The Exploding Eggs Experience

Learn

Chemistry Terms

Decomposition Reaction

- Definition - A reaction where the reactant breaks down into two of more products.

Exothermic Reaction

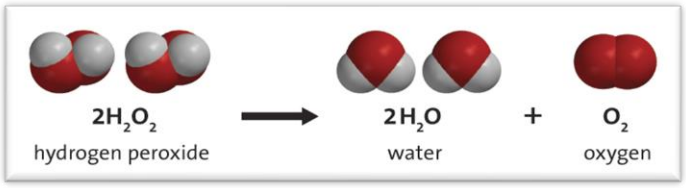
- Definition - A reaction that releases heat as one of its products.

Catalyst

- Definition - a substance that can increase the rate (speed) of a chemical reaction without itself undergoing any permanent chemical change.

The Big Picture

Let's learn about those terms using the example of Hydrogen Peroxide.



Hydrogen Peroxide is H_2O_2. It is constantly decomposing over time. When it decomposes, it becomes 2 different products: H_2O and O_2 (water and oxygen).

When H_2O_2 decomposes into H_2O and O_2 (water and oxygen), it also produces heat. This means the decomposition of H_2O_2 is an exothermic reaction.

Hydrogen Peroxide (H_2O_2) is always decomposing, but it does so at a very slow rate. If we wanted to speed that reaction up, we can add a catalyst to the H_2O_2., It so happens, that Yeast contains an enzyme called catalase, which actively decomposes H_2O_2. So, when we add the yeast to our hydrogen peroxide, the catalase in the Yeast acts as a catalyst to the decomposition reaction and helps the H_2O_2 quickly decompose to water and oxygen right before our eyes in a matter of seconds.

How can we demonstrate this is in a fun way? If we mix H_2O_2 with soap and water, and then add some Yeast, we can instantly create water, air and heat which when mixed with the soap, leaves us with warm soapy bubbles. Head to the experiment to try this out yourself!

Experiment

What you need:

- **3 tsp** of 30 or 40 volume Hydrogen Peroxide
    - Typically, only found in a salon store
- **1 tsp** Active Dry Yeast
- **8 tsp** water
- **1-2 drops** dish soap
- **4-5 drops** of food coloring
- **1** plastic egg
- Goggles and gloves are optional
    - The hydrogen peroxide we use in this experiment is much stronger than the one we use at home to clean out cuts, so be careful handling it!

Experiment steps:

If you're using the AR partner app, Science for Seniors, match the color of the stars in the experience with the steps on this sheet.

1. Put on your protective goggles and gloves if you have them.
2. Set out a dish mat, newspaper or a tin tray to perform the experiment in and help with easy clean up.
3. Mix 1 tsp yeast to 4 tsp lukewarm water in a small bowl. We want to let this sit for a few minutes to fully combine.
4. Mix a few drops of dish soap with 4 tsp water in a second small bowl.
5. Add several squirts of food coloring to the soapy water. The more you add, the more vibrant the explosion will be.
6. Add 4 tsp Hydrogen Peroxide to the bowl with soapy water.
7. Open the plastic eggs and tape up any air holes.
8. Pour the Hydrogen Peroxide and Soap mixture in one half of the egg.
9. Pour the yeast mixture in the other half of the egg.
10. Close the egg and watch it explode!
11. Notice that the foam we produced is warm to touch! And more importantly, it's safe to touch! The decomposition of Hydrogen Peroxide (the experiment we just performed) just produces water, soap and oxygen.

Discover

How does this all apply to your everyday life?

Well, let's talk about our hair. Hydrogen Peroxide is commonly found in hair coloring products. That is why we must buy our high concentration bottle used for this experiment at a salon store. Hydrogen Peroxide bleaches human hair by breaking down hair's melanin, the tiny grains of pigment which create natural hair color. Our bodies naturally produce both Hydrogen Peroxide and catalase (the same enzyme found in yeast that helps to breakdown hydrogen peroxide). However, as we get older our bodies continue to produce hydrogen peroxide but make less catalase. Because there is less catalase available to breakdown the hydrogen peroxide, the concentration of hydrogen peroxide in our bodies increases. The increased concentration of hydrogen peroxide breaks down the melanin in our hair and causes our hair to lose its color and turn grey or white.

Informational Videos

Check out these videos to learn more about how our hair gets it color and why it greys.

If you're using the AR partner app (Science for Seniors), scan the characters below to pull up the videos.

https://www.youtube.com/watch?v=WEOncb9hXYE

https://www.youtube.com/watch?v=oCtdFSAgKCY