

The **pH scale: Basics** simulation explores the pH of acids and bases in everyday life, and how pH is affected by dilution with water.

CHOOSE an everyday liquid.

- Drain Cleaner
- Hand Soap
- Blood
- Spit
- Milk
- Chicken Soup
- Coffee
- Orange Juice
- Soda Pop
- Vomit
- Battery Acid

Water

DILUTE with water

ADD more liquid

DRAG the probe into solution to measure pH

pH Scale: Basics

Customization Options

The following query parameters allow for customization of the simulation, and can be added by appending a '?' to the sim URL, and separating each query parameter with an '&'.

Query Parameter and Description	Examples
<code>autofill</code> - when true, the dropper will autofill the beaker to 0.50 L when switching solutes. Default is false.	<code>autofill=true</code>
<code>supportsPanAndZoom</code> - when true, enables panning and zooming of the simulation using pinch-to-zoom or browser zoom controls. Default is true.	<code>supportsPanAndZoom=false</code>

Model Simplifications

- For liquids with a range of measured pH values, an average value from the literature was used.
- The simulation does not account for different acid dissociation constants (K_a) for each liquid when calculating pH after dilution. We make the simplification that any increase in the concentration of the major ion is due to the ions already present in the added water. For example, if students add 100 mL of water to an acidic solution, then the number of moles of H_3O^+ increases by 1×10^{-8} . The concentration of the minor ion is then calculated using the self-ionization constant for water (K_w). These calculations account for the leveling effect of water.

Insights into Student Use

After using indicators like litmus or pH paper, students may think that the color of the liquid is related to pH. To tackle this idea, we show battery acid and drain cleaner with the exact same color.

Suggestions for Use

Sample Challenge Prompts

- Classify solutions as acids or bases, given their pH.
- Predict if the pH of your solution will increase or decrease after you add water.
- Describe two different ways you could fill the beaker with a solution with pH 6.00. Is it possible to use hand soap to do this? Explain.

See all published activities for pH Scale: Basics [here](#).

For more tips on using PhET sims with your students, see [Tips for Using PhET](#).