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

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

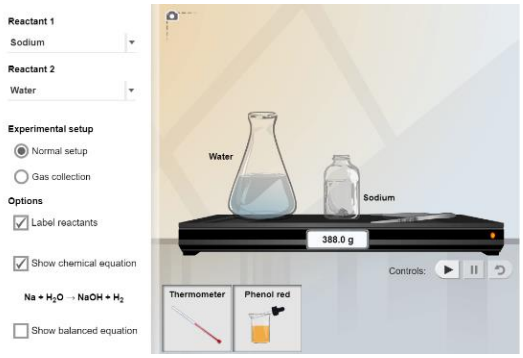
Post-Investigation
Guided/Open Inquiry
C-E-R Prompts
Extension Activities

Learn More
Teacher Resource Hub
On-Demand PD

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.



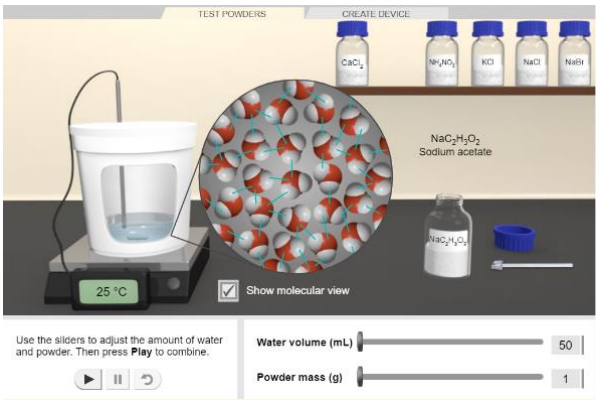
Investigation Supplement or Substitution Option: Individually or with a partner, ask students to create their own combinations of reactions or provide pre-determined combinations for them to explore. Ask students to collect data in a table or graphic organizer identifying evidence of a reaction.

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.



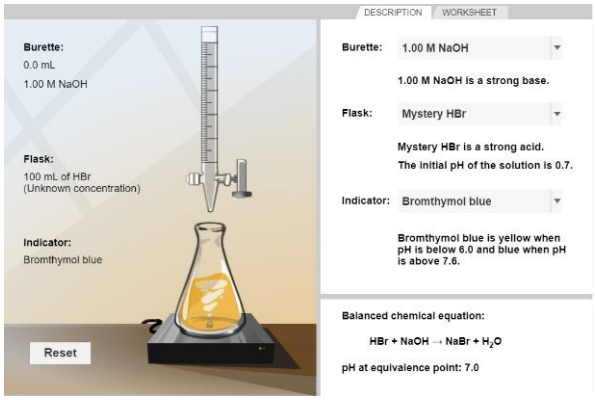
Investigation Supplement or Substitution Option: Use the Gizmo to design a hot or cold pack. Activity B will allow students to experiment with different combinations of materials to see which combination produces the greatest temperature changes (endothermic/exothermic). Students can work individually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



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.