



# EPA HOUSEHOLD HAZARDOUS WASTE REDUCTION

POLLUTION PREVENTION (P2) EDUCATION TOOLBOX  
Tools for Helping Teachers Integrate P2 Concepts in the Classroom

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## WHAT IS HOUSEHOLD HAZARDOUS WASTE?

If you walk around your garage, kitchen, bathroom, or workshop, you'll probably find hazardous materials or products you and your family use every day. Hazardous materials that can no longer be used become household hazardous waste (HHW). HHW includes hazardous materials such as household cleaners, paints, paint thinners, motor oils, gasoline, and pesticides. HHW may pose a threat to human health or the environment if it is not disposed of properly. HHW poses a threat because it exhibits one or more of the following characteristics:

### Toxic:

Poisonous materials like pesticides and expired medicines can harm various organs when swallowed, inhaled, or absorbed through the skin. Some toxic materials can also cause cancer.

### Corrosive:

Materials like battery acid and bleach can dissolve other materials, including metals. Corrosive materials can cause severe burns to skin, eyes, and other tissues.

### Ignitable:

Flammable materials like gasoline and paint thinner catch fire very easily, sometimes with just a little extra heat or a small spark. Ignited materials can cause severe burns.

### Reactive:

Unstable materials can explode or give off poisonous gases when mixed with water or other materials (for example, mixing bleach and ammonia).

Typically, about 1 percent of all waste generated in the average American household is hazardous. The average household generates about 30 pounds (about the weight of a medium-sized dog) of HHW per year, for an annual national total of about 1.6 million tons. The types and percentages of HHW in our daily garbage are shown below:

Household maintenance items (paint, thinners, glues)	36.6%
Household batteries	18.6%
Personal care products (nail polish and remover, hair spray)	12.1%
Cleaners	11.5%
Automotive-maintenance products (grease, oil)	10.5%
Pesticides, pet supplies, and fertilizers	4.1%
Hobbies/Other (pool chemicals, lighter fluid)	3.4%
Pharmaceuticals	3.2%

## WHY IS HOUSEHOLD HAZARDOUS WASTE REDUCTION IMPORTANT?

Hazardous materials are found in almost every home. We use products like the ones in the pie chart in our cars, yards, and even on ourselves. HHW and other hazardous materials that are not handled properly at home can be dangerous, especially to young children and pets. In addition, when HHW is not disposed of properly, it can be dangerous for people and the environment. For example, if HHW is combined with your

household trash, trash haulers or sanitation workers can be injured from explosions, fumes, or fires. If HHW is dumped on the ground or poured into sewers, storm water can wash it into streams, lakes, and rivers. Many cities, including Chicago, get their drinking water from these sources. In other cases, HHW may seep down through the ground until it reaches aquifers, which are underground sources of water, for communities that get their drinking water from wells. When the aquifers get polluted, drinking water may no longer be drinkable, or it may be more difficult to treat water to safe drinking levels. Plants and animals that live in or near the streams, lakes, and rivers can also be harmed from HHW in the water.

## **HOW CAN POLLUTION PREVENTION HELP YOU?**

Neighborhood collection days allow HHW to be disposed of properly. However, the key is to prevent HHW generation in the first place. The best way to do this is to use non-hazardous products, but there are other ways to reduce HHW.

The following four P2 concepts can help you evaluate your household practices and identify ways to reduce the impact of HHW from your home:

### **Changing What You Use**

- ✓ Read labels on the products you use and ask yourself, "Do I really need to use this product?" Safer alternatives may exist. For example, you could use water-based (latex) paint instead of oil-based paint, compost instead of chemical fertilizers, cedar chips instead of mothballs, or boric acid instead of commercial ant and roach killers.

### **Changing What You Do**

- ✓ Think about what you do in your home that generates HHW and ask yourself, "Is there a safer way I can be doing this?" For example, you could use sandpaper or a heat gun instead of chemical paint strippers or a plunger instead of a chemical drain cleaner.
- ✓ If you must use hazardous products, read and follow the specific instructions on labels. Most products provide instructions for use and proper disposal.
- ✓ Buy hazardous products only in the quantity you need and use the product up entirely; consider how you will dispose of unused portions of a hazardous product before you purchase it.
- ✓ Make sure you don't use too much of a product. More is not necessarily better. In fact, using more material than necessary costs you money and may be more hazardous for you or the environment.
- ✓ If they are still in useable condition, reuse hazardous products and recycle what can no longer be used. You can also share hazardous products you cannot use with a responsible friend or neighbor that needs the products.

### **Improving Your Housekeeping**

- ✓ Store hazardous products according to the instructions on labels.
- ✓ Unless the containers are leaking, always keep hazardous products in their original containers. The containers are designed specifically for the products.
- ✓ Immediately clean up any spills or leaks according to the instructions on labels.
- ✓ Make sure the containers always have readable labels. If a label comes off or can no longer be read, make a new label with a permanent marker.

### **Educating Yourself and Others**

- ✓ Share your knowledge and ideas regarding HHW reduction with your family and friends.
- ✓ Read and learn more about other alternatives to using hazardous products.

## LESSON PLAN

The following lesson plan provides guidance and activities that will help you meet the following goals:

- ✓ Define household hazardous waste (HHW) and name its four characteristics
- ✓ Explain why HHW reduction is important, particularly how it affects people and the environment
- ✓ Explain how P2 concepts can be used to reduce HHW

The preceding pages of the fact sheet contain the background information and definitions necessary to implement this lesson plan, which meets the requirements for the following Chicago Academic Standards and Frameworks: 6th grade - state goal 13 CAS B.; 7th grade - state goal 11 CAS C. CFS1, state goal 13 CAS B. CFS1; 8th grade - state goal 11 CASC. CFS 6, state goal 13 CASA. CFS3.

### WHAT IS HOUSEHOLD HAZARDOUS WASTE?

Begin the lesson by asking students,

"What is hazardous waste?"

- ✓ Explain that industries produce hazardous products that we use in our everyday lives. In turn, households that use these products may dispose of them as HHW.
- ✓ Ask the students to name some of the hazardous products that we use in our everyday lives (examples include gasoline; oil; paints and thinners; bathroom, kitchen, and drain cleaners; and pesticides).

Based on the information provided, explain the four HHW characteristics.

- ✓ Provide an opportunity for interactive discussion in which you ask students to define and give examples of wastes that exhibit each characteristic or property.
- ✓ When explaining the "toxic" characteristic, explain that products and wastes may be more hazardous to other living things than to people and that the dose of a toxic waste (that is, how much you take in), as well as how you are exposed to it (for example, swallowed, breathed, or absorbed through the skin), determines the danger. Give medicine as an example: the recommended dose is good for you, but too much can be harmful.

Review the list of types of HHW in our daily garbage.

- ✓ Explain that although a single household may generate much less waste than a factory, there are millions of households across the U.S., and almost all of them generate HHW.

### Activity No. 1 - Household Hazardous Waste Quiz

**Objectives:** Students should understand the four types of hazardous characteristics: toxic corrosive ignitable, and reactive and know the types of products to which they apply.

**Time Length:** About 15 minutes

**Materials Needed:** One copy of attached "Household Hazardous Waste Quiz" for each student.

**Activity:**

- ✓ Distribute and allow students 5 to 10 minutes to complete the "Household Hazardous Waste Quiz."
- ✓ Clarify that the items listed may exhibit more than one hazardous characteristic.
- ✓ Discuss the students' answers, making sure they understand the four characteristics of HHW.

**WHY IS HOUSEHOLD HAZARDOUS WASTE REDUCTION IMPORTANT?**

Based on the information provided, discuss why HHW reduction is important.

- ✓ Emphasize that improperly managing HHW can affect people and the environment, just like improperly managing industrial hazardous waste.
- ✓ Use the example of an oil tanker spill contaminating the ocean. Just as with a tanker spill, dumping used oil into a sewer can pollute local water sources. In fact, a 1-quart can of oil can create a 2-acre oil slick, which is about the size of two football fields.

**HOW CAN POLLUTION PREVENTION HELP YOU?**

Based on the information provided, discuss how the four P2 concepts described earlier can be used to evaluate household practices and identify ways to reduce HHW in your home.

- ✓ Keep this discussion interactive—ask students for other ideas, including ways they can reduce their own use of products that can become HHW (for example, buying rechargeable batteries for games and radios).
- ✓ Emphasize that not using hazardous products or "changing what you use," although not always the easiest way to do something (it may require more time and "elbow grease"), is the best way to reduce household hazardous waste. However, if you must use a hazardous product, other P2 concepts can also help you reduce HHW.

Review the following non- or less-toxic alternatives to using hazardous products, and ask students for other ideas about alternatives.

Ask students to write these alternatives in their journals.

**Kitchen and Bathroom Cleaner**

- Mix vinegar with salt and water for a good surface cleaner

**Drain Cleaner**

- Use vinegar and baking soda followed by boiling water.

**Tub/Tile Cleaner**

- For bathroom tiles, mix baking soda with non-chlorine bleach to form a paste. Apply with a brush, let dry, and wipe with a clean cloth.

### Air Fresheners

- For room odors, set out a few drops of vanilla or peppermint extract in a dish; use aromatic herbs, incense, or potpourri.
- For carpet odors, sprinkle with baking soda and vacuum.

### Roach Deterrent

- Sprinkle cracks and dark places with technical grade boric acid or borax. Keep out of reach of children or pets.

### Ant Deterrent

- Wash countertops, cabinets, and floor with equal parts of vinegar and water to deter ants.

## Activity No. 2 - Know Your Labels

**Objectives:** Students should be able to find information on labels regarding the characteristics and proper use of household hazardous products and understand that properly using products is an important element of P2.

**Time Length:** About 15 minutes

**Materials Needed:** A variety of labeled containers (preferably empty) of hazardous household products from your home. An unlabeled, clear-glass jar containing maple syrup or molasses.

### Activity:

- ✓ Display containers and have students read the container labels that identify “WARNINGS” and “DIRECTIONS” to the rest of the class.
- ✓ From these labels, have students determine which of the four hazardous characteristics apply to these products and how to use them.
- ✓ Show students the unlabeled, clear-glass jar containing maple syrup or molasses and ask students to identify possible contents (looks like maple syrup, but could it be motor oil?). This shows the importance of keeping hazardous materials in their original containers.

## Activity No. 3 - A Less Toxic Alternative

**Objective:** Students should be able to understand the benefits of using a less toxic alternative product.

**Time Length:** About 10 minutes

**Materials Needed:** Lemon juice, water, one quart spray container, commercial window cleaning product (with ammonia, alcohol, solvent, or other toxic constituent), newspaper.

### Activity:

- ✓ Select a student to mix 1 tablespoon lemon juice with 1 quart of water in the container.
- ✓ Have two other students apply the commercial window product and less toxic alternative to different windows in the classroom. Wipe windows clean using the newspaper and about the same level of effort.

- ✓ In an interactive discussion, have other students evaluate the effectiveness of the two cleaning products (Is the alternative just as effective? If not, what can be done to improve its effectiveness? )
- ✓ Have students identify the pros and cons of using each cleaning product (for example, the less toxic alternative takes time to mix and may require more effort, but is safer for you and the environment; the less toxic alternative is also less expensive).
- ✓ Note that using newspaper to clean windows is just as effective as using paper towels, but is less wasteful because it reuses a product that is already recycled.

#### **METHOD OF EVALUATION/ASSIGNMENT**

Have students write the following questions in their journals:

- ✓ What hazardous products are used in your home?
- ✓ Are your hazardous products in their original containers, with labels?
- ✓ Do you read and follow directions on labels?
- ✓ Are your hazardous products stored in a safe place?
- ✓ Are you using any safer alternatives to hazardous products?
- ✓ If not, what safer alternatives could you be using?
- ✓ How is HHW disposed of at your home?

Using these questions, students should conduct a "home audit" with their families and write the results in their journals.

## ATTACHMENT 1

### HOUSEHOLD HAZARDOUS WASTE QUIZ

The following is a list of common household products/materials. If disposed of, they may be considered household hazardous wastes. Identify the hazardous characteristic(s) for each of the materials listed below. Write "I" for ignitable, "C" for corrosive, "T" for toxic, "R" for reactive, or "N" for none of the above. [Note: more than one answer may be correct.]

1.	Bleach	
2.	Gasoline	
3.	Oil-Based Paint	
4.	Aspirin	
5.	Nail Polish Remover	
6.	Drain Cleaner	
7.	Ant & Roach Killer	
8.	Baking Soda	
9.	Oven Cleaner	
10.	Batteries	
11.	Lighter Fluid	
12.	Latex Paint	
13.	Weed Killer	
14.	Antifreeze	
15.	Paint Thinner	



## ATTACHMENT 2

### HOUSEHOLD HAZARDOUS WASTE QUIZ

#### (Answer Key)

The following is a list of common household products/materials. If disposed of, they may be considered household hazardous wastes. Identify the hazardous characteristic(s) for each of the materials listed below. Write "I" for ignitable, "C" for corrosive, "T" for toxic, "R" for reactive, or "N" for none of the above. [Note: more than one answer may be correct.]

1.	Bleach	C, T, R
2.	Gasoline	I, T
3.	Oil-Based Paint	I, T
4.	Aspirin	N*
5.	Nail Polish Remover	I, T
6.	Drain Cleaner	C, R, T
7.	Ant & Roach Killer	T
8.	Baking Soda	N
9.	Oven Cleaner	C, T, R
10.	Batteries	C, T, R
11.	Lighter Fluid	I, T
12.	Latex Paint	T
13.	Weed Killer	T
14.	Antifreeze	T
15.	Paint Thinner	I, T

\* T is dose is too high