

Objective

By the end of this lesson, Emily will learn how to create invisible ink using lemon juice, understand the science behind it, and discover how to reveal her secret messages using heat.

Materials and Prep

- Lemon
- Water
- Cotton swabs or a small paintbrush
- White paper
- Heat source (like a lamp or an iron, with adult supervision)

Before starting, make sure you have all the materials ready. Discuss with Emily the importance of safety when using a heat source.

Activities

• Making the Invisible Ink:

Emily will squeeze lemon juice into a small bowl and mix it with a few drops of water. Using a cotton swab or paintbrush, she will write a secret message on the white paper. This will be her invisible ink activity!

• Understanding the Science:

Discuss with Emily how lemon juice is an organic compound that oxidizes when heated, which makes it change color and become visible. This will help her understand the chemical reaction involved.

• Revealing the Message:

With adult supervision, Emily will carefully hold her paper near a heat source to reveal her message. She can observe how the writing appears and discuss what happens as it heats up.

• Creative Writing:

Encourage Emily to write a short story or a poem using invisible ink. This activity will combine her creativity with her new science skills!

Talking Points

- "Did you know that lemon juice can be used as invisible ink? It's a fun way to send secret messages!"
- "When we heat the lemon juice, it changes color. This happens because of a chemical reaction. Can you guess why that happens?"
- "The reason lemon juice works is that it contains organic compounds that are sensitive to heat. What do you think would happen if we used something else?"
- "Safety first! Always be careful when using heat. What are some ways we can stay safe while revealing our messages?"
- "This technique has been used for centuries! Can you think of any historical figures who might have used invisible ink?"
- "Invisible ink is not just for fun; it has been used in espionage and secret communications. How cool is that?"

- "What kind of secret messages would you like to write? Let's brainstorm some fun ideas!"
- "Remember, the more heat you apply, the darker your message will appear. Why do you think that is?"
- "How does it feel to create something that only you can see until you reveal it? It's like magic!"
- "What other natural substances do you think could work as invisible ink? Let's explore!"
- "This activity combines art and science. What do you enjoy more: creating art or discovering scientific principles?"
- "What did you learn today that surprised you the most? Let's share our thoughts!"