

Objective

By the end of this lesson, Sky will understand the basic chemistry behind hair dyeing, including how different chemical reactions occur during the dyeing process, and will be able to describe the impact of pH and oxidation on hair color. Sky will also learn how to safely experiment with hair dye formulations.

Materials and Prep

- Hair dye samples (preferably semi-permanent and permanent)
- pH strips or pH meter (if available)
- Plastic gloves
- Plastic mixing bowls and spoons
- Old towel or cape to protect clothing
- Water
- Notebook for observations and notes

Before the lesson, ensure that all materials are gathered and that Sky understands the importance of safety when working with chemicals. Discuss the need for gloves and protective clothing to prevent skin staining.

Activities

- **Understanding the Chemistry:** Begin with a brief presentation on the chemistry of hair. Discuss the structure of hair, the role of melanin, and how hair dye interacts with hair at a molecular level. This will set the foundation for the practical activities.
- **pH Experimentation:** Using pH strips, test the pH of different hair dye samples. Discuss how the pH level can affect the dyeing process. Sky can take notes on the different pH levels and hypothesize how this might affect the final color.
- **DIY Hair Dye Formulation:** Challenge Sky to create a simple hair dye using natural ingredients (like beet juice or coffee) and compare it to commercial hair dyes. This hands-on activity will allow her to experiment with color and understand the role of each ingredient in the dyeing process.
- **Color Change Observation:** If possible, apply a small amount of a hair dye sample to a strand of hair (or a synthetic hair wig), and observe the color change over time. Document the changes and discuss the chemical reactions taking place.

Talking Points

- "Did you know that hair is primarily made of a protein called keratin? Understanding this helps us know how dye interacts with hair."
- "pH is super important in hair dyeing. A lower pH can help open the hair cuticle, allowing the dye to penetrate better. Why do you think that is?"
- "Oxidation is a key process in permanent hair dye. It changes the color molecules in your hair. Can you think of other examples of oxidation in everyday life?"
- "When experimenting with DIY hair dyes, think about the color wheel. Mixing colors can lead to

unexpected results! What colors do you think will mix well?"

- "Safety first! Always wear gloves when working with hair dye. What do you think could happen if we don't?"