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Connecting Activity #2

"Are Household Chemicals Safe?"

6-8 EDUCATION MODULE

EPA

Missouri Botanical Garden

Correlation with Education Standards Summary

Connecting Activity #2
"Are Household Chemicals Safe?"

For a narrative description of these standards please refer to the Teacher's Guide.

National Standards

SOURCE: www.education-world.com/standards

NPH-H. 5-8 .1 .2

Missouri Show-Me Standards

SOURCE: www.dese.mo.gov/standards

Performance Standards:
GOAL 1: 2
GOAL 3: 1
GOAL 4: 1, 7

Knowledge Standards:
CA 1, 3, 6
HPE 5
SC 8

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Connecting Activity #2

"Are Household Chemicals Safe?"

Recommended Grade Level:
6-8
Preparation Time:
You will need time to collect a variety of household products for the demonstration and to make photocopies.
Presentation Time:
One 50-minute class period.

Overview

Many of the products we have in our homes contain dangerous chemicals that can cause serious harm to humans, animals, and the environment. Products such as air fresheners, drain cleaners, bathroom disinfectants, motor oil, flea collars, and pesticides, to name only a few, need to be used and disposed of safely. Some of these chemical products have a less toxic alternative; most of the necessary ingredients are common items you probably have at home. These alternatives pose less danger to humans and the environment. This lesson informs students about safety labeling and allows exploration of possible alternatives to some cleaning products found within a typical home.

Goals

- To provide an opportunity to explore advantages/disadvantages of using homemade cleaning products containing safer ingredients as an alternative to commercially available household cleaners
- To compare the effectiveness, cost, and usability of homemade cleaners to commercial cleaning products

Objectives

When the activity is completed, students will be able to do the following:

- Identify signal words that tell consumers that products are hazardous and what those hazards are.
- Determine the benefits and risks to health and the environment in using these materials.
- List three non-toxic alternatives to commercial cleaners.
- Give three examples for safely storing and disposing of toxic/hazardous products and their containers.

Materials

- Typical household cleaning products with legible labels (such as cleanser, all purpose cleaner, window cleaner, etc.) One product per pair of students.
- Examples of safer possible alternatives. (Baking soda for a scouring powder, vinegar or lemon solution for window cleaner) to use in cleaning comparison demonstration.
- One copy for each **team** of students of the *"Student Investigation Sheet"*
- One copy for each student of *"Safer Household Product Recipes" sheet and the "Home Inventory Worksheet."*

NOTE: You will have to make a bottle of alternative window cleaner See *"Safer Household Product Recipes"* sheet for directions.

Materials (Cont.)

- One scouring sponge, and paper towels or rags for each cleaning product.
- Two plates with mustard dried on them (for cleaning demonstration).
- Two picture frames with dirty glass from fingerprints (for cleaning demonstration).

NOTE: The surfaces must be uniformly dirty to be measurable. (Classroom surfaces can also be used. Look for areas that collect fingerprints i.e. doors and door frames, light switchplates. Use caution when cleaning around electrical switches.)

- One copy of the *"Product Comparison Worksheet"* for each team testing products.

Procedure

1. Begin by asking if anyone shops for the family or ever had to purchase a cleaning product for the home. What were some of the precautions taken when the product was used? What was done with the product when it was no longer needed? Was it a hazardous material? How could you tell?

2. Display the following information for poison control. Discuss if anyone in the class has ever had to call Poison Control before.

If you have a poisoning emergency, call
1-800-222-1222.
If the victim has collapsed or is not breathing, call 911.

3. Discuss with the students that the most common injury from cleaning products is a result of improper use. For example, deaths occur each year from consumers improperly using chlorine based products with ammonia based products. Reading the label is important. Manufacturers are required by law to inform consumers of any potential risks. Federal guidelines have standardized the language for labeling of products that pose potential dangers.

Labeling has two purposes:
- To protect health of the consumer using the product, overseen by the Consumer Product Safety Commission and by the U.S. Environmental Protection Agency.
- To prevent contamination of the environment after disposal, overseen by the U.S. EPA.

4. Provide the following definitions for the students, and discuss what the warnings mean. Identify the types of products that may fall within each of the four categories. Many household cleaners contain pesticides and are meant to be toxic; bleach, midew remover, and anti-bacterial cleaners are a few examples.

Signal Words used for hazardous labeling: (In order of of most harmful to least harmful.)

Danger / Poison: A taste to a teaspoon can kill an average sized adult.
Warning: A teaspoon to an ounce can kill an average sized adult.
Caution: An ounce to a pint can kill an average sized adult.
Non-toxic: Products do not require warning labels.

Principal Hazards:

Toxic: Capable of causing injury or death through ingestion, inhalation or absorption through the skin.
Corrosive: Chemical action can burn and destroy living tissues or other material that come in contact with the product.
Ignitable / Flammable: Can be easily set on fire.
Reactive / Explosive: Can deteriorate or explode through exposure to heat, sudden shock, pressure, or exposure to incompatible chemicals or conditions.

5. Because the use of household chemicals can affect our health and our environment strict guidelines exist for the transportation, storage, and disposal of these products. Labels must list what the principal hazard is when using the product and recommend a storage and disposal method for the product and/or container. Discuss potential negative environmental impacts from improperly disposed of chemicals.

6. Display a collection of various commercial household cleaning products. Divide the class into teams of two to three students. Have a representative from each team choose one of the cleaning products. Distribute the *"Are Household Chemicals Safe?" Investigation Sheet*, one per team of students. Give the class a few minutes to complete the worksheet.

7. Ask students to brainstorm safety precautions for these products if they were used in their homes. Are the storage considerations different depending on who lives in the home? What about people visiting the home?

8. Distribute a copy of *"Safer Household Product Recipes"* Sheet to each student. Have each team present their product to the class including label information, proper disposal methods, and possible safer alternatives that might be used.

9. Choose four students to participate in a cleaning comparison demonstration. Two students will be on Team A, the other two will be Team B. The objective is to compare a commercial cleaner with a homemade cleaner on the same dirty surface. Pair up students and give each a sponge. Distribute a copy of the *"Product Comparison Worksheet"* to each student in the class. Half of the class will record for Team A, the other half will record for Team B.

   For Team A, student one will use baking soda and water and student two will use a commercial kitchen cleanser and water. They will clean the plates with dried mustard.

   For Team B, student one will use the alternative recipe window cleaner (lemon juice and water or vinegar and water) and student two will use a commercial window cleaner.They will both try to clean the fingerprints off of the dirty picture frame glass.

   (As previously noted, dirty surfaces around the classroom may also be used. Try comparing a commercial all purpose cleaner with the homemade version listed on the

"Safer Household Product Recipes" sheet. This is a better alternative when there is not a sink in the classroom.)

Have students clean their surfaces. Ask Team A and Team B students to describe how their products perfomed so that the product comparison worksheets can be completed. Have the rest of the class compare the results. Ask the students who used the cleaners what they thought of the product, how it smelled, how it felt on their skin, and if they would use this product at home. Compare the costs of the products tested. Homemade cleaners are usually much less expensive. Give students time to record on their worksheets which products they would use and why. Have the class discuss their responses.

OPTION: Have students complete *"Home Inventory Worksheet."* See Discussion Questions below.

Discussion Questions

- Thinking about their personal home cleaning products, what recommendations might students make to promote a safer environment?
- Have students recall how many commercial cleaning products are in their homes. Remind them to think of all rooms of the house, including the garage. Distribute the '*Home Inventory Worksheets"*. Have the students list the products they know they have at home then have them take the sheet home to complete. Students will be amazed at how many more commercial cleaners are in their home than they realized.

Conclusion

By completing this activity, students will increase their awareness of safer alternative cleaning products. Understanding how little it takes for commercial cleaners to cause potential harm compared to the effectiveness and expense of alternative cleaners will give students the ability to be better consumers and make choices to lessen harmful environmental impacts.

Extensions

- Design a safer cleaning kit. What products would you eliminate or substitute? What kind of equipment might you need? Where may you be able to sell these kits?
- Have students create stickers with the poison control phone number on it to be posted by their telephones. Who else should have this information? Make stickers for them, too.
- Investigate what type of household hazardous waste collection is available in your area by calling your health department or solid waste management district.
- Safer products do not necessarily need to be homemade. Send students on a safer product scavenger hunt at their local grocery or discount store and have them report their findings.

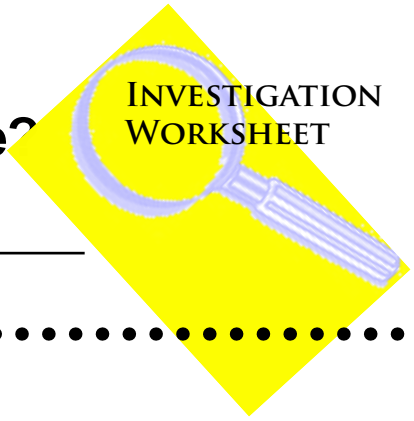
References And Sources For More Information

- *Resource Your Waste: A Teachers Guide,* Missouri Department of Natural Resources ©2000
- *Household Hazardous Waste Reduction Pollution Prevention Education Toolbox* U.S. EPA.
- *Guide to Hazardous Products Around the Home* Household Hazardous Waste Project, ©1989

- For more information, see these cool web sites:
  Virtual House Tours
  http://www.epa.gov/kidshometour
  http://www.epa.gov/grtlakes/seahome/housewaste/house/mainmenu.htm

  Purchasing Decisions Wizard see how USEPA ranks products.
  http://www.epa.gov/opptintr/epp/cleaners/select/matrix.htm
- Books
  Clean House, Clean Planet: Clean Your House for Pennies a Day, the Safe Nontoxic Way by Karen Noonan Logan (Pocket Books 1997)

Are Household Chemicals Safe?



Name(s): _____

Directions:

Select one product from the display of commercial household cleaning products. Carefully read the information on the product label and answer the following questions as completely as possible.

1. What is the name of the product?_____

2. What is it used for?_____

3. Is the statement "Keep out of reach of children" on the label? _____

4. What is the *signal word* on the label and what does it mean?*(Danger/Poison, Warning, Caution, Non-Toxic, or no signal word)* _____

_____

5. What *hazardous property* does the product have?*(Toxic, Corrosive, Ignitable/ Flammable, Reactive/Explosive)* _____

_____

6. List any directions that help protect people's health. _____

_____

7. Does the label offer any first aid directions? If so, what are they? _____

_____

8. Does the label give any suggestions for storage? If so, what are they? _____

_____

9. Describe, from the label, directions for disposing of the empty container. _____

_____

10. What might be a safer alternative to using this commercial product? _____

_____

Safer Household Products Recipes

TASK	SAFER ALTERNATIVE PRODUCT & RECIPES
Wash Windows	**Window Cleaner** - Mix one tablespoon of lemon juice or white vinegar into one quart of water, apply and wipe dry with a soft, lint free cloth. **Tips:** To avoid streaks, never wash windows while the sun is shining on them. To polish windows or mirrors to a sparkle, try linen towels or crumpled newspaper.
Sanitizer	**Soap and Water** - Regular cleaning with plain soap and hot water will eliminate most bacteria. **Isopropyl Alcohol** - Wipe surface and allow to dry (must dry to do its job). Work in well-ventilated area. **Borax and Water** - Mix 1/2 cup Borax in one gallon warm water and clean with this solution. **Tip:** Keep things dry! Mold, mildew and bacteria cannot live without moisture.
Drain Cleaner	**Baking Soda and Vinegar** - Pour 1/3 cup baking soda down into drain, add 1/2 cup white vinegar and cover drain, let stand 3-4 minutes, flush with a kettle of boiling water. **Prevention Tips:** To avoid clogged drains, use a strainer to trap food and hair; collect grease in cans rather than pouring it down the drain; pour a kettle of boiling water down the drain weekly to melt fat and soap build up. Use a plunger, or a mechanical snake to eliminate a clog rather than chemicals. Enzyme cleaners work well to clear some clogs and maintain your drains.
Furniture Polish (Wood Cleaner)	The idea behind furniture polish for wood is to absorb oil into the wood. Many oils found in our kitchens and bathrooms work very well. **Olive Oil or mineral oil and Lemon Juice** - Mix two parts oil and one part lemon juice. Apply and polish with a soft cloth. Leaves wood looking and smelling good! **Oil or Castille Soap** - This is a less-toxic or non-toxic cleaner.
All Purpose Cleaner	**Vinegar and Baking Soda** - Mix together one gallon (4L) of hot water, 1/4 cup (50ml) white vinegar, and one tablespoon baking soda. This solution is safe for all surfaces, can be rinsed with water, and is very effective for most jobs. For a stronger cleaner or wax stripper, double the amounts of all the ingredients except for the water. **Alternative Method:** Mix two teaspoons Borax into one quart of hot water, add two tablespoons of white vinegar and one teaspoon of dishsoap. Put this mixture in a spray bottle. Add a few drops of essential oil if you desire a fragrance.

Are Household Chemicals Safe?

STUDENT PRODUCT COMPARISON WORKSHEET

Name(s):_____

Commercial Product Tested: _____ Approx. Cost _____

Warning label information/Signal Words_____

Could it be dangerous to children? Yes ☐ No ☐

Alternative Product Tested _____ Approx. Cost _____

Could it be dangerous to children? Yes ☐ No ☐

Surface cleaned:_____

Effectiveness: how well did it clean?

Commercial product

Excellent ☐ Good ☐ Fair ☐ Poor ☐

Homemade alternative

Excellent ☐ Good ☐ Fair ☐ Poor ☐

How pleasant was the product to use?

Commercial product

Excellent ☐ Good ☐ Fair ☐ Poor ☐

Homemade alternative

Excellent ☐ Good ☐ Fair ☐ Poor ☐

Taking cost, effectiveness, and pleasantness of use into consideration which products might you use and why?

Are Household Chemicals Safe?

HOME INVENTORY WORKSHEET

If you have a poisoning emergency, call 1-800-222-1222.
If the victim has collapsed or is not breathing, call 911.

Name: _____

Using the products found in your home, fill out this chart and save it for future reference.

Product	Where was it stored?	Signal Word Poison/Danger Warning Caution Non-Toxic/ No Warning	Storage Recommendation	Product Disposal						Possible Alternatives
				Use Remaining Product	Flush Down Drain	Place In Trash	Rinse, Dry, Then Place In Trash	Save For *HHW Collection	Other	

Are there any products in your home that are older than you are? ☐ **Yes** ☐ **No** **List:** _____

*HHW=Household Hazardous Waste