

Integrating Gizmos with Hands-on Activities and Investigations



Gizmos can be used to support learning along with a hands-on investigation. Using a Gizmo at different times in the lesson cycle allows students to interact with the content in a variety of ways and modalities. Each Gizmo is accompanied with customizable Lesson Materials and a Teacher Guide that includes strategies and ideas to integrate Gizmos into your lesson plans.

These Gizmos are a few examples of how simulations can support conceptual understanding pre-investigation, as the investigation (supplement or substitution) and post-investigation to enhance learning experiences for students. You can use all of these strategies or pick/choose which best aligns with your teaching style.

Physical Science - Chemistry	Chemical Changes Feel the Heat Titration
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There are over 400+ Gizmos to choose from, all aligned to the latest standards help educators bring powerful new learning experiences to the classroom.



Integration Ideas

Pre-Investigation

Make predictions
 Introduce concept/lab
 Activate Prior Knowledge

Investigation

Demonstration
 Individual/Group
 Investigations Task Cards

Post-Investigation

Guided/Open
 Inquiry C-E-R
 Prompts Extension Activities

Learn More

[Educator Resource Hub](#)

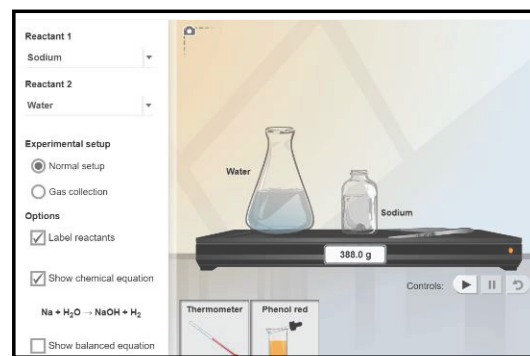
Gizmo: [Chemical Changes](#)

How can Gizmos support my 'Reactions in the Lab' investigation using different chemicals/ingredients?

Pre-Investigation Option: Use the Gizmo whole group changing the reactants and asking students to identify evidence of a chemical reaction. Discuss equipment, atoms, reactants/products and differentiate between physical and chemical changes.

Investigation Supplement or Substitution Option: Individually or with a partner, ask students to create their own combinations of reactions or provide pre-determined combinations for them to explore. Ask students to collect data in a table or graphic organizer identifying evidence of a reaction.

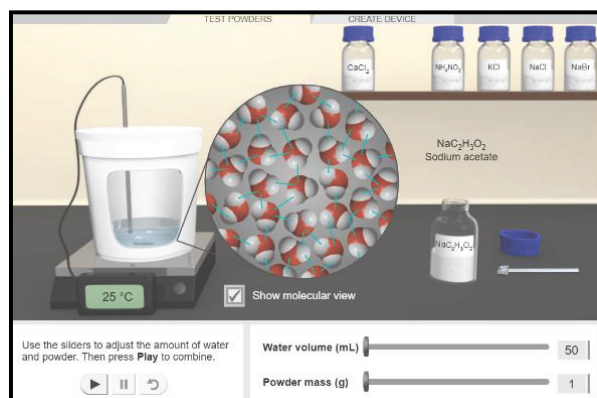
Post-Investigation Option: Take screenshots of a few of the experiments and ask students to identify physical or chemical changes. Students should write about their evidence and how it supports their observations.



Gizmo: [Feel the Heat](#)

How can Gizmos support my Endothermic/Exothermic hands-on investigation?

Pre-Investigation Option: Use the Gizmo as an interactive lecture, asking students to make observations about how the molecules bond in endothermic and exothermic reactions. Drag a powder to the bench, adjust amounts of powder/water, then ask students to predict-observe-explain the reaction. Provide choice by asking students to select the next reaction.



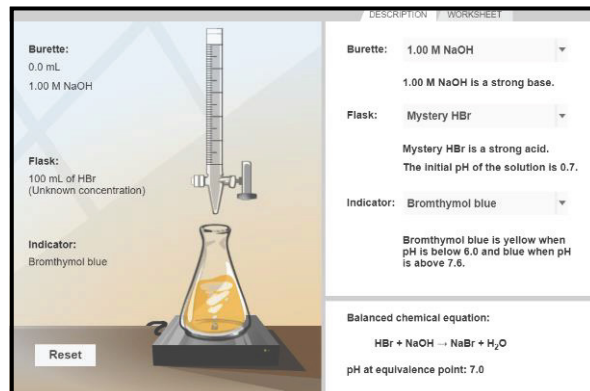
Investigation Supplement or Substitution Option: Use the Gizmo to design a hot or cold pack. Activity B will allow students to experiment with different combinations of materials to see which combination produces the greatest temperature changes (endothermic/exothermic). Students can work individually or in small groups to collaborate then share their findings with the class.

Post-Investigation Option: Activity C allows students to design their own packs with specific temperature ranges and time periods. This is a great extension activity or STEM Challenge to pose to the students. This could lead to students creating their own hot/cold packs as a performance assessment.

Gizmos: [Titration](#)

How can Gizmos support my hands-on Titration investigation?

Pre-Investigation Option: Use the [pH Analysis Gizmo](#) to discuss how to determine if a solution is an acid/base (Warm-up/Activity A). Use vocabulary in context as you use the Gizmo (terms: acid, base, neutral, indicator, litmus paper) whole group or students working in pairs. Then, use the Titration Gizmo Pre-Gizmo Activity in the Teacher Guide to demo how to change the pH of a solution. Ask students to predict the new pH of the water when adding a strong acid/base and look for patterns in the amount of solution to change the indicator. Model the Gizmo Warm-up whole group to show students how to manipulate the simulation and ask the questions provided. Place students in groups to complete Activity A.



The screenshot displays the Titration Gizmo interface. On the left, a simulation shows a burette containing 0.0 mL of 1.00 M NaOH solution being added to a flask containing 100 mL of HBr of unknown concentration. The indicator is Bromothymol blue, which is currently yellow. A 'Reset' button is visible at the bottom left of the simulation area. On the right, the control panel includes dropdown menus for 'Burette: 1.00 M NaOH', 'Flask: Mystery HBr', and 'Indicator: Bromothymol blue'. Text in the control panel states: '1.00 M NaOH is a strong base.', 'Mystery HBr is a strong acid. The initial pH of the solution is 0.7.', and 'Bromothymol blue is yellow when pH is below 6.0 and blue when pH is above 7.6.'. At the bottom right, the balanced chemical equation is shown as $\text{HBr} + \text{NaOH} \rightarrow \text{NaBr} + \text{H}_2\text{O}$, and the pH at the equivalence point is listed as 7.0.

Investigation Supplement or Substitution Option: If equipment or materials are limited, this is a great alternative. Allow students to use titration to determine the concentration of an acid or base (Activity B). Students will then use titration to determine unknown concentrations.

Post-Investigation Option: Activity C, Question 6 allows students to practice titration calculations by selecting Random Flasks. Ask students to solve 3 - 5 analytes, record their data and share their results. Students can create titration graphs and/or complete a Claim-Evidence-Reasoning prompt to answer the question, ie. "How is titration used to determine an unknown concentration?". Students will determine evidence from class activities and the Gizmo to support their reasoning.