

**Goal:** Compare the reactions of yeast and iodide to show the strength of a stronger catalyst and the strength given by higher concentrations of substances

## Yeast reaction

### **Materials:**

Hydrogen Peroxide ( $\text{H}_2\text{O}_2$ ): Preferably at a 6% concentration-Higher concentrations will make more dramatic results but can be more expensive and hard to find.

Yeast: Active dry yeast.

Warm Water: Used to activate the yeast.

Dish Soap: Any brand. This creates the foamy effect.

Food Coloring (Optional): To make the foam colorful.

Plastic or Glass Bottle: A 16oz bottle works well.

Safety Glasses & Gloves (Maybe just gloves): Always a good idea when doing chemical reactions.

Tray or Container: To contain the foam overflow.

Instructions:

Put on safety gloves and place tray/container

### **Procedure**

Prepare yeast: In a small bowl, mix about 2 tablespoons of warm water with 1 teaspoon of active dry yeast. Stir and let it sit for about 5 minutes until it's fully activated.

Pour about 1/2 cup of hydrogen peroxide into the bottle.

Add a few drops of food coloring (if we're using it) to the hydrogen peroxide.

Add a good squirt of dish soap to the bottle and gently swirl to mix.

Pour the yeast mixture into the bottle with the hydrogen peroxide in the sink

The foam will quickly rise out of the bottle, creating the "elephant toothpaste" effect.

### **Budget:**

Hydrogen Peroxide (6% concentration): Around \$3-\$5 for a pint, prices may vary.

Active Dry Yeast: About \$1-\$3 for a small packet.

Dish Soap: \$1-\$3 for a generic brand.

Food Coloring (Optional): \$2-\$4 for a small set.

Safety Glasses & Gloves: \$5-\$10, but these are reusable for other experiments.

Bottle & Tray: These might already be available at home. If we want to purchase though, a simple plastic bottle and tray can be around \$1-\$5 each.

Total Estimated Budget: \$15 - \$30, depending on what materials we already have and where we purchase what we don't have.

## Iodide Reaction

### **Chemicals needed:**

Potassium iodide

Stronger percent hydrogen peroxide (%30-35)

Dish soap

### **Procedure:**

Dissolve about 20 grams of potassium iodide in 20 ml of water

Add dish soap to 20 ml of 30% of hydrogen peroxide

Add the saturated potassium iodide solution into the beaker with hydrogen peroxide and dish soap in the sink

Watch reaction happen

Compare results of iodide and yeast

### **Budgeting**

Potassium iodide 100 grams- \$20

[https://www.amazon.com/Potassium-Iodide-Purity-Crystals-Powder/dp/B0B31Z5S8J?source=ps-sl-shoppingads-lpcontext&ref\\_=fplfs&psc=1&smid=A3EVWETYVE34RX](https://www.amazon.com/Potassium-Iodide-Purity-Crystals-Powder/dp/B0B31Z5S8J?source=ps-sl-shoppingads-lpcontext&ref_=fplfs&psc=1&smid=A3EVWETYVE34RX)

30% peroxide 100ml- \$20

<https://www.flinnsci.com/hydrogen-peroxide-30-reagent-100-ml/h0037/>

Dish soap - I have it at home - Free

### **Questions for Sloneker**

1. Does he think the reaction can work if we use less dissolved potassium iodide for the reaction since 40 grams per run is a LOT
2. Does he think we can use less 30% Peroxide per run because Peroxide is expensive
3. What measures should be taken for waste disposal after the experiment, particularly for the iodide reaction?
4. Is there any specific safety equipment required for handling 30% hydrogen peroxide?

### **Safety**

- Potassium Iodide- Do NOT eat, drink or swallow this product
  - It cause cause skin and eye damage so be very careful when handling material
  - If in contact with skin or eyes rinse under water for several minutes and call for help if irritation persists
- Skin and Eye Irritation: Hydrogen peroxide can cause irritation if it comes into contact with skin or eyes, especially with the 30% concentration. Immediate rinsing with water is advised if contact occurs and call for help immediately
- Inhalation Risks: Inhaling the gas released during the reaction can be irritating to the respiratory system. Ensure good ventilation.
- Mess and Stains: The foam can create a mess, and food coloring can stain, be careful when handling it and prepare the area accordingly.
- Chemical Burns: Higher concentrations can cause chemical burns. Stick to the recommended concentration.