

Subject: Chemistry

Topic: Acids, Bases and Salts

Grade: 7

Sub – Topic:

Duration: 30 mins

Aim: To demonstrate how the acidic properties of lemons can be used to make an invisible ink.

Background:

Lemon juice—and the juice of most fruits, for that matter—contains carbon compounds. These compounds are pretty much colorless at room temperature. But heat can break down these compounds, releasing the carbon. If the carbon comes in contact with the air, a process called oxidation occurs, and the substance turns light or dark brown.

Materials Required:

- Fresh lemon juice
- Water
- Spoon
- Bowl
- Cotton bud / thin paintbrush
- White paper
- Lamp/ light bulb or candle

Preparation:

- Squeeze the juice of the lemon half into the bowl.
- Add the water and mix with a spoon.
- Think of a secret message we would like to write—and to whom we're going to deliver it!
- **Extra:** If we want to be super-secret, we can write a boring old message or draw a picture on the paper with a pencil before we write the secret message to disguise it even further.

Procedure:

- Soak the Q-tip in the lemon juice-and-water solution.
- Use the damp Q - tip to write the top - secret message on the piece of paper.
- Wait a few minutes for the paper to dry. While we are waiting, we can switch on the lamp to give the lightbulb time to heat up (being careful not to touch the hot bulb itself).
- When the paper is dry, hold it up to the hot lamp for a few minutes (but don't let the paper get so hot that it burns). *What happened to your invisible ink? How long did it take for the change to occur?*
- **Extra:** Try this activity with other acidic liquids, such as apple juice or vinegar. *Which ones work best?*

Result and Outcome:

Diluting the lemon juice in water makes it very hard to notice when you apply it to the paper, no one will be aware of its presence until it is heated, and the secret message is revealed.

**Precaution:**

1. Please ensure an adult's presence while working with flame.
2. Be careful while holding the paper over the bulb or open flame of a candle as it may burn the paper if held too close to the heat source.

Conclusion:

Lemon juice is acidic in nature and contains carbon compounds. These compounds are almost colourless at room temperature. Heat breaks down these compounds and releases the carbon. When carbon comes in contact with air (specifically oxygen), oxidation occurs and the substance turns light or dark brown. If it oxidizes long enough, it can go all the way to black.

Cleanup:

- Use caution with the lamp, as the lightbulb can stay hot even after it is turned off.
- Have extra lemon solution? Add more water and a little sugar, and we can turn our invisible ink into lemonade! And it's no secret that lemonade tastes good.