

Activity presented in partnership with:



Invisible Ink

AGE RANGE: All Ages • PREP TIME: 5-10 minutes • LEARNING TIME: 15-30 minutes

Invisible Ink for all ages

During the American Revolution, Patriot spies needed a safe way to get vital information to General Washington. To do so, they wrote messages in invisible ink made of fat, let the messages dry and sent them to Washington. Once the message reached Washington, an intelligence officer would hold the paper close to a candle, and heat it almost to the burning point. The fat in the ink darkened quickly, causing the words to become visible. Unfortunately, it was very easy to set the paper on fire. British sentries also knew about these inks and often checked for hidden messages on any papers carried by a courier. Later, invisible inks used a chemical reaction to reveal the message instead of heat. These types of inks were safer and harder to detect.

The experiments here are for all ages. Younger kids can do the experiment without needing a heat source, while older kids can initiate their reaction by adding heat source. Read on for instructions to both experiments.

Instructions – for kids 4+ no heat required

Gather the following items:

- White paper (4" x 4" square is fine)
- Q-tips
- Jar of butter/fat
- Coffee grounds in a small bowl
- Plastic or regular teaspoon

1. Dip the Q-tip into the butter so the swab is saturated with the material
2. Write a word or draw an image on the paper with the Q-tip-butter/fat
3. Wait a few seconds and then note that the grease from the fat starts to show up
4. With a teaspoon sprinkle a heavy layer of coffee grounds over the word or picture

5. With the teaspoon, press down on the coffee grounds firmly so they will stick to the fat
6. Shake off the excess coffee grounds back into the bag or bowl
7. The remaining coffee grounds will stick to the fat and the word or image will be seen clearly



Instructions – for older kids

Gather the following materials:

- White paper (4" x 4" square is fine)
- Q-tips or thin paintbrush
- Lemon juice (bottled or from ½ lemon)
- Small bowl
- A few drops of water
- Plastic or regular teaspoon
- Hair Dryer or Iron



1. Squeeze or pour lemon juice into the bowl. Add a few drops of water.
2. Dip the Q-tip into the lemon juice so the swab is wet with the material.
3. Write a word or draw an image on the paper with the lemon juice Q-tip. The more lemon juice you use the darker your message will be!
4. Wait 15-20 minutes for the lemon juice to dry on the paper. Try not to move the paper while it dries.
5. When you're ready to read your message find a safe heat source: hair dryer or iron will both work.
6. Heat your paper with the hair dryer on high heat, or if you're using an iron, turn the heat to high and iron your paper.
7. Watch your secret message reveal itself when exposed to heat!
8. It will be HOT, so let your paper cool for one minute before touching it.

How does this work?

Lemon juice is organic (meaning it contains carbon-based compounds) and acidic. Citric acid is a carbon-based compound in lemon juice that is invisible at room temperature. When heat is applied to the lemon juice, the heat breaks down the citric acid, releasing the carbon from the compound. Oxygen in the air reacts with the released carbon, turning the lemon juice brown and revealing your secret message.



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