characterizations of household hazardous materials. They will start thinking about how they can reduce the use and improve the disposal of these materials, a major part of the EPA's source reduction strategy.



PREPARATION

1. Collect a variety of common household products. Try to include at least one product from each of the four categories used by the EPA to classify hazardous waste: ignitable, corrosive, reactive and toxic. Include safe cleaning alternatives such as vinegar, baking soda, salt and lemon juice. Select materials that have enough information on the label to allow the students to make a decision as to the product's safety without relying too much on prior information or guessing. (For assistance in selecting products, refer to the lists in Teacher Notes.)
2. Seal all of the products, whether the container is full or empty, in clear plastic bags.
3. Set up stations around the classroom. Place one product at each station.

PROCEDURE

1. Show students two or three common household hazardous products. Ask students to identify what is hazardous about each. Accept reasonable answers. Inform students they will be doing an in-depth analysis of several products.
2. Instruct students to wear safety glasses during the activity and NOT to open any of the bags unless bottles are completely empty.
3. Give each student a data recording sheet. It includes definitions of the four main categories used by the EPA to characterize hazardous materials. If necessary, instruct students on how to read a label.
4. Instruct students to rotate from station to station, examining and classifying each product according to the EPA criteria. (Some products may fit into more than one category.) As a speedier alternative, make sure that products from all four classifications are at each station, divide the class into four groups, and have each visit one of the stations.

   In completing their data recording sheets, students should support their classification of each product with some concrete evidence from their observation. Suggest safe methods of handling and disposing of each of the products. Also suggest any safe, non-hazardous alternatives to the product. (See Teacher Notes for alternatives list.)

QUESTIONS

When all students have examined all the products, compare, discuss and debate their findings. When discussing management methods for hazardous waste, point out how source reduction is the best option because it does not use or produce any hazardous materials.

a. Which products have more than one classification?

b. Which product has the most codes?

c. Which products do you have at home?

d. Should there be a warning on any of these products?

e. How might warnings affect consumer purchases?

f. Do some products already have warnings? Are the warnings obvious and detailed enough?

EXTENSIONS

1. Ask students to inventory common products at home and use the same criteria to determine the characteristics of each. Where is it stored? How old is it? How much is left? How should it be handled or disposed of? Share and analyze the results. Are some materials common to many lists? What are they? Compute a tally of the five most common hazardous products. Post the inventory sheets and the tallies.

2. Ask students to find and scientifically test a safer alternative for at least one of the most common hazardous products. How/why does it work? Is it effective?

3. Have students develop a marketing campaign for the safer alternative. They should develop new labels and advertising (print, radio, TV) as part of the campaign.

The Dose Makes the Poison

When it comes to hazards or toxicity, sometimes we have to go beyond the quality of a particular material or chemical to consider the quantity as well. Pool chemicals are a good example. In concentrated forms, these chemicals can be extremely dangerous to people, animals and plants. However, in miniscule amounts, the same chemicals actually reduce the risk of certain health hazards by controlling the level of organisms that can cause health problems in humans.

Here's an interesting way to explain this concept to the class:

There's a widely used chemical called dihydrogen monoxide, or hydroxyl acid. In large doses, this compound can kill. The same is true if only taken in miniscule amounts and restricted to a few drops a week. Further, this chemical causes metals to corrode, is a major cause of flooding and environmental devastation and is the principal ingredient in acid rain. By now, you've certainly laughed at what this chemical compound is–water!

Classifying Hazardous Household Waste Data Record

Name(s) _____

EPA Classification Codes of Hazardous Materials

Category	Potential hazard
Ignitable/flammable	Easily catches on fire
Corrosive	Causes deterioration, etching, or eating away of body tissue and other surfaces that it touches. Strong acids and bases fit into this category
Reactive	Dangerous, unwanted reactions, explosions or detonations can occur from unstable ingredients or when the material is mixed with or exposed to other substances
Toxic	Poisonous; may cause injury or death if swallowed, inhaled, or absorbed through the skin. Most household chemicals are toxic and even fatal if ingested in large enough quantities
Irritant*	Causes redness, inflammation, or soreness to skin, eyes, mucous membranes or the respiratory system
Carcinogenic*	Known to cause cancer

**Irritant and Carcinogenic are codes used in some classification systems*

Data Recording Table

Material (name)	Classification code(s)	Reasons for assigning code	Disposal method	Safe alternative

Teacher Notes

Classification of Some Household Hazardous Products

Note: These are based on generalizations for a given product. However, there are many manufacturers that use various ingredients for the same product. Labels should always be checked to determine a given product's status or code.

Product Classification	Hazard Code
hair spray/hair dyes	toxic, flammable
nail polish remover	flammable, toxic
medicines	toxic
all-purpose cleaners	toxic, flammable, corrosive
ammonia	toxic, reactive
chlorine bleach	toxic, corrosive, reactive
brass/silver polish	toxic, flammable, corrosive
disinfectants	toxic, flammable, corrosive
drain openers/cleaners	corrosive, reactive, toxic
furniture polish/waxes	flammable, toxic
oven cleaners	corrosive, toxic
rug/upholstery cleaners	toxic, flammable, corrosive
spot cleaners/removers	toxic, flammable
toilet bowl cleaners	toxic, corrosive
window cleaners	toxic
antifreeze	toxic
brake fluid	flammable, toxic
car batteries	corrosive, reactive
motor oil	flammable, toxic
paints	flammable, toxic
preservative (wood)	toxic, flammable
solvents/thinners	toxic, flammable
stains/sealants/varnishes	flammable, toxic
strippers/removers	toxic, flammable
mothballs	toxic
rodent poisons	toxic
insecticides	toxic
herbicides/fungicides	toxic
ant/wasp/roach sprays	toxic
flea powders/sprays	toxic
swimming pool chemicals	toxic, corrosive, reactive
charcoal lighter fluid	flammable
photo-developing chemicals	toxic, flammable, corrosive

Disposal of Hazardous Household Products

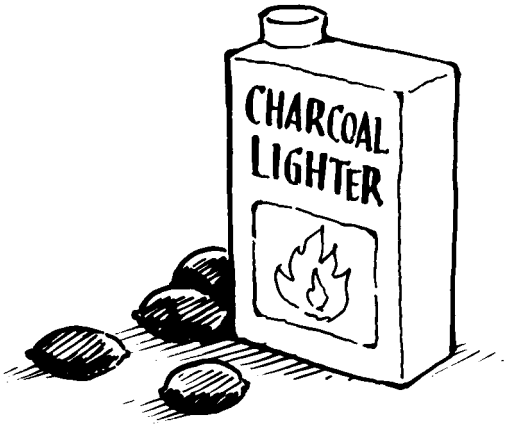
The disposal method of choice for most hazardous products is to fully use the product as quickly as possible or to give the remainder in the original container to someone who will use it. In most cases, the empty container can then be disposed of in the local landfill. If the product cannot be totally used up, the unused portion should be tightly sealed and stored in a labeled container until it can be disposed of when household hazardous waste is collected in your community.

A few products can be discharged into the sewer system, provided they are disposed in small quantities, one chemical at a time, and flushed with a large quantity of water. These include ammonia, bleach and disinfectants.

A few products can be recycled by taking them to a special recycling center. These include motor oil, antifreeze and in some locations, batteries.

Teacher Notes

SAFE ALTERNATIVES
to Hazardous Household Products



Drain cleaner
Use a plunger or plumber's snake.

Oven cleaner
Clean spills as soon as the oven cools using steel wool and baking soda. For tough stains, add salt. (Not for self-cleaning ovens.)

Glass cleaner
Mix 1 teaspoon of vinegar or lemon juice in 1 quart of water. Spray on and use newspaper or cloth to wipe and dry.

Toilet bowl cleaner
Use a toilet brush and baking soda or vinegar.

Furniture polish
Mix 1 teaspoon of lemon juice in 1 pint of mineral or vegetable oil and wipe furniture.

Rug deodorizer
Sprinkle liberal amounts of baking soda on the rug. Wait 15 minutes and vacuum.

Metal polish
Use natural acids such as lemon juice, sour milk, ketchup, etc. and give them plenty of time to work.

Plant sprays
Wipe leaves with mild soap and water; rinse.

Mothballs
Use cedar chips, lavender flowers, rosemary, mint or white peppercorns.

Flea and tick products
Put brewer's yeast or garlic in your pet's food; sprinkle fennel, rue, rosemary or eucalyptus seeds or leaves around animal bedding. Or use a flea comb.

Rats, mice, rodents
Get a cat or use a trap.

Insect garden pests
Use boric acid. Introduce predators such as ladybugs, ground beetles or praying mantis. Plant marigolds.

Roach and ant killers
Place boric acid in and along cracks.

Fertilizers
Use manure or home-composted products.

Stain remover
White chalk as a substitute for spot cleaners that remove oil stains

Air freshener
Cinnamon and cloves or potpourri

Rug cleaner
Club soda

Paint and grease cleaner
Baby oil

General cleaning (bathroom and kitchen)
Baking soda