

# Turning Water into Wine

## Student Worksheet

Name \_\_\_\_\_

**Overview** It's a miracle! Well, at least it's science that looks like a miracle. Welcome to the world of phenolphthalein.

**What to Learn** You should understand that phenolphthalein is an acid/base indicator that stays clear in the presence of an acid but turns colors in the presence of a base.

### Materials

- 2 test tubes
- test tube stand
- sodium carbonate (washing soda) ([MSDS](#))
- phenolphthalein (liquid)\* ([MSDS](#))
- medicine dropper
- distilled water (bottled water is ok)
- test tube stoppers
- funnel (optional but useful)
- gloves and goggles
- Additional solutions for testing (vinegar, clear soda, baking soda + water, soapy water, etc.)

\*May substitute cabbage juice for phenolphthalein. Chop up a red cabbage and boil in water for 5 minutes. Strain the pieces out and use the juice as your indicator. Cabbage juice will have a wider color range, and turn different colors in the presence of acids and bases.

### Lab Time

1. Sprinkle a small amount of sodium carbonate ( $\text{Na}_2\text{CO}_3$ ) into the bottom of a test tube. Cap sodium carbonate and put aside. Put the test tube in the test tube rack.
2. Use a funnel to fill the test tube partway with distilled water. Use enough water to make a saturated solution (That means to add enough water so all of the solids disappear. A few solids on the bottom are ok for this experiment). Cap and shake to mix.
3. Add 3-4 drops of phenolphthalein in the test tube (Note: make sure your dropper is very clean and dry so there is no contamination). Cap phenolphthalein and put aside. Cap the test tube and shake.
4. Use phenolphthalein to test other liquids to see if they are acids or bases.
5. To clean up, wash liquids down the drain with plenty of water. Wash test tubes three times with water and dry with a clean, fresh paper towel.

## Turning Water into Wine Data Table

Substance	Color in the presence of phenolphthalein?	Acid or Base?
Sodium carbonate solution		

**Exercises** Answer the questions below:

1. How is phenolphthalein used as an acid/base indicator?
2. A student put a few drops of phenolphthalein into a liquid but didn't see any color change. Did he or she do the experiment wrong? What could have happened?
3. How could phenolphthalein be used to write a secret message?

## Exercises

1. How is phenolphthalein used as an acid/base indicator? (It stays clear in the presence of an acid but turns pink in the presence of a base.)
2. A student put a few drops of phenolphthalein into a liquid but didn't see any color change. Did he or she do the experiment wrong? What could have happened? (The liquid must have been an acid. Phenolphthalein stays colorless when it touches an acid).
3. How could phenolphthalein be used to write a secret message? (A message could be written with a cotton swab doused with a basic solution. Then, phenolphthalein could be brushed on the message, turning it pink).

**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.