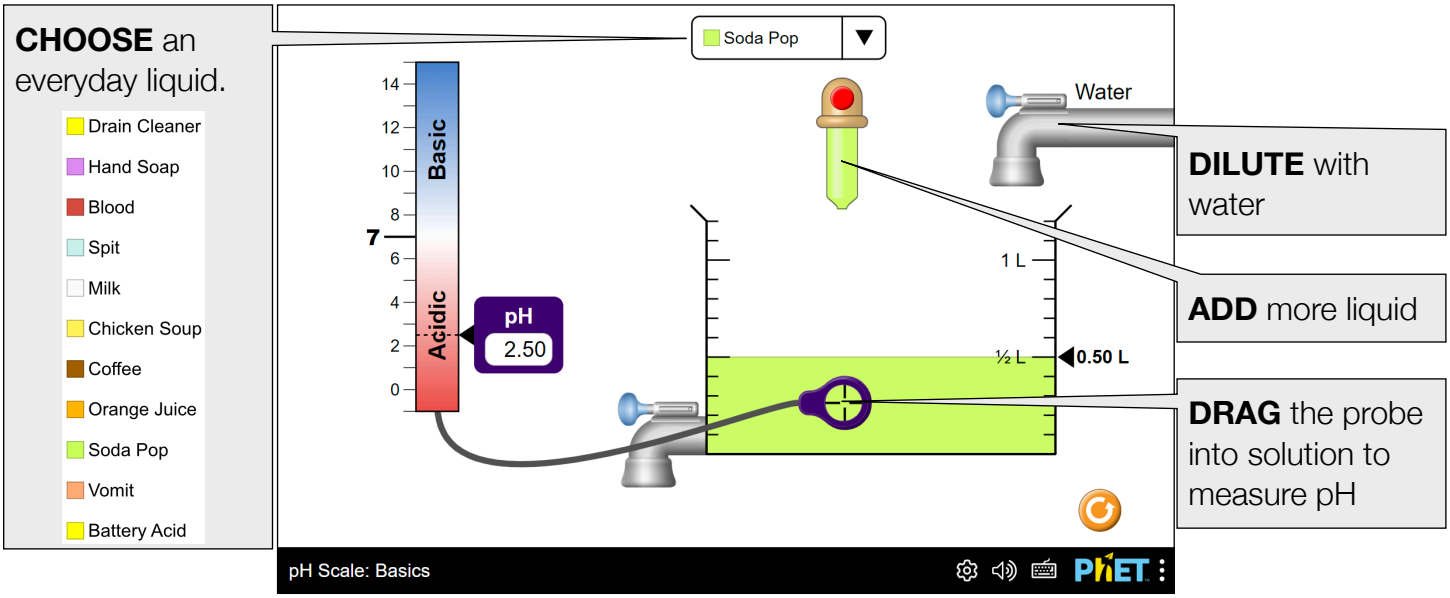
PhET Tips for Teachers — pH Scale: Basics

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

Customization Options

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 a '`&`'. The general URL pattern is:
`…html?queryParameter1&queryParameter2&queryParameter3`

For example, in pH Scale: Basics, if you want to enable autofill (`autofill=true`), and disable pan and zoom (`supportsPanAndZoom=false`) use:
https://phet.colorado.edu/sims/html/ph-scale-basics/latest/ph-scale-basics_all.html?autofill=true&supportsPanAndZoom=false

To run this in Spanish (`locale=es`), the URL would become:
https://phet.colorado.edu/sims/html/ph-scale-basics/latest/ph-scale-basics_all.html?locale=es&autofill=true&supportsPanAndZoom=false

Carpenter & Rouinfar, October 2025

⚙ Indicates this customization can be accessed from the Preferences menu within the simulation.

Query Parameter and Description	Example Links
⚙ `autofill` - when `true`, the dropper will autofill the beaker to 0.50 L when switching solutes. Default is `false`.	`autofill=true`
⚙ `locale` - specify the language of the simulation using ISO 639-1 codes. Available locales can be found on the simulation page on the Translations tab. Note: this only works if the simulation URL ends in "_all.html".	`locale=es` (Spanish) `locale=fr` (French)
⚙ `interactiveHighlightsInitiallyEnabled` - opens the sim with interactive highlights enabled.	`interactiveHighlightsInitiallyEnabled`
`audio` - if muted, audio is muted by default. If disabled, all audio is permanently turned off.	`audio=muted` `audio=disabled`
`allowLinks` - when `false`, disables links that take students to an external URL. Default is `true`.	`allowLinks=false`
`supportsPanAndZoom` - when `false`, disables panning and zooming using pinch-to-zoom or browser zoom controls. Default is `true`.	`supportsPanAndZoom=false`

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.

See all published activities for pH Scale: Basics here.
For more tips on using PhET sims with your students, see Tips for Using PhET.