

Sugar Secret Code

GENERAL INFORMATION

Many juices and other liquids such as milk, sugar water, and clear sodas can be used as invisible ink. *Carbon* compounds in these solutions make this activity possible. When the dry, colorless solution is heated, the carbon compound breaks down producing pure carbon, which is black.

Other combinations of chemicals can be used in creating invisible ink. Potassium ferrocyanide or tannic acid can become visible by exposure to ferric chloride or ferric alum. Also invisible ink can often be detected by *infrared* or *ultraviolet* light. Writing inks used in pens consist of dyes and *resins* dissolved in water or glycol alcohol. These inks dry by evaporation.

Ballpoint pens use a thick, sticky ink to keep the ink from leaking around the rotating ball. Erasable inks contain pigments that are not readily absorbed by paper. They are bound by a resin that sits on the paper and may be erased for a certain time after being written on the paper. Fountain pens use a very fluid ink that consists of iron compounds mixed with water and *tannic acid*.

MATERIALS

You will need two tablespoons sugar, $\frac{1}{4}$ cup water, a toothpick, white writing paper, a blue ballpoint pen, an iron or exposed light bulb.

PROCEDURE

The paper needs to get quite hot, almost scorched, to develop the 'ink' so be patient. **Caution: The teacher should handle all hot equipment such as irons, hot plates, etc.**

ANSWERS TO QUESTIONS

1. The invisible ink turns dark and the writing becomes visible. This happens because the heat causes a chemical reaction in the ink, turning it dark.
2. Invisible ink has been used to send secret messages during wartime. You could send messages to your friends or make partial drawings that become visible when heated.

EXTENSION IDEAS

1. ALTERNATE INK

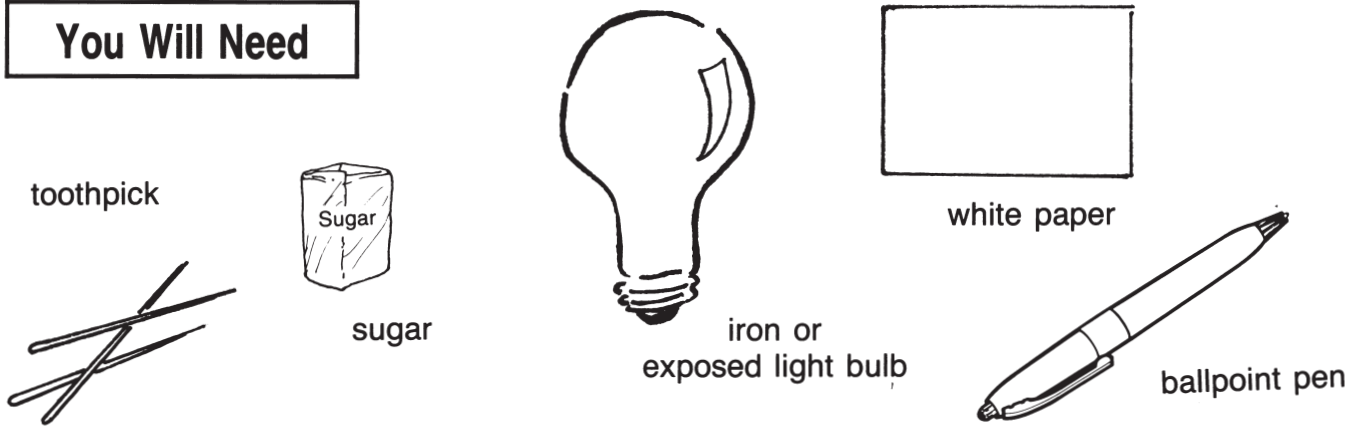
Try this experiment using alternate forms of ink such as milk, fruit or vegetable juices, etc. Try to find the most successful invisible ink. Check your local hobby or magic shop for invisible inks.

2. CHANGE CONCENTRATION

Use different concentrations of sugar water, from very thick to very watery.

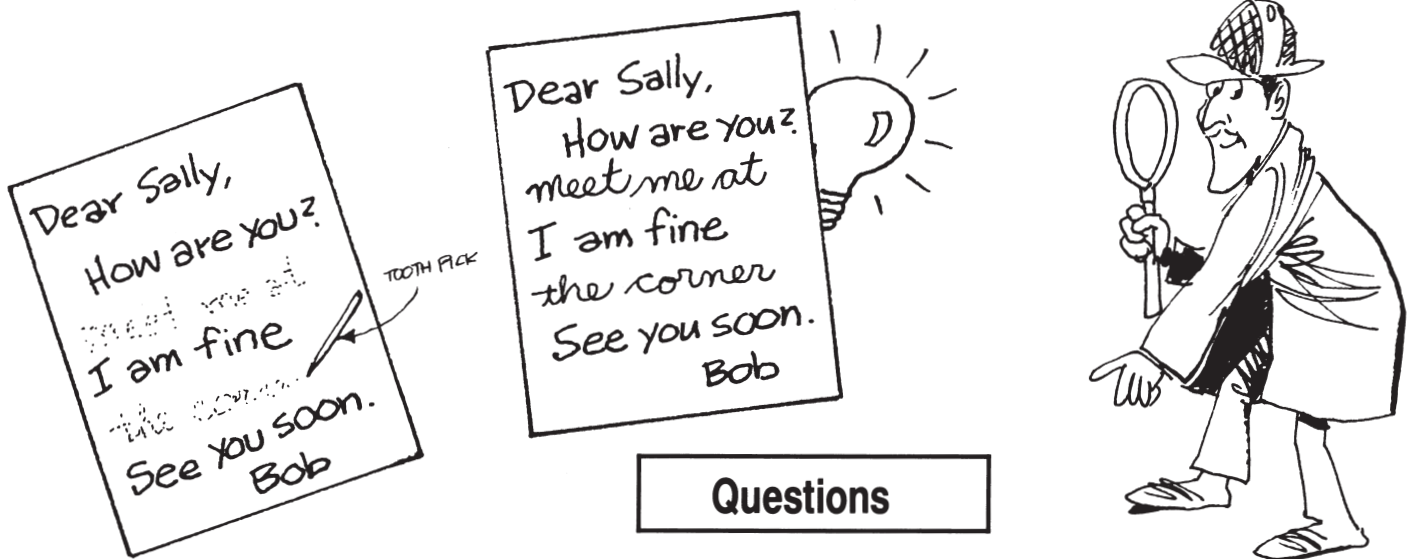
Sugar Secret Code

You Will Need



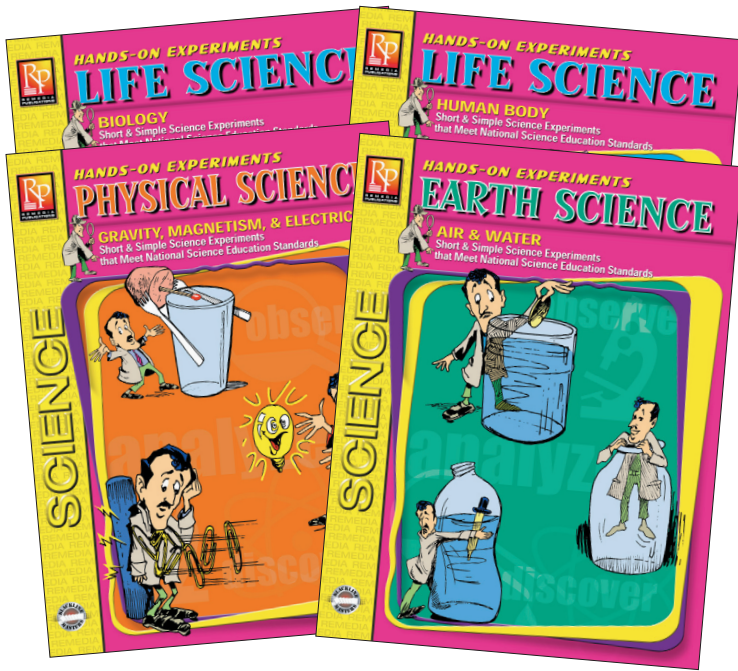
Here's How

1. Write a short letter on a piece of paper with a blue ink ballpoint pen.
2. Mix about two teaspoons of sugar in one-half cup water and dip the end of a toothpick in the sugar water – use it to write another message between the lines of the letter.
3. After this dries, hold the letter up to a light bulb or iron it with a warm iron. The message will appear as the paper nears the scorching point.



1. What happens when the invisible ink is warmed? Why?
2. How could you use invisible ink?

More from Remedia Publications



Hands-On Science Experiments

These fun, easy-to-do experiments use materials found in the kitchen, garage, or garbage can!

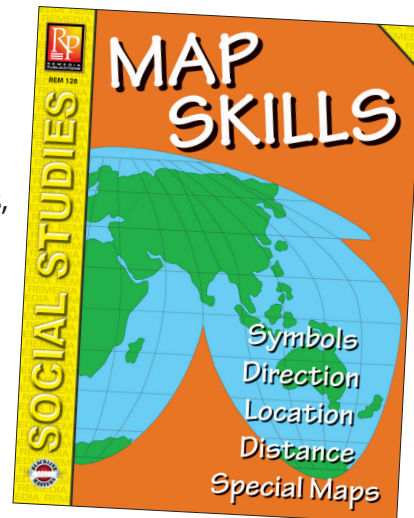
Investigations cover physical science principles such as heat and light energy, metal conductivity, magnets, and more. Life science concepts include experiments in touch, taste, smell, central nervous system, reaction time, sight, and more. Earth science features concepts dealing with air and water. Fifteen experiments per book.

[LEARN MORE](#)

Mapping Skills

Abundant practice interpreting a wide variety of maps! Students will learn about directions, map symbols, scales, grids, and legends. They will also use maps to follow and give directions. Frequent comprehension questions provide students with the opportunity to apply new concepts. This 52-page book will be a welcome addition to your social studies curriculum!

[LEARN MORE](#)



High-Interest Mini Mysteries Binder

Students follow clues, find facts, and make inferences to solve each caper. These short, high-interest mysteries take place in fascinating locations that will grab your struggling reader's attention!

Each mystery is paired with an informational text to build students' knowledge of the location where the fiction story takes place, which introduces students to multiple text types as called for in the Common Core State Standards.

[LEARN MORE](#)