

# Acids and Bases

## Student Worksheet

Name \_\_\_\_\_

**Overview** ACID!!! The word causes fear to creep in and gets our attention. BASIC!!! The word causes nothing to stir in most of us, but you'll soon understand the basics of bases and acids.

**What to Learn** After today, you'll understand that litmus paper can be used to determine if something is an acid or a base. The strength of that acid or base is indicated by the pH scale. Acids have pH 1-7 and bases have a pH of 7-14.

### Materials

- Lemon
- Apple
- Blue litmus paper
- White vinegar ([MSDS](#))
- Clear glass cup
- Tartaric acid ( $C_4H_6O_6$ ) ([MSDS](#))
- Measuring spoon
- Measuring syringe
- Water
- Test tube rack
- Test tube
- Cool water
- Sodium hydroxide (NaOH) ([MSDS](#))
- Dropper pipette
- Calcium hydroxide (CaOH) ([MSDS](#))
- Erlenmeyer flask
- Solid rubber stopper
- Storage bottle
- Stick-on label
- Permanent marker

### Lab Time

**Important Note:** When testing with litmus paper, don't dip the litmus paper into the chemical bottle. Use a clean dropper to transfer the chemical to the paper. Dipping into the chemical can and will, eventually, contaminate the chemical.

1. Press blue litmus paper on a lemon and then an apple. Make observations.
2. Dip the end of blue litmus paper in distilled white vinegar. Make observations.
3. Take 1-2 crystals of tartaric acid ( $C_4H_6O_6$ , the acid found in white wine) and put crystals on the end of a strip of blue litmus paper. Close the container of tartaric acid. Add one drop of water to the crystals and observe.

4. Make a solution of 5 milliliters of water and one spoon tip of  $\text{C}_4\text{H}_6\text{O}_6$ . Make sure to cap chemical and clean spoon when through.
5. Place solution on a strip of blue litmus paper. Run under cool water. You have just made RED litmus paper.
6. Use a dropper pipette to get one drop of sodium hydroxide (CAUTION! This is a very strong solution!). Place on red litmus paper. Observe. Rinse dropper with water and soap.
7. Put one spoonful of the solid calcium hydroxide in an Erlenmeyer flask. Cap the calcium hydroxide.
8. Fill flask to the 75 milliliter line. Cap tightly with rubber stopper. WITH THUMB ON CAP, shake well.
9. Allow solution to sit. Some calcium hydroxide will fall to the bottom, and a clear liquid will be present on the top.
10. Use a clean pipette to get a drop of clear liquid from the top layer. Place on blue litmus paper. If no color change, try placing drop on red litmus paper. Observe.
11. After you finish the experiment, don't discard the contents of the Erlenmeyer flask. It now contains limewater, a substance you need to save for the "Carbon Dioxide" lesson. Carefully pour the liquid into a storage bottle and discard the solids in the trash. Place a sticker on the bottle and/or use a permanent marker to label the bottle for future use. Keep the storage bottle out of direct sunlight when storing it.

## Acids and Bases Data Table

Sample	Acid or Base?

**Exercises** Answer the questions below:

1. How are lemons and apples similar?
2. How can an apple be an acid if acids are supposed to be sour? (HINT: Think about the natural sugars found in apples)
3. What is the difference between red and blue litmus paper?
4. My teacher asked me to test for a base, but I only have blue litmus paper. What can I do?

## Exercises

1. How are lemons and apples similar? (Lemons and apples are both acids)
2. How can an apple be an acid if acids are supposed to be sour? (HINT: Think about the natural sugars found in apples). (The sugar in apples overpowers the sour taste. Some apples, like Granny Smith apples, do taste sour).
3. What is the difference between red and blue litmus paper? (Red tests for a base, and blue for an acid)
4. My teacher asked me to test for a base, but I only have blue litmus paper. What can I do? (Use an acid to turn the blue litmus paper red. Run water over it and voila, red litmus paper. Now I can test for bases)

**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.