

## Cloverbud Investigators: STEM for Every Season



# Erupting Jack-O-Lantern



October

**Background:** Boom, Bang, BOOM...we all like to watch things go up in smoke, blow apart, or just bubble up uncontrollably! To make this happen we need to have a chemical or physical reaction occur. In this investigation, we will be creating a chemical reaction with hydrogen peroxide. You may know hydrogen peroxide as the stuff your mom or dad uses to clean your cuts or scrapped knees, it bubbles up when they pour it on your wound. Why do you think it starts to bubble when it comes in contact with your cut but not your skin? To answer that question we need learn a little bit of chemistry. Hydrogen peroxide has the chemical makeup of  $H_2O_2$ , two hydrogen atoms and two oxygen atoms. It is used as a mild antiseptic to clean out cuts and abrasions. In the bottle, hydrogen peroxide looks a lot like water and its chemical makeup is also very close to water ( $H_2O$ ) but it has an extra oxygen atom. When you pour the hydrogen peroxide on a cut it comes in contact with an enzyme called a catalase, which is found in most of our cell tissue and blood but not on our skin. This catalase breaks down the hydrogen peroxide,  $H_2O_2$  into water  $H_2O$  and oxygen  $O_2$ . The release of the extra oxygen molecule is what causes the bubbles to form. This bubbling helps to clean the cut or scrape of blood, infection, or dirt.

**October's Mystery:** Can we make our Jack-O-Lantern pumpkin erupt using yeast and hydrogen peroxide?



### Supplies:

- Pumpkin
- 6% Hydrogen Peroxide ( $H_2O_2$ )
- Liquid Dish Soap
- Food Coloring
- Soda Bottle
- Dry Yeast (small packet)
- Warm Water



### Science Behind Erupting Jack-O-Lantern:

In this investigation, we are going to explore a chemical reaction as we combine dish soap, yeast, food coloring and water with the hydrogen peroxide. The chemical reaction that takes place will result in an eruption of foam. Watch out-this WILL get messy! For our experiment we will

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combine all of our ingredients in a Jack-o-lantern! The foamy concoction that erupts from the pumpkin is actually soap bubbles filled with oxygen gas.

The secret ingredient that makes this investigation fun is the yeast, which acts as a catalyst (something that speeds up a reaction) in this case the decomposition of hydrogen peroxide. When hydrogen peroxide ( $\text{H}_2\text{O}_2$ ) decomposes, it breaks down to form water ( $\text{H}_2\text{O}$ ) and oxygen ( $\text{O}_2$ ). As the reaction takes place, we will see steam coming from the bubbling foam. This shows evidence that the reaction is exothermic. An exothermic reaction is a chemical reaction that releases energy in the form of light or heat. Expressed in a chemical equation: reactants  $\rightarrow$  products + energy

### **What to Do:**

**Step 1:** Carve a pumpkin or use a pre carved pumpkin or plastic pumpkin.

**Step 2:** Pour 1 cup (8oz or 250ml) of 6%  $\text{H}_2\text{O}_2$ , 1 Tablespoon of liquid dish soap, and eight drops of food coloring into a soda bottle/cup). Swirl the ingredients around to mix them up. Then place the soda bottle inside the pumpkin.

**Step 3:** In a separate bowl, mix together a small packet of dry yeast and 3 tablespoons of warm water.

**Step 4:** Pour the mixture into the soda bottle in the pumpkin. Place the top (if it has one) back on the Jack-O'-Lantern and stand back.

**Step 5:** Foam will explode out of the Jack-O'-Lantern. The yeast will quickly remove the oxygen from the peroxide, creating lots of bubbles filled with oxygen.

**Caution! This experiment is messy and should be done outside or set the pumpkin on a large pan or tray.**

**Repeat Experiments:** Try running the experiment again but adjust the ingredients.

Does the amount of yeast used make a difference?

What happens if you do not mix the yeast with water before adding it?

Record your findings for each experiment.

### **Go Over Findings:**

What ingredient was the catalyst in our experiment causing our eruption?

What are some other uses for hydrogen peroxide?

What happened when we added more yeast to the experiment?



Can we relate this activity to any type of career or STEM field of study?

**Investigate, Create, & Take: Investigators can take with them:**

- ✓ Pumpkins and gourds

**Sources:**

Oozing Pumpkin Elephant's Toothpaste, Steve Spangler Science.

<http://www.stevespanglerscience.com/lab/experiments/oozing-pumpkin-elephants-toothpaste/>

WebMD, Hydrogen Peroxide; <http://www.webmd.com/drugs/2/drug-76035/hydrogen-peroxide/details>

**Additional Links:**

Video of the experiment

Science Bob's Crazy Foam Experiment, Science Bob-

<https://www.bing.com/videos/search?q=hydrogen+peroxide+foaming+experiment&view=detail&mid=EB2ED23FC7638B907EF8EB2ED23FC7638B907EF8&FORM=VIRE>

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