LESSON 1: Hazardous Products in Your House

LESSON'S CONCEPT

The average home contains numerous products that are potentially hazardous if stored or used improperly.

PURPOSE

Students will learn to analyze labels from containers of household products.

OVERVIEW

In this lesson students will:

- Read and analyze labels on empty household products and complete a chart related to such issues in the classroom and at home.
- Identify words that mean that products are hazardous and use a chart to categorize hazardous substances.
- Design brochures about ways to use safely household products which may be hazardous.

CORRELATIONS TO CALIFORNIA'S CONTENT STANDARDS AND FRAMEWORKS

- Students read labels of household products and identify words that mean that these products are hazardous.
  - "It is important to know as much as possible about substances [in household products] because, among other reasons, many are dangerous if not used knowledgeably. They may be dangerous in themselves, they may combine to form dangerous mixtures, or their use may have undesirable long-term effects." (*Science Framework*, page 47)
- Students develop charts about household hazardous products.
  - Students "interpret one- and two-variable data graphs to answer questions about a situation." *(Mathematics Content Standards for California Public Schools, Kindergarten Through Grade Twelve*, page 18)
- Students describe in their journals some labels that indicate that the product is hazardous. They also write in their journals some safety rules concerning the use of household hazardous products.
  - Students "use traditional structures for conveying information (e.g., chronological order, cause and effect, similarity and difference, and posing and answering a question)." *(English–Language Arts Content Standards for California Public Schools, Kindergarten Through Grade Twelve*, page 23)

SCIENTIFIC THINKING PROCESSES

observing, communicating, comparing, classifying.

TIME

45 minutes to prepare for the lesson; 90–120 minutes to implement the lesson

VOCABULARY

corrosive, ignitable, hazardous material, household hazardous waste, reactive, toxic

PREPARATION

___ **1.** Read the "Background Information for the Teacher" at the end of this lesson.

___ **2.** Obtain copies of labels from household hazardous products and from nonhazardous products. Obtain enough of these to provide one of each type of label to each group of two to three students. Note that labels may be difficult to remove and removing them leaves the container of household hazardous products unlabeled; therefore, copies of the labels from household hazardous products are recommended. Empty, rinsed-out containers of hazardous products with taped lids for added precaution can also be used. Examples of labels of nonhazardous products include those from containers used for vegetable oil, baking soda, sugar, salt, spices, canned goods, rice, breakfast cereals, dog food, toothpaste, and hand lotions.

___ **3.** Duplicate the chart, "Group Chart for Collecting Data from a Label," for each group of two to three students (page 512). If possible, duplicate the chart on paper that has been used on one side.

___ **4.** Duplicate the charts, "Household Hazardous Products Data Collection Form" (pages 519) and "Hazardous Ingredients and Health Hazards of Some Products" (pages 520 and 521) for each student.

___ **5**. Make transparencies of "Class Data from Labels" (page 513); "Four Categories of Hazardous Substances" (page 514); and "Product Labels, A, B, C, and D" (pages 515-518).

___ **6**. Obtain the phone number of the local poison control center from your community's health services department or waste management agency.

MATERIALS

___ Copies of labels from household hazardous products and labels from nonhazardous products, one of each type of label for each group of two to three students

___ The transparencies, "Class Data from Labels," "Four Categories of Hazardous Substances," and "Product Labels"

___ A copy of "Group Chart for Collecting Data from a Label " for each group of students

___ "Household Hazardous Products Data Collection Form" and "Hazardous Ingredients and Health Hazards of Some Products" for each student

PRE-ACTIVITY QUESTIONS

A. Ask students what they think hazardous products are. *Products that can hurt you if they are used improperly.* List their responses on the chalkboard. Ask students to help you list products found in the home that might be hazardous. (Accept all answers at this time.)

B. Ask students:

- How would you know if a substance was hazardous*? Someone might tell me; I can look at the label.*
- What types of words are often listed on a package to indicate that the contents are hazardous? *Danger, poison, caution; keep away from children and pets.* (Students will learn more about these in this lesson.)
- In its container, a household hazardous product will not harm people or the environment. How might people get exposed to a hazardous product? *By eating or drinking it, breathing it in, touching it.* (You might need to provide hints for younger students to help them answer this question.)

PROCEDURE

A. Ask students, "What will help us in determining whether or not a product can be hazardous?" *Read the label.* Tell students that they will read some labels to identify potentially hazardous products.

- Project the transparency "Product Labels, A" and review the components of the label:

  (a) Type of product: All Purpose Cleaner

  (b) Product's use: Disinfectant

  (c) Name of potentially hazardous substance(s) in the product: N–ALKYL; dimethyl benzyl ammonium chloride

  (d) Warning label: Caution; Keep out of reach of children.

- Provide each group of two or three students with a "Group Chart for Collecting Data from a Label."
- Project "Product Labels, B" and, as a class, record the data for columns A–D from the label. Do not complete column "E" at this time.

- Project "Product Labels, C" and, as a class, discuss why these two products are not considered hazardous. Can they become hazardous if not used properly? *Yes.* How? *If you eat too much of the toothpaste or drink the lotion.*
- Provide a label from a household hazardous product and a label from a nonhazardous product to each group.
- Ask groups to fill in the "Group Chart for Collecting Data from a Label" in columns "A" through "D" (not "E").
- As two groups finish the task, they can exchange labels (if the labels are different).

B. Have students share their data as you or a student writes the results on the "Class Data from Labels" transparency.

C. Project the transparency "Four Categories of Hazardous Substances."

- Tell students that there are four major categories of hazardous substances: toxic, ignitable, corrosive, and reactive.
- Ask students to describe what they think each word means (see "Background Information for the Teacher").
- Ask students to identify some products that might fit into different categories.

D. Ask students to use their "Group Chart for Collecting Data from a Label" and complete column "E" to categorize several of the products they have listed. For example from "Product Labels, A" (you might want to project the label on the overhead projector) the hazardous product category (toxic, reactive, flammable, corrosive) is "toxic."

E. Project the transparency for "Class Data from Labels" and have students describe which category in column "E" should be checked off.

F. Project the transparency of "Product Labels, D." Discuss one of the safety rules concerning household hazardous products: Read all labels carefully.

- Ask students to read the label on product D.
  - What does the information on the can of the spray paint tell us? *That the contents are extremely flammable; vapor is harmful; contents are harmful or fatal if swallowed; before using, carefully read cautions elsewhere on label.*
  - What category or categories of household hazardous substance is this product? *Ignitable and toxic.*
- Remove the transparency.

G. Discuss why household hazardous products should never be mixed. (They could react with each other and give off a poisonous gas or could explode.)

H. Discuss why it is not a good idea to put a product in a different container. *Someone else might not know that this container contains a hazardous product; if there was some product left in the container and you pour another product into the container, they could react with each other and give off a poisonous gas or could explode.*

I. Discuss what might be an appropriate and safe way to handle an empty container that had contained household hazardous waste. (You might need to help students with these answers.) *First read the label to see whether there are any recommendations concerning the handling of the empty container. Find out if this type of container is recyclable in your community. If it is not recyclable and there are no special instructions on the label, then you can put this empty container in the trash can to go to the landfill.* (Note that the container must be completely empty; there should not be any free-flowing liquid or material left.)

Note: The proper management of household hazardous waste will be addressed in Lesson 4.

J. Share with students the phone number of the local poison control center. It is_____ .

Journal Prompt: List some safety rules concerning household hazardous products.

K. Ask students to share their journal entries. Develop and post a class list of safety rules concerning the use of household hazardous products.

L. Provide a copy of the chart, "Hazardous Ingredients and Health Hazards of Some Products," for each student. Assign students or groups of students to find the meanings of words from the chart that they might not know, such as carcinogenic, nervous system, digestive system, respiratory system, and urinary system. Ask students to share with the class what they have learned.

(Use school's letterhead.)

Dear Parent or Guardian:

Please read the following information with your child:

We are studying household hazardous products. Household products can be hazardous if they have a warning label indicating the following: caution, danger, keep out of reach of children and pets, flammable, poison, etc.

Please assist your child in completing the "Household Hazardous Products Data Collection Form" for six products you have at home. Make certain that the lids are secured before your child handles the container of each product. Also make certain that your child washes his or her hands after handling the containers. Please sign the back of the "Household Hazardous Products Data Collection Form" to ensure that adult supervision was provided during this assignment. Your child should bring the completed form back to class tomorrow.

Please place potentially dangerous household products on high shelves where children and pets cannot reach them.

Thank you,

Homework Assignment: Provide a copy of the chart, "Household Hazardous Products Data Collection Form," for each student. Tell students to take the "Hazardous Ingredients and Health Hazards of Some Products" sheets and to work with an adult to examine labels of five household hazardous products; then complete the data collection form for each of the five products. The students should ask the adults to tighten the lids on any containers they will be inspecting. The adult will need to sign on the bottom of the form. Students should use the "Hazardous Ingredients and Health Hazards of Some Products" to help them complete column "C." Under direct supervision, students can check kitchens, bathrooms, laundry rooms, utility rooms, garages, closets, and hobby or garden areas to analyze labels of potentially hazardous products.

SAFETY NOTE: Remind students that all potentially hazardous products should be handled with care. Containers that are leaking or missing lids should not be handled. A parent or other adult must supervise this homework assignment.

DISCUSSION/QUESTIONS

A. Ask students to share and discuss their findings concerning household hazardous products in their homes.

B. Look at the list that the class started in "Pre-Activity Questions" Part A and ask the students to edit their lists. Then have them add to the list of potentially hazardous products found in their homes. Keep this list until the end of this lesson.

C. Ask students:

- Define "household hazardous product."
- Why would people want to store and handle household hazardous products carefully? (Accept all answers.)

APPLICATION

A. Ask students what safety precautions they should follow when using household hazardous products. *Read the labels and follow directions carefully*. Help students identify additional precautions, such as:

- If the product is corrosive, wear plastic or rubber gloves.
- If the product is ignitable, keep away from heat, sparks, and flame.
- If the product is reactive, do not keep any other open containers around it, and wear gloves and goggles when using it. Do not mix it with any other product.
- If the product is toxic, wear gloves and goggles and use in a well-ventilated area.

B. Ask students to design a brochure to inform others of safe ways to use and store household hazardous products.

Note: Less hazardous alternatives are available to do certain tasks than using some common household hazardous products**.**

Note: For information about the safe management of household hazardous wastes, see Lesson 4 in this unit.

RESOURCES

Videos

Hazardous Waste, Whose Problem Is It Anyway? 1989 (10 minutes) Available from the Environmental Health Coalition, San Diego.

A class goes to different rooms in a house and looks at the problems of household hazardous products and wastes. Discusses the importance of reading labels, storing household hazardous products safely, and managing household hazardous waste properly.

Outta Sight, Outta Mind. 1978 (11 minutes) Available from the Environmental Health Coalition, San Diego.

A grandfather and his grandson are out in a boat and discuss the problems and solutions to household hazardous products and wastes. Stresses the importance of reading labels and using these products safely; also discusses how chemicals can affect us and the proper management of household hazardous waste.

Student's Page

GROUP CHART FOR COLLECTING DATA FROM A LABEL

Names of groups members:_____

_____

A	B	C	D	E			
		Hazardous	Warning				
Type of product	Product use	substance(s)	label	Corrosive	Ignitable	Reactive	Toxic
1.							
2.							
3.							
4.							
5.							
6.							

Transparency

CLASS DATA FROM LABELS

A	B	C	D	E			
Type of product	**Product use**	**Hazardous substance(s)**	**Warning label**	Corrosive	Ignitable	Reactive	Toxic
1.							
2.							
3.							
4.							
5.							
6.							
7.							
8.							
9.							
10.							

Transparency

FOUR CATEGORIES OF HAZARDOUS SUBSTANCES

Category of hazard	Product
Corrosive	**e.g., battery acid**
Ignitable	**e.g., paint remover**
Reactive	**e.g., bleach mixed with ammonia**
Toxic	**e.g., pesticide**

Transparency

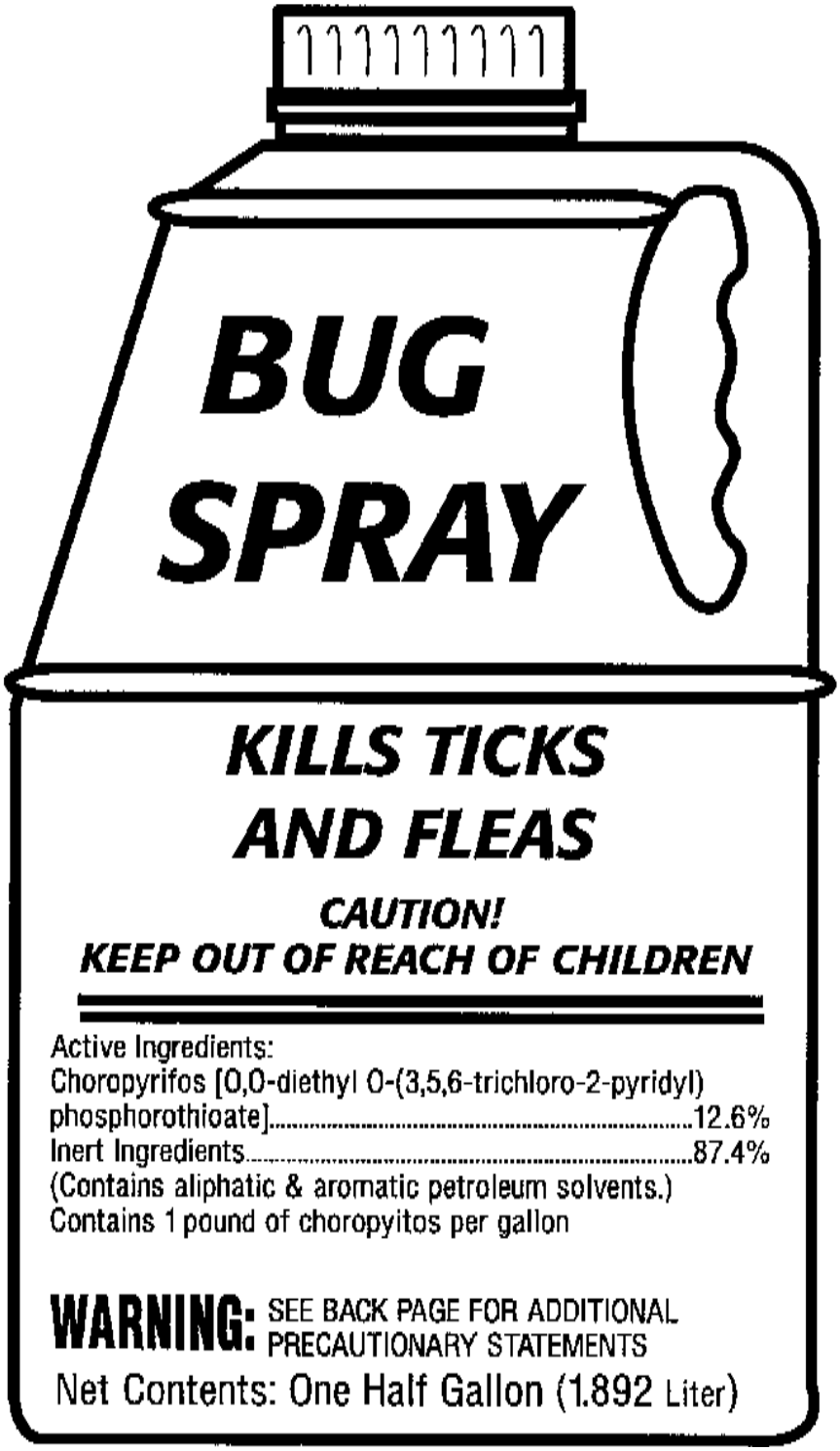
PRODUCT LABELS

A

Transparency

PRODUCT LABELS

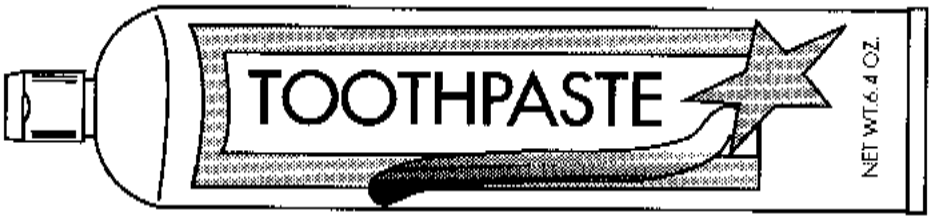
B



Transparency

PRODUCT LABELS

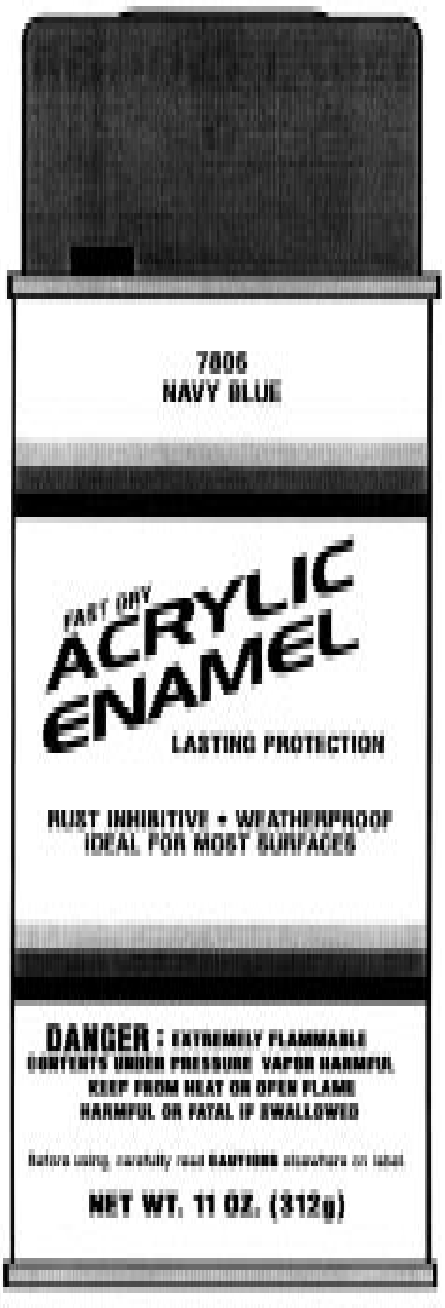
C



Transparency

PRODUCT LABELS

D



Homework Assignment

HOUSEHOLD HAZARDOUS PRODUCTS DATA COLLECTION FORM

NOTE: All potentially hazardous products should be handled with care. Do not handle products that are leaking or missing lids. A parent or other adult should supervise this homework assignment.

Directions: Please work with an adult to examine some household hazardous products. Ask your adult supervisor to tighten the lid to any container whose label you will inspect. Complete this form for five household hazardous products. Check kitchens, bathrooms, laundry rooms, utility rooms, garages, closets, and hobby or garden areas for potentially hazardous products. Use the "Hazardous Ingredients and Health Hazards of Some Products" (pages 520 and 521) to help you complete column "C" of this data collection form.

A	B	C	D	E			
Type of product	**Product use**	**Hazardous substance(s)**	**Warning label**	Corrosive	Ignitable	Reactive	Toxic
e.g., bug spray	*To kill bugs.*	*Methyomyl*	*Caution; keep out of reach of children*				
1.							
2.							
3.							
4.							
5.							

Student's Name: _____ Date: _____

Signature of adult supervising this activity: _____

Student's Page

HAZARDOUS INGREDIENTS AND HEALTH HAZARDS OF SOME PRODUCTS

Product	Hazardous ingredients	Potential health hazards
Air freshneners and deodorizers	Formaldehyde	Toxic; carcinogenic; irritates eyes, nose, throat, and skin; damages nervous, digestive, and respiratory systems
Antifreeze	Ethylene glycol Methanol	Very toxic; damages circulatory and urinary systems Toxic; damages nervous and respiratory systems
Bleach	Sodium hypochlorite	Corrosive; irritates and burns skin and eyes; damages respiratory, digestive, and nervous systems
Disinfectants	Sodium hypochlorite Phenols Trichloroethylene	Corrosive; irritates and burns skin and eyes; damages respiratory, digestive, and nervous systems Ignitable; very toxic; damages respiratory and circulatory systems Toxic; vapor irritates skin, eyes, and respiratory tract
Flea powder	Carbaryl Dichlorophene Chlordane and other chlorinated hydrocarbons*[1]	Very toxic; irritates skin; damages respiratory, circulatory, and nervous systems Toxic; irritates skin; damages nervous and digestive systems Toxic; irritates eyes and skin; damages respiratory, digestive, and urinary systems
Floor cleaner wax	Diethylene glycol Petroleum solvents	Toxic; damages nervous, urinary, and digestive systems Highly ignitable; carcinogenic; irritates eyes, nose, throat, and lungs Ammonia Toxic; vapor irritates skin, eyes, and respiratory tract
Furniture polish	Petroleum distillates or mineral spirits	Highly ignitable; toxic; carcinogenic; irritates skin, eyes, nose, throat, and lungs
Herbicides (weed killers)	Chlorinated phenoxes (contaminated with dioxin)	Toxic; carcinogenic; irritates skin, eyes, and throat
Oven cleaner	Sodium or potassium hydroxide (lye)	Corrosive; burns skin, and eyes; toxic; damages nervous and digestive systems

Items marked with an asterisk (*) are banned or restricted pesticides and should not be used by households.

[1]Chlorinated hydrocarbon pesticides are marketed under the following names: Endrin*, Aldrin*, Dieldrin*, Toxaphene*, Lindane, Benzene*, Hexachloride, DDT*, Heptachlor*, Chlordane*, Mirex*, Methoxychlor.

Student's Page

HAZARDOUS INGREDIENTS AND HEALTH HAZARDS OF SOME PRODUCTS (continued)

Product	Hazardous ingredients	Potential health hazards
Paints	Aromatic hydrocarbon thinners	Ignitable; toxic; carcinogenic; irritates skin; damages digestive and urinary systems
	Mineral spirits	Highly ignitable; toxic; irritates skin, eyes, nose, and throat; damages respiratory system
Paint thinner	Chlorinated aliphatic hydrocarbons	Toxic; damages digestive and urinary systems
	Esters	Toxic; irritates eyes, nose, and throat; damages digestive system
	Alcohols	Reactive; ignitable; irritates eyes, nose, and throat
	Chlorinated aromatic hydrocarbons	Ignitable; toxic; damages digestive and urinary systems
	Ketones	Ignitable; toxic; damages respiratory system
Pesticides	Carbamates[2]	Toxic; damages nervous system
	Chlorinated hydrocarbons	Toxic; carcinogenic; damages nervous system
	Organophosphorus[3]	Toxic; damages nervous system
Toilet bowl cleaners	Sodium acid sulfate or oxalate or hypochloric acid	Corrosive; toxic; burns skin; damages digestive and respiratory systems
	Chlorinated phenols	Ignitable; very toxic; damages respiratory and circulatory systems
Window cleaners	Diethylene glycol	Toxic; damages nervous, urinary, and digestive systems
	Ammonia	Toxic; vapor irritates skin, eyes, and respiratory tract

[2]Carbamates are marketed under the following names: Aldocarb*, Ozamyl, Carbofurna, Methyomyl, Sectran, Propoxur, Carbaryl (Sevin).

[3]Organophosphorous pesticides are marketed under the following names: Phorate, Mevinphos*, Demeton*, Disulfotan, Parathion*, Diazinon, Ronnel, Azinphosmethyl.

BACKGROUND INFORMATION FOR THE TEACHER

In order to accomplish a number of common household tasks efficiently and effectively with minimum effort, people use many products which contain hazardous substances. When we no longer want the contents in a container, the contents become waste. Hazardous waste is discarded material that, when improperly managed, may pose significant threats or potential hazards to human health or the environment. The topic of household hazardous waste will be addressed in lessons 2, 3, and 4. Household hazardous waste is poisonous waste found in homes that can cause problems for living organisms or the environment. This waste can be explosive, toxic, corrosive of metal or skin, disease-causing, radioactive, and dangerous. In this lesson students will focus on household products which may be hazardous.

A product containing a hazardous substance is required to have a label with warning statements and safety information if it is packaged for or intended for use in or around the home. Most household hazardous products are considered hazardous because of the way they affect humans or react with other chemicals.

Household hazardous wastes are considered hazardous because they fit into one or more of the following categories:

- Corrosive: eats away materials and living tissue by chemical action (e.g., oven and toilet bowl cleaners, battery acid).
- Ignitable: ignites easily (e.g., lighter fluid, spot and paint remover, varnish). (Students might be more familiar with the word "flammable.")
- Reactive: creates an explosion or produces deadly vapors when exposed to heat, air, water, or shock or when mixed with other chemicals (e.g., bleach mixed with ammonia-based cleaners).
- Toxic: poisonous when ingested, touched, or inhaled even in small quantities (e.g., rat poison, cleaning fluids, pesticides, bleach, toxic metals such as lead).

The average home contains numerous products that are potentially hazardous if stored or used improperly. A household product is potentially hazardous if the label contains words like "poison," "danger," "warning," "caution," "keep away from heat or open flames," or "keep away from children and pets."

If a product containing hazardous substances cannot be avoided for a specific household task, read its label and follow the directions properly. Make sure that appropriate safety precautions are taken, such as wearing eye protection and protective gloves.

When a project at home is finished, leftover chemicals should be stored safely in the home in their original container. Read the original product label for safe storage requirements; if the label falls off, clearly relabel the storage container; use nonbreakable containers; secure in a tamper-proof area (inaccessible to children and animals); and check regularly for any leaks. Also keep products and wastes away from moisture, water, and food and never mix one product with another.

Pesticides, acids, corrosives and their empty containers, flammables, paints, paint removers, used oil, used oil filters, and wood preservers should be stored until you can take them to a household hazardous waste collection facility or to a location of a scheduled household hazardous waste collection day in your area. (This topic will be addressed in Lesson 3.) For more information see "Appendix B–VI, Household Hazardous Wastes."