



## Acid and Base Indicators: How Do You Know What the pH of a Solution Is?

Indicators provide a quick and convenient way to measure a solution's pH. Indicators are themselves either a weak acid or a weak base, able to exchange protons with the solutions they are testing via an equilibrium reaction. Because the protonated and unprotonated forms of the indicator are different colors they give a quick visual indication of the pH.

### Watch Video 1

#### Observe Part 1

**Predict:** What color do you think the indicator will be when mixed with each of the common household chemicals?

### Watch Video 2

#### Observe Part 2

**Explain:** How close were your predictions? Were there any results that surprised you?

#### Identify an Experimental Design Flaw

How could using tap water instead of distilled water affect the indicator?

#### Refine/Expand the Experiment

How could you modify the experiment to give quantitative results instead of just qualitative?



## Practice Scientific Reasoning

How did the color of the cabbage compare to the color of the indicator solution? What might you infer from this about the pH of the cabbage?

## Watch Video 3

## Connect to Your World

Carbon dioxide can react with water to form carbonic acid. However, no matter how much dry ice was added, the first cylinder did not change color. Why do you think this was?

## Learn More by Exploring This Link

Acid-Base Solution <https://phet.colorado.edu/en/simulation/acid-base-solutions>

## At-Home Extension

Red cabbage is not the only natural pH indicator, many brightly colored fruits and flowers can be used as an indicator. Select several different specimens to extract with hot water. You can use vinegar to acidify the solution or an ammonia based clean to basify it. Record the changes in color associated with each sample you tested.