**Next:**
*Materials and Explanations*

**Then:**
*Step-by-Step Photo Sequence*
RELIGHTING A FLAME

Use carbon dioxide and oxygen gases to extinguish and ignite fire.

Materials
• Yeast
• Baking soda
• White vinegar
• Hydrogen peroxide
• Popsicle stick
• Two graduated cylinders
• (or similar containers)
• Lighter
• Measuring spoons
• Safety glasses
• Adult supervision

EXPERIMENT
1. Add 1 teaspoon of baking soda to two graduated cylinders.
2. Add 1 teaspoon of yeast to both of the graduated cylinders.
3. Shaken, spin, and twirl the graduated cylinders to mix up the baking soda and yeast combination.
4. Add a generous splash of hydrogen peroxide to one of the graduated cylinders.
5. In the other graduated cylinder, pour in a generous amount of white vinegar.

The addition of hydrogen peroxide and vinegar to their respective cylinders creates a reaction with bubbling and fizzing in each of the cylinders. This is how you know you're on the right track.
6. Use a lighter to ignite a popsicle stick. Make sure that you have a strong, consistent flame on the popsicle stick before continuing.

7. Stick the lit end of the popsicle stick down into the graduated cylinder that contains vinegar. You don't need to touch the bubbles or liquid. The flame will extinguish.

8. Now, take the still-smoking popsicle stick, placing and holding it in the cylinder that contains hydrogen peroxide. Again, no need to touch the bubbles or liquid in the cylinder. The ember where a flame once was will begin to glow more intensely as it stays in the cylinder until… the flame relights!

9. Repeat placing the popsicle stick into the vinegar cylinder and the flame will once again extinguish. Replace the popsicle stick in the hydrogen peroxide cylinder and, once again, the flame is reignited.

HOW DOES IT WORK?
Most flames require oxygen, fuel, and sufficient heat to ignite and stay lit. These three components of fire are referred to as the fire triangle or combustion triangle. Removal of any of the three components will cause the flame to extinguish or "go out."

In the instance of the popsicle flame, the three necessary components are present during the initial lighting of the fire. The heat generates from a separate flame, the lighter. The wood of the popsicle stick provides the fuel. Finally, the oxygen level present in the atmosphere is enough to sustain a flame. When you stick the flaming popsicle stick into the first graduated cylinder it extinguishes. That means one of the three components of the fire triangle is missing, but which one?

The secret lies in the bubbling mixture in the cylinder. The baking soda (also known as sodium bicarbonate) is a base. The vinegar, or acetic acid, is a weak acid. When baking soda and vinegar are combined, the immediate acid-base reaction creates carbonic acid. Carbonic acid is unstable and decomposes into carbon dioxide (CO2) and water (H2O). The bubbling that you see inside of the cylinder is the production of the CO2 gas. When you dip the popsicle stick into the cylinder, you're exposing the flame to concentrated CO2 gas. The lack of oxygen extinguishes the flame.
HOW DOES IT WORK?
Upon placing the popsicle stick into the second graduated cylinder, the ember begins to glow more intensely until the flame reignites. The invisible property at work is the reintroduction of oxygen (O2). The high concentration of O2 in the cylinder makes the heat source more intense until the flame ignites again.

Hydrogen peroxide (H2O2) is fairly unstable and always trying to decompose into water (H2O) and oxygen (O2). When yeast is mixed with hydrogen peroxide, it acts as a catalyst to the decomposition. This creates oxygen at a much faster rate that you can see bubbling inside of the graduated cylinder. Placing the partially glowing ember into the concentrated oxygen completes the fire triangle and reignites the flame.
HERE IS WHAT YOU NEED

2 GRADUATED CYLINDERS
MEASURING SPOONS
POPSICLE STICK
LIGHTER
HYDROGEN PEROXIDE
VINEGAR
MYSTERY POWDER #1
MYSTERY POWDER #2
ADD 1 TSP OF THE MYSTERY POWDER #1 TO EACH OF THE CYLINDERS
ADD 1 TSP OF MYSTERY POWDER #2 TO EACH OF THE CYLINDERS

MIX IT UP
3. Add a generous splash of hydrogen peroxide to one of the cylinders.

4. Add a generous splash of vinegar to the other cylinder.
5 CAREFULLY LIGHT THE POPSICLE STICK & ALLOW IT TO BURN UNTIL YOU SEE AN EMBER GLOWING
6

DIP THE STICK IN THE CYLINDER WITH VINEGAR TO EXTINGUISH THE FLAME.

DIP IT IN THE OTHER CYLINDER TO WATCH IT RE-LIGHT.