



The Effectiveness of Cleaning Products

Introduction

When we talk about the environment, we usually think about the health of the planet. While it is important that we think about the earth, it is also important to consider the issues and challenges that can exist in our indoor environments.

In this lesson, students will explore the micro-environment that exists in their own homes. Through the lesson and activities, students will learn about the factors that affect indoor air quality.

National Science Standards

This lesson and its extensions address the following national science standards:

- Science as Inquiry (Content Standard A)
- Science in Personal and Social Perspective

Grade levels 9–12

Lesson Duration: One 30 to 45 minute period for the core discussion and activities. Extensions can include additional in-class work, independent assignments, or science fair projects.

Goal: To examine the effectiveness of different cleaners and to explore the possible hazards that some chemicals in cleaners can have on users and the environment.



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To complete this lesson, you should have:

- Student packets, available as a separate PDF file
- Four cleaning products labeled: A, B, C, and D
- Paper towels
- Access to cold water
- One or more surfaces to be cleaned
- Masking tape (optional)

Lesson Description and Outline

Note: This outline is one way to run the lab. You can adapt it to what works best in your class.

Pre-lab discussion

Ask students: Why do we clean?

Get students' thoughts on this.

Ask students: What does "clean" smell like?

Examples: outdoors, trees, flowers, fruit, other?

Ask: How is the notion of fresh, clean air outside different than the chemical nature of most "clean" smells generated by products?

Ask: What are you looking for in a cleaner?

Brainstorm a few ideas with the group.

Ask students: What do you think when you see words like Caution, Warning or Danger on products? Do these influence how you would use a product?

Note: Cleaners for this experiment

You can use any off-the-shelf surface cleaners for this experiment, but you may want to expand the field by including options like:

- Plain water
- White vinegar
- Cleaners sold as non-toxic or environmentally friendly

Transition to the lab

Today, we're going to compare different cleaners by looking at how effective they are, and by other criteria that you will develop yourself.

Divide the class into lab groups and distribute the student packets.

Option: Conduct a double-blind test

Prepare spray bottles ahead of time labeled A, B, C, and D and don't let students know what is in each bottle during the experiment.

Whenever possible, scientists perform a "Double Blind" test in experiments.

Explain that in a double blind experiment, the person who is conducting the experiment does not know which product they are using during testing.

Double blind tests are typically used when there is also a test subject. In this way, the subject does not know what they are working with either.

Ask: Why are double blind tests more credible?



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Use the Student sheets to conduct the lab, or design a process that works better for your class.

Analysis/Conclusion

Use these questions to stimulate discussions and generate additional thoughts and ideas from the class.

- Which product(s) would you select as the most effective cleaning product(s)? Why?
- Can there be negative consequences to cleaning?
- Can cleaning be harmful to us? Can cleaning be harmful to the environment?
- Why does removing “dirt” minimize the presence of bacteria?
- “Killing 99%” of bacteria” is a claim made by several cleaning products. Can this do more harm than good? Why?
- Where is it important to kill as many bacteria as possible? Why?
- Is it important that cleaning products be non-toxic? Why?
- Why is it preferable to clean with cold water than with hot water?
- What criteria will you choose when purchasing cleaning products for your home?

Extensions

Before and after cleaning each surface, swab it and grow a culture on a Petri dish. After a few days or a week, compare the growth rates for each product.

- Conduct the experiment using a cafeteria table after the last lunch period of the day.
- Ask students to use the Resource Guides in their packets to do further research.



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