Invisible Ink

Ages 4-10

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Background

Your mission, if you choose to accept, is to keep your intel classified. You must keep your special message or drawing concealed from the other agents until the secret code is given to you by your handler. Do you accept?

Materials

1. Paper
2. Cotton swabs
3. Baking soda (1 tablespoon)
4. Rubbing alcohol (1 cup)
5. Turmeric (1 teaspoon)
6. Paper Towel
7. Small paint brushes (optional)

Experiment

Part 1: Making your message or picture

1. Add 1 tablespoon of baking soda to ½ cup of water in a bowl
2. Stir the baking soda into the water to make the “invisible ink”
3. Use a cotton swab or small paintbrush to draw a picture of the bacteria with new functions
4. Set your paper aside to dry (it dries faster in the sun!)

Part 2: Revealing your message or picture

5. While you are waiting for your paper to dry, you can make a solution to reveal your message! This solution can stain easily, so we recommend wearing old clothes in case of a spill, and mixing it in a glass bowl to make it easy to clean later.

6. Add 1 teaspoon of turmeric to ½ cup of rubbing alcohol
7. Stir the turmeric into the water
8. After you paper has dried, use a paper towel or paintbrush to apply the color changing solution
9. Your secret message or picture is now revealed!

How does this experiment work?

Today, we made a chemically activated invisible ink. This means that the chemicals in our ink are revealed by a different solution called a "reagent". In this experiment, the turmeric rubbing alcohol mixture is the reagent.

Another type of common homemade invisible ink is heat activated. This approach uses acids as ink. For example, lemon juice, apple juice , and vinegar are all acidic and can be used as invisible ink. One way to remember that a liquid is acidic is it has a sour taste. When the acid heats up, it changes color so the message is revealed.

This experiment also introduces to students the basic idea of synthetic biology. It asks students to draw their versions of the bacteria (the instructor can show what the bacteria looks like) and give the bacteria a new function (maybe the bacteria can sing?) to introduce them the concept of synthetic biology.

Should this be live or recorded?

This isn't super long so it could work live. Maybe as the paper is drying we can encourage them to make another one (either message or picture whatever they didn't do the first time). We could also ask the kids to present their work and we take a screen shot.

Amazon links to materials (campers might have these at home already -- I'm assuming they have paper and paper towels)

1. Cotton swabs
2. Baking soda
3. Rubbing alcohol
4. Turmeric
5. Small paint brushes (optional but these are $0.01)
6. Sealing plastic bag

7. Plastic squeeze bottle