

# Invisible Ink

Spy Science Series

## Lab objectives:

- Learn how pH of different substances interact.
- Measure and create solutions

## Safety measures:

- Substances should not be consumed.
- If the substances get on hands, wash off with plenty of water.
- If substances get on clothes, first rinse with water to remove any acids that would react with the base in soaps.

## Tie into other subjects:

- Create a spy sketch and act it out.
- Deliver a secret message to a friend at a birthday party.
- Create invites to a secret party.

# Seeing Red

## Supplies:

- 1% phenolphthalein
- Sodium Carbonate
- Water
- White paper
- Blotter paper
- Paint brush



## Process:

1. Using your paint brush and phenolphthalein, create a picture or image on a white sheet of paper. Use a light touch so it dries faster.

2. Set it aside and let it dry a few moments.

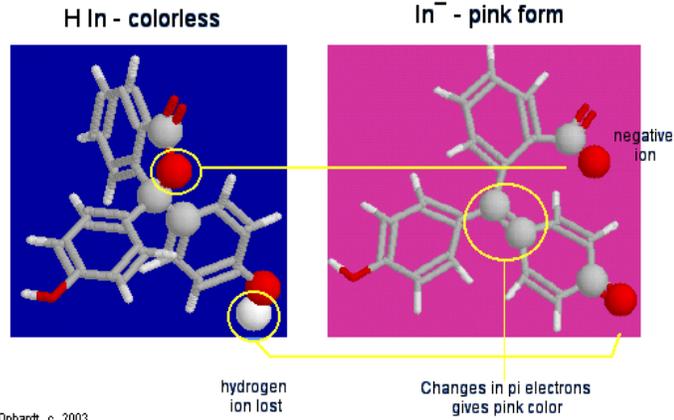
While waiting for it to dry, mix together the sodium carbonate and water.

3. While you only need about ¼ teaspoon of sodium carbonate in about 1/8 cup of water, more a stronger concentration (more sodium carbonate) will give a brighter red solution.

4. Soak some of the sodium carbonate solution up with a piece of blotting paper. Place the blotting paper over the top of your secret message to expose it.

## What is happening there?!

Phenolphthalein Indicator

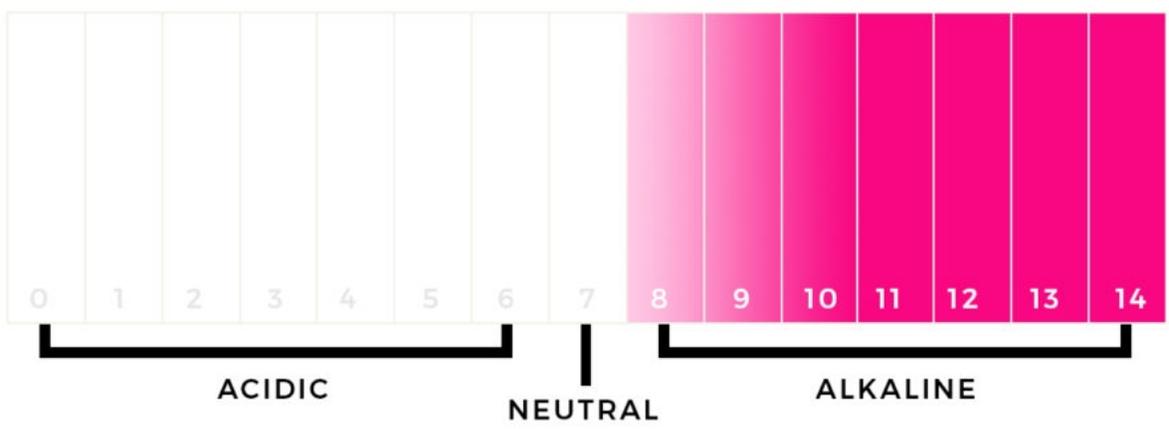


C. Ophardt, c. 2003

## Experiment:

What other solutions could you use to expose the secret message?

# PHENOLPHTHALEIN COLOR CHANGE



# Seeing Blue

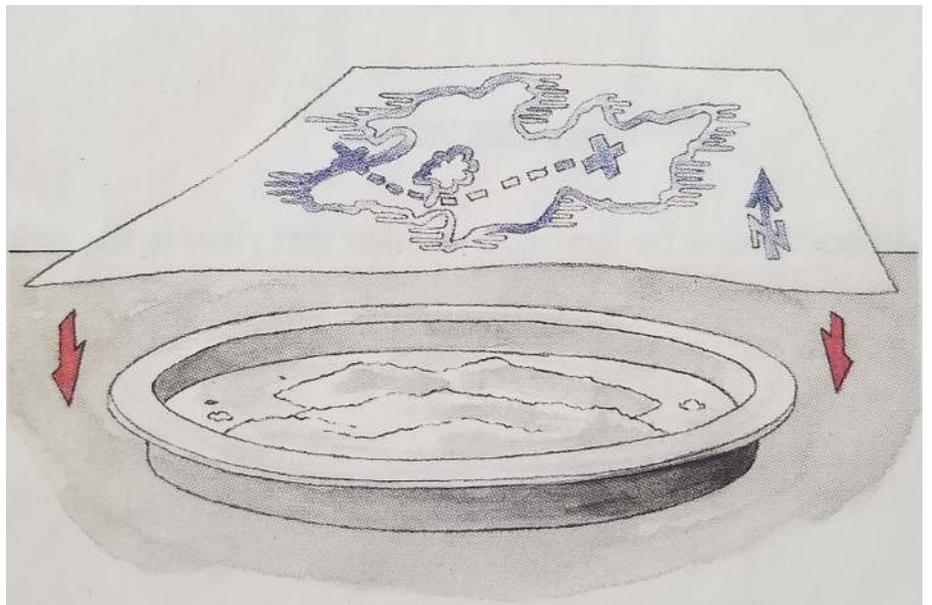
## Supplies:

Copper sulfate solution  
Ammonium chloride  
Calcium hydroxide  
Pie tin  
Light blue or white paper  
Blotter paper  
Paint brush

## Process:

1. Fill your test tube with about an inch of water. Dissolve about a small scoop of copper sulfate into the water. Shake vigorously to dissolve.
2. Using a paint brush, create your image or message on light blue or white paper. Set it aside to dry.
3. In a DRY test tube, combine ammonium chloride and calcium hydroxide in a 1:1 ratio. Shake to mix, then spread it out into the pie tin.
4. Lay the secret message over the tin and watch the message reveal.

Notes



# Jeeing Brown

## Supplies:

Vinegar  
Onion  
Lemon

Garlic press (if using onion)  
Juicer (if using lemon)

White paper  
Oven, electric hot plate, or stove and frying pan.

## Process:

1. Prepare your ink by either juicing a lemon or squeezing small chunks of onion in a garlic press.

Vinegar is used as is.

2. Using a paint brush, create your image or message on white paper. Set it aside to dry.

3. Using LOW heat, heat the message so the juice carbonises.

This can be done in the oven on warming, a hot plate, or very low heat in a frying pan. Temperatures will vary based appliance.

Notes



Can I get your feedback, please?

I'm always looking to make our workshops better. Everything from the teaching explanations, the delivery, the content... everything!

The goal is to make science fun and accessible while still informing about the wonderful world we live in.

I'll be working hard on the labs for next year to share with the Homeschool Explorers.

If at any time you want to reach out for questions, comments and/or requests, please don't hesitate to contact me at:

[gconyers@insanitek.net](mailto:gconyers@insanitek.net) or via phone at 317.759.1284.

FYI: Since it's just me (for now), I rarely have a chance to pick up the phone. Please leave a message and I'll get back to you as soon as I can.

PS: You can find this lab, as well as all the others we've done and more, online in our Resource Library.

<https://insanitek.net/knowledge-conduit/library-of-resources/>

The password is "Knowledge" without the quotes. :)