

Teacher Section:

What Should I Use to Clean My Shower?



(Adapted from: V. Campbell, J. Lofstrom, and B. Jerome. *Decisions – Based on Science*. National Science Teachers Association. 1997. pages 41-45.)

DESCRIPTION:

Students will develop a decision chart to understand the decision making process. Using the cleaning solutions in the mold control activity, students will decide what to use to clean the mildew in their shower.

PURPOSE/GOALS:

Students will be able to:

- Interpret toxicity data and integrate health concerns into decision making process
- Develop criteria for evaluating solutions to a particular problem
- Use a decision chart to evaluate solutions or actions in light of specific goals

TIME ESTIMATE:

Prep: 10 minutes (photocopying)

Activity: 50-55 minutes

MATERIALS (PER STUDENT):

- Student Worksheet 1: Household Product Comparison
- Student Worksheet 2: Decision Analysis Chart
- Student Handout: Criteria for Evaluation
- Product Label Information

MATERIALS TO PHOTOCOPY:

- 1 transparency of *Decision Analysis Chart*
- Student Worksheet 1: Household Product Comparison
- Student Worksheet 2: Decision Analysis Chart
- Student Handout: Criteria for Evaluation
- Product Label Information

TERMINOLOGY:

Threshold	LOEL (lowest observable effect level)
LD ₅₀	LD ₁₀₀
Signal Words	Individual Susceptibility
Criteria	

SUGGESTED LESSON PLAN:

Getting Started

1. Have students review the results of the Mold Control activity.
2. Review steps of risk assessment if this activity has been covered.

Doing the Activity

1. Discuss the decision making process with students.
 - a. We do it unconsciously everyday.
 - b. Decisions are based on certain criteria.
 - c. Decisions can have several solutions.
 - d. Decisions are made for both rational and personal reasons.
 - e. Decisions are typically made to achieve specific goals.
2. One of those tools to assist with the decision making process is a *Decision Chart*.
3. The three cleaning products used in the mold control activity are already on the right side of their chart. Have students then brainstorm additional products that they might choose to clean the mold in their shower (cleanser, bleach, baking soda, soap, "elbow grease," etc.)
4. Have students brainstorm desirable characteristics of their cleaning products (effective, cheap, less toxic, pleasant odor, easy to use, gentle on the shower, etc.)
5. Students should then spend about 10-15 minutes working on their decision charts.
6. Discuss what product(s) the students chose to be the most desirable based on their decision chart. Do they agree with this end result?

RESOURCES:

- Project Learning Tree. *Exploring Environmental Issues: Focus on Risk*. American Forest Foundation. 1998.
- U.S. Environmental Protection Agency. *A Brief Guide to Mold, Moisture and Your Home*. U.S. EPA Publication #402-K-02-003.<http://www.epa.gov/iaq/molds/moldguide.html>
- American Lung Association. *Suggestions for Green Cleaning*. American Lung Association of Oregon. Master Home Environmentalist Brochure.

HOUSEHOLD PRODUCT INFORMATION TEACHER KEY

Tilex® Mildew Remover:

- **Active Ingredient:** Sodium Hypochlorite 2.4% by volume
- **Threshold (LOEL):** ~0.001%*
- **LD₁₀₀ (Lethal Dose 100%):** ~1%*
- **LD₅₀ (Lethal Dose 50%):** ~0.008%*
*Note: LOEL, LD50, and LD100dose determined from Mold Control! back-up data; actual answers will vary according to student experimental results.
- **Pesticide Signal Words: WARNING:** Causes substantial but temporary eye injury and can irritate skin. Due to irritating nature, may be harmful if swallowed.
- **Safety Instructions:** It is a violation of Federal law to use this product in a manner inconsistent with its labeling. Use only in well ventilated areas. For sensitive skin or prolonged use, wear gloves. Do not get in eyes or on clothing. Vapors may irritate. Avoid prolonged breathing of vapors.
- **Product Appeal:** answers will vary.
- **Cost:** ~ \$4.00
- **Non-damaging to Surfaces:** From Product Label: "Kills TOUGH Mildew Stains Without Scrubbing!"
- **Ease of Use:** (From Product Label) To Remove Mildew Stains: Turn sprayer nozzle to OPEN position. Spray, wait until stains disappear and rinse. Heavy mildew buildup may need two cleanings. This product may not be able to remove mildew embedded in hard water deposits, old grout or silicone caulking. For soap scum proteins use Tilex™ Soap Scum Remover.
- **Synthetic vs. Natural Product:** Synthetic
- **Product Endorsement:** Household chlorine bleach (3.5% w/v solution) is not recommended by the U.S. Environmental Protection Agency as a routine practice during mold cleanup. (In contrast to household chlorine bleach, Tilex® Mildew Remover is a 2.4% w/v solution).
"Biocides are substances that can destroy living organisms. The use of a chemical or biocide that kills organisms such as mold (chlorine bleach, for example) is not recommended as a routine practice during mold cleanup. There may be instances, however, when professional judgment may indicate its use (for example, when immune-compromised individuals are present). In most cases, it is not possible or desirable to sterilize an area; a background level of mold spores will remain - these spores will not grow if the moisture problem has been resolved. If you choose to use disinfectants or biocides, always ventilate the area and exhaust the air to the outdoors. Never mix chlorine bleach solution with other cleaning solutions or detergents that contain ammonia because toxic fumes could be produced." *A Brief Guide to Mold, Moisture and Your Home*. U.S. EPA Publication #402-K-02-003.<http://www.epa.gov/iaq/molds/moldguide.html>
- **Individual Susceptibility:** Not recommended for use by persons with heart conditions or chronic respiratory problems such as asthma, emphysema or obstructive lung disease.

HOUSEHOLD PRODUCT INFORMATION

TEACHER KEY CONTINUED

Lysol® Antibacterial Kitchen Cleaner

- **Active Ingredient:** Alkyl Dimethyl benzyl ammonium chlorides
 - **Threshold (LOEL):** ~0.01%*
 - **LD₁₀₀ (Lethal Dose 100%):** 100%*
 - **LD₅₀ (Lethal Dose 50%):** ~0.5%*
- *Note: LOEL, LD50, and LD100dose determined from Mold Control! back-up data; actual answers will vary according to student experimental results.
- **Pesticide Signal Words:** **CAUTION:** Hazardous to humans and domestic animals. May cause eye irritation. Avoid contact with eyes.
 - **Safety Instructions:** No information listed as to protective clothing, ventilation, etc.
 - **Product Appeal:** answers will vary.
 - **Cost:** ~ \$4.00
 - **Non-damaging to Surfaces:** From Product Label: "Kills 99.9% of germs in seconds on hard nonporous surfaces. Cuts grease and grime. Streak-free shine!"
 - **Ease of Use:** (From Product Label) To Operate: Turn nozzle counter clockwise to spray. Adjust to desired pattern. General Kitchen Cleaning: Spray soiled areas, then wipe clean. No rinsing! On painted surfaces, test a small area. Not recommended for use on acrylic plastics. For heavily soiled surfaces, first clean according to General Kitchen Cleaning directions. To disinfect nonporous cutting boards, spray until thoroughly wet, let stand for 10 minutes, then rinse thoroughly.
 - **Synthetic vs. Natural Product:** Synthetic
 - **Product Endorsement:** No endorsement or recommendations by the U.S. EPA or American Lung Association about the use of this product.
 - **Individual Susceptibility:** No information listed.

Household Vinegar:

- **Active Ingredient:** Acetic Acid
 - **Threshold (LOEL):** ~1%*
 - **LD₁₀₀ (Lethal Dose 100%):** not able to be determined from Mold Control! activity.
 - **LD₅₀ (Lethal Dose 50%):** 100%*
- *Note: LOEL, LD50, and LD100dose determined from Mold Control! back-up data; actual answers will vary according to student experimental results.
- **Pesticide Signal Words:** VINEGAR is a household food item. No signal words. Vinegar is not harmful to skin because it is not very concentrated.
 - **Safety Instructions:** No information listed on the product label; however it is often recommended for use in cleaning because it is low in toxicity.
 - **Product Appeal:** answers will vary. Heinz label states: "Heinz Distilled White Vinegar is made from sun-ripened grain and crystal clear water. With its clean, crisp flavor, it's a deal for your favorite marinades, salads, and recipes." However, some people are bothered by the strong vinegar odor.

HOUSEHOLD PRODUCT INFORMATION TEACHER KEY CONTINUED

Household Vinegar continued:

- **Cost:** ~ \$1.50
- **Non-damaging to Surfaces:** No information.
- **Ease of Use:** No information.
- **Synthetic vs. Natural Product:** Natural
- **Product Endorsement:** The American Lung Association Master Home Environmentalist Program has developed a series of recipes for “green cleaning” including hard, non-porous surface cleaners using vinegar and water or using baking soda and liquid castile soap. However, the American Lung Association has not endorsed “green products’ based on their effectiveness to control mold on hard non-porous surfaces. *Suggestions for Green Cleaning*. American Lung Association of Oregon. Master Home Environmentalist Brochure.
- **Individual Susceptibility:** No information.

HOUSEHOLD PRODUCT COMPARISON TEACHER KEY

Criteria	Product		
	Tilex®	Lysol® Antibacterial Kitchen Cleaner	Vinegar
Threshold (LOEL)	~0.001%	~0.01%	~1%
LD ₁₀₀	~1%	~100%	<i>Not able to determine</i>
LD ₅₀	~0.008%	~0.5%	~100%
Toxicity	<i>Moderately toxic</i>	<i>Slightly Toxic</i>	<i>No Toxicity Label</i>
Signal Words	<i>Warning</i>	<i>Caution</i>	<i>No Signal Word</i>
Safety Instructions	<i>Gloves, ventilation recommended. Avoid breathing vapors</i>	<i>No information listed</i>	<i>No information listed</i>
Product Appeal? Y/N	<i>Answers will vary</i>	<i>Answers will vary</i>	<i>Answers will vary</i>
Cost	~\$4.00	~\$4.00	~\$1.50
Non-damaging to Surfaces? Y/N	<i>No</i>	<i>No</i>	<i>No</i>
Ease of Use	<i>See directions</i>	<i>See directions</i>	<i>No information listed</i>
Synthetic vs. Natural Product	<i>Synthetic</i>	<i>Synthetic</i>	<i>Natural</i>
Other:			
Other:			

DECISION ANALYSIS CHART

PROBLEM STATEMENT:

WHAT SHOULD I USE TO CLEAN THE MILDEW IN MY SHOWER?

CLEANING PRODUCT OPTIONS

DECISION CRITERIA & FACTORS	Tilex®	Lysol®	Vinegar	Other Product:
Effectiveness: Based on each of the three factors listed below which product do you think is the most effective? 1 = Least Effective, 2 = Moderately Effective, 3 = Most Effective				
Threshold (LOEL)				
LD ₁₀₀				
LD ₅₀				
Safety: Based on each of the three factors listed below which product do you think is the most safe? 1 = Least Safe, 2 = Moderately Safe, 3 = Most Safe				
Toxicity				
Signal Words				
Safety Instructions				
Individual Preference: Based on each of the five factors listed below which product is the most appealing? 1 = Least Appealing, 2 = Moderately Appealing, 3 = Most Appealing				
Product Appeal?				
Cost				
Non-damaging to Surfaces?				
Ease of Use				
Synthetic vs. Natural				
Other Criteria:				
Factor #1:				
Factor #2:				
Total Product Score:				



STUDENT PAGES

FOR

DECISION ANALYSIS

FOLLOW THIS PAGE