

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

The screenshot shows the PhET pH scale: Basics simulation interface. On the left, a list of everyday liquids is provided with their respective pH values. The main simulation area features a vertical pH scale from 0 to 14, with 7 marked as neutral. A beaker contains a yellow liquid, and a digital display shows a pH of 6.15. A dropper is positioned above the beaker, and a water tap is visible. Callout boxes highlight the following features:

- Choose an everyday liquid.** A dropdown menu is set to "Chicken Soup (pH 5.8)".
- Dilute with water.** A callout points to the water tap.
- Use the dropper to add more of your liquid.** A callout points to the dropper.
- Drag the probe into solution to measure pH.** A callout points to the pH probe in the beaker.

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.

Model Simplifications

pH of everyday liquids: For liquids with a range of measured pH values, an average value from the literature was used. **Dilution:** 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} mol.* 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.

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](#).