

# The Suds Lab: EcoSuds Laundry Detergent

## Adventure Guide

### Why this Experiment?

This hands-on experiment is a fun and educational way to introduce kids to chemistry, sustainability, and real-world applications through making a homemade laundry detergent. By formulating a single-load laundry detergent, kids explore solubility, pH balance, surfactants, and eco-friendly alternatives that clean clothes effectively without harmful chemicals.

## The Experiment

### Provided Supplies

- Baking Soda (Sodium Bicarbonate) – Variable
- Constant Dry Ingredients: Borax, Washing Soda (Sodium Carbonate), Coarse Salt, OxyClean
- Grated bar soap (Ivory or Zote)
- Scent Crystals/Essential Oil- Variable
- Mixing Bowl – reusable airtight container

### Step-By-Step Instructions

#### Step 1: Combine Dry Ingredients

1. In the provided bowl, mix 1 tbsp baking soda and 1 tbsp dry ingredients.

#### Step 2: Add Wet Ingredients

2. Add 1/2 tbsp grated soap and scent crystals
3. Store in airtight container until use

#### Step 3: Use in Laundry

4. Pour the mixture directly into the washing machine drum before adding clothes.
5. For extra stain removal, let it sit on clothes for 10 minutes before starting the cycle.

#### How to Use the Laundry Detergent

- Add one batch of detergent per standard load of laundry (should be about 2-1/2 tbsp of detergent).
- Use warm or hot water for heavy stains and cold water for delicates.
- For extra fabric softening, add white vinegar to the rinse compartment.

### Taking It to the Next Level

- 💡 Change the Ingredient Ratios: What happens if you adjust the baking soda amount? \*NOTE: Do not exceed 2 tbsp of baking soda per load
- 💡 Test Different Water Temperatures: Does cold vs. hot water affect how well the detergent cleans? Which temperature works best for removing stains?
- 💡 Experiment with Scent: Does adding more scent crystals to the detergent improve its effectiveness?



## Interactive Science

### How does the science work?

This experiment explores key chemistry concepts in cleaning science:

- ♦ Washing Soda (Sodium Carbonate): Raises water's pH, helping to break down oils and dirt.
- ♦ Baking Soda (Sodium Bicarbonate): Acts as a deodorizer and mild abrasive to remove stains.
- ♦ Castile Soap (Surfactant): Helps break up grease, dirt, and oils from fabric.
- ♦ Salt: Acts as a natural fabric softener and stain remover.
- ♦ Scent Crystals/Essential Oils: Provide an antibacterial boost while leaving clothes smelling fresh.

Explore.  
Express.  
Empower.





# The Science Behind the Experiment



## Scientific Process

**Ask a Question** – What makes laundry detergent effective?

**Make a Hypothesis** – What do the participants think will happen in the experiment? (Example: "Baking soda improves stain removal.")

**Conduct an Experiment** – Mix the ingredients and test the detergent

**Observe & Record Results** – Does it remove dirt? Does it leave clothes soft?

**Draw Conclusions** – Which formulation worked best? Why?

## Definitions

- Independent Variable (What You Change): Amount of baking soda, or scent crystals/essential oils
- Control Variables (What Stays the Same): Type of vinegar, type of baking soda, dry ingredients (OxyClean, washing soda, salt)

## Variables & Constants

### Variables (Things We Can Change)

- The amount of baking soda: Does more make a bigger cleaning reaction?
- Using scent crystals (or essential oils): does including essential oil impact cleaning ability in addition to scent?

### Constants (Things That Stay the Same)

- The type of vinegar (white vinegar)
- The same brand of baking soda
- Environment or conditions

Encourage kids to change only one variable at a time to see how it affects the experiment!

## Career Pathways

Exploring chemistry through DIY experiments can inspire careers in:

- 🧪 **Chemist** – Studies chemical reactions to create cleaning solutions, cosmetics, and medicines.
- 🌱 **Environmental Scientist** – Works on sustainable cleaning solutions and pollution reduction.
- ⚙️ **Chemical Engineer** – Designs eco-friendly household products and materials.
- 🍴 **Food Scientist** – Uses chemistry to improve food preservation and hygiene.
- 🔧 **Material Scientist** – Develops biodegradable cleaning materials and packaging.
- 🏠 **Textile Science** – Creates biodegradable and sustainable cleaning products

## College Programs for STEM Careers

- Chemical Engineering– the properties of matter, and how they work.
- Environmental Science & Sustainability– addressing environmental challenges using chemistry, physics, and biology.
- Materials Science & Engineering– Focuses on developing eco-friendly household products.

# Additional Science Applications

## Chemical & Environmental Science

- ✓ The Science of Cleaning: How surfactants lift dirt and oils from fabrics.
- ✓ Solubility & pH Balance: How different ingredients dissolve and work in water.
- ✓ Sustainability Practices: How DIY alternatives reduce waste and environmental impact.
- ✓ Practical Applications: Chemistry concepts applied to everyday household products.



## Additional Support

