SEDONA RECYCLES

KEEPING THE RED ROCKS GREEN SINCE 1989

Defend Your Drain!

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Overview

Would we be concerned if a company was dumping large amounts of toxic substances down the drain? Most likely, but what about the small amounts we use in everyday products? The cumulative effects can be just as damaging. The substances we use must go through a water treatment facility, not all of which are equipped to handle new chemicals and products on the market. More than 20% of water in the U.S. fails the clean water quality test. In this lesson, students look at everyday cleaning products and think about how the products we buy affect our environment. They learn to read labels and create alternative products.

Objectives

- Understand that water conservation includes keeping our household wastewater clean of excess chemicals.
- Learn what happens to our water when it goes down the drain.
- Explore how the products we buy affect the environment.
- Compare what household cleaners contain and what they do to the water system.

Grade Level: 3-12

Suggested Time: 1 hour

Multimedia Resources

- https://www.youtube.com/watch?v=-WWwmYrJkac
- http://www.bhg.com/homekeeping/house-cleaning/tips/green-cleaning-recipes/
- http://helloglow.co/10-best-essential-oils-for-green-cleaning/

Materials

- 7% white vinegar
- Borax
- Hot tap water
- Essential oils
- Castile soap or olive oil
- Measuring cups and tablespoon measures
- Plastic spray bottles or glass jars with lids

Before the Lesson

- Have materials ready
- Set up in area where spill cleanup is easy
- Make sure there is access to a water tap

The Lesson

Part I: How Does Your Water Come and Go?

1. Ask students to think about what goes down their drains every day (soap, shampoo, cleaning products, food, oils, toilet water, etc.). What about outside drains (roof run-off, driveway, landscaping chemicals)?
2. Where does the water go when it leaves your house? Some water, like outside run-off goes directly into the environment. How might this affect your local plants and animals?
3. Where does water from indoor drains go? All the drains in a house go to one big drain and may be sent through a septic system or to a treatment plant. Water at a treatment plant goes through many steps to separate:
    - Screening: removes wood, rocks, even dead animals.
    - Aerate: replaces oxygen used by decomposing organic matter, oxygen needed for fish later. This also makes gritty things like coffee grounds, dirt, and sand particles settle out so they can be removed.
    - Sludge removal: organic matter settles to the bottom and is removed.
    - Scum removal: soap, grease, and oils float to top and are skimmed off.
    - Kill bacteria: chlorine is added to kill bacteria, and then neutralized with other chemicals.
    - Release: the effluent is then released back into rivers or oceans. *Septic systems go through an underground filtration process before going back into the water cycle

4. Where does the water we drink come from? (Colorado River Basin aquifers in Verde Valley, AZ) Do you feel differently about what you put down the drain knowing that the water goes back into the cycle that we drink from?

Part II: What Are You Putting in Your Water?

1. Choose three or four cleaning products from home or the school's supply
2. Break into groups, one bottle per three students.
3. Have students read labels and find three things: any ingredients that they don't understand, does water need to be added in the instructions, and warnings.
4. If this product should be added to water, what do you do with the leftovers (such as mop water)? Are these things okay to go down the drain? What are the chemicals you don't understand? Are they safe?
5. For products that are a spray and wipe, how may they be harmful to people, pets, or water?

Common Problem Chemicals

(Adapted from https://experiencelife.com/article/8-hidden-toxins-whats-lurking-in-your-cleaning-products/)

- **Phosphates:** Used to improve laundry detergents and soaps, they cause algae blooms, which deplete water of oxygen and kill the organisms that live in that water system. The hazards aren't just where the phosphates go, it's also where they come from: Florida has 100,000 acres of waste ponds from phosphorous mining. **Alternative:** citric acid or sodium carbonate.
- **Phthalates:** In fragrances and is an endocrine disrupter. **Alternative:** essential oils
- **Perchloroethylene:** In carpet cleaners and stain removers, possible carcinogen and neurotoxin. **Alternative:** Ecover brand products or castile soap
- **Triclosan:** Antibacterial in dish and hand soaps. Antibacterials can create supergerms, bacteria resistant to harsh cleaners. It also kills beneficial bacteria. **Alternative:** Seventh Generation products and other plant based cleaners.
- **Quaternary Ammonium Compounds:** Found in fabric softeners, used as an antibacterial as well. Skin irritant and can cause respiratory disorders. **Alternative:** Vinegar, or nothing at all - you won't miss it!
- **2-Butoxyethanol:** Solvent in window cleaners; can cause sore throats and severe liver and kidney damage. **Alternative:** diluted vinegar

- **Ammonia:** Anti-streaking agent in window cleaners. Lung irritant and deadly when mixed with bleach. **Alternative:** Vodka, also gives ammonia's characteristic shine to metals.
- **Sodium Hydroxide or lye:** Used in oven cleaners, can cause severe burns of eyes, skin, and throat. **Alternative:** baking soda and vinegar

Make Your Own Green Cleaner

1. ¼ cup 7% white pickling vinegar
   White vinegar inhibits the growth of mold, mildew, and some bacteria
2. 2 teaspoons Borax
   Borax softens water to make a better detergent; alkaline property helps to kill mold and fungus.
3. 3 ½ cups hot tap water
4. 5-20 drops of essential oil to desired scent
   Certain oils have mild antiseptic properties, such as lemon, lavender, tea tree, rosemary, eucalyptus, peppermint, wild orange, thyme, and pine.
5. 1/4 cup castile soap
   Castile soap is an olive oil-based soap and loosens dirt from surfaces.

Many water treatment facilities are not equipped to remove certain chemicals. Substances that have been ingested by humans end up in the water system and are hard to remove including artificial sweeteners, medicines, and even caffeine! Pharmaceuticals should never get flushed or go down a drain. Other problems are bug sprays, sunscreens, and flame-retardants on clothing.