

# Turning Water into Ink

## Student Worksheet

Name \_\_\_\_\_

**Overview** You will look like a true magician as you pour two clear solutions together and make something that looks like real ink!

**What to Learn** By the end of this experiment you will understand how to make a saturated solution, and how to identify a chemical reaction.

### Materials

- sodium ferrocyanide ([MSDS](#))
- ferric ammonium sulfate ([MSDS](#))
- 2 test tubes
- distilled water
- goggles and gloves
- water

### Lab Time

**CAUTION: Do not mix sodium ferrocyanide with any other chemical other than specified here, as it can produce hydrogen cyanide gas, which is lethal. Handle this chemical with care, wear gloves, and keep it locked away when not in use.**

1. Measure out a tiny bit of sodium ferrocyanide into a test tube filled partway with water. You want to add enough of the crystals so that when you shake the solution (with the cap on), all of the crystals dissolve into the water and make a saturated solution.
2. Into a second test tube, dissolve another tiny bit of ferric ammonium sulfate in water, adding just enough to make a saturated solution. \*
3. When you're ready, pour one test tube into the other and note the change!
4. When finished, rinse with plenty of water and make sure to clean up lab area thoroughly.

**\*NOTE:** You can use this as real ink by using it BEFORE you combine them together like this: dip a toothpick into the first solution (sodium ferrocyanide solution) and with the tip write onto a sheet of paper. While the writing is drying, dip a piece of paper towel in the other solution (ferric ammonium sulfate solution) and gently blot along where you wrote on the paper... and the color appears as blue ink. You can make your secret message disappear by wiping a paper towel dipped in a sodium carbonate solution.

**Bonus Experiment Idea!** You can grow yellow-gold crystals by cooling off a cup of hot water. Here's how: into a test tube, add 40 drops of hot water and 1 small spoon measure of sodium ferrocyanide. Suspend a small pebble attached to a thread into the test tube (this is your starter-seed for your crystals to attach to). If after a day or two your crystals aren't growing, just reheat the solution and add a little bit more of the chemical. To grow purple crystals, use ferric ammonium sulfate instead of the sodium ferrocyanide. You can also use 2 spoonfuls of cobalt chloride in a fresh test tube to grow red-colored crystals.

**ANOTHER Bonus Experiment Idea!** Mix 1/3 measure of ferric ammonium sulfate and 1/3 measure of sodium Ferro-cyanide in a glass 1/2 full of water. To another glass 1/2 full of water, add 5 drops of phenolphthalein solution. In an empty glass put 1 spoonful of sodium silicate powder and 2 spoonfuls of water. Pour the contents of these last two glasses into the first glass, stir and watch what happens.

## Turning Water into Ink Data Table

Chemical	Detailed Description	How much water it took to make a saturated solution
sodium ferrocyanide		
ferric ammonium sulfate		
sodium ferrocyanide + ferric ammonium sulfate		

**Exercises** Answer the questions below:

1. What is a saturated solution?
2. Was this a chemical or physical reaction? How do you know?
3. What happened to the molecules of sodium ferrocyanide and ferric ammonium sulfate when they were combined together?

## Exercises

1. What is a saturated solution? (a solution where as much solute is dissolved into the solvent as is possible)
2. Was this a chemical or physical reaction? How do you know? (chemical reaction because there was a color change)
3. What happened to the molecules of sodium ferrocyanide and ferric ammonium sulfate when they were combined together? (they reacted and formed a new product)

**Closure** Before moving on, ask your students if they have any recommendations or unanswered questions that they can work out on their own. Brainstorming extension ideas is a great way to add more science studies to your class time.