



# Stackable Instructionally- embedded Portable Science (SIPS) Assessments Project

## Grade 5 Science Unit 1 Sample Lesson “Where Did it Go?” Matter and Its Interactions April 2023

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**Science Grade 5**  
**Unit 1: Matter and Its Interactions**  
**Sample Lesson: Where Did it Go?**  
**Suggested Time to Complete: 100 minutes**

**Purpose & Use Statement:** This sample lesson was developed for state and local administrators and teacher leaders (e.g., curriculum directors, instructional facilitators, professional learning specialists) to (1) illustrate an example of an instructional lesson developed using a principled design approach, and (2) support accompanying process documentation about how to use the SIPS unit as an instructional framework to intentionally design high-quality lessons in an aligned curriculum, instruction, and assessment system. This sample lesson should be evaluated and refined, as necessary, to align appropriately with a standards-based curriculum, instruction, and assessment system prior to its use. Additionally, teachers should refine this lesson to meet the local, cultural, and individual needs of the students.

## Desired Results

### Overview of the Learning Goals

In this lesson, students experience a chemical reaction and work to understand what has occurred. To do this they will compare and contrast the materials before and after the reaction, make observations when an acid and base are mixed, document the changes in properties after the reaction, provide evidence that the total weight of substances is the same before and after, and then attempt to separate out the products back into the reactants through mechanical means in order to find that it cannot be done.

### Connections to Prior Learning

#### DCI

- **Prior DCI Learning from K-2 (from NGSS Appendix E: DCI Progression within NGSS; p7)**
  - Matter exists as different substances that have observable different properties.
  - Different properties are suited to different purposes.
  - Objects can be built up from smaller parts.
  - Heating and cooling substances cause changes that are sometimes reversible and sometimes not.
  - Matter can change states (solid, liquid, gas) when heated, cooled, and/or mixed [P2-PS1-1] (listed as a prior understanding Big Idea in Unit 1).

#### CCC - Cause & Effect

- **Prior learning from K-2:** Students are expected to understand that events can be described in terms of cause(s) and effect(s) and have some experience identifying causes and/or effects.
  - In Grades K-2, students learn that events have causes that generate observable patterns. They design simple tests to gather evidence to support or refute their own ideas about causes [Appendix G].
- **Prior learning from this grade band (e.g., Grades 3 & 4):** During Grades 3-5, students are expected to become adept at identifying/testing causes and effects and become aware that events can be correlated, but not causally related.
  - Multiple Grade 3 and Grade 4 PEs use this CCC, so students will likely have some experience with the CCC elements in Grades 3-5, prior to starting Grade 5 and Unit 1.
  - An example Grade 4 PE that uses the same CCC element as the 5-PS1-4 CCC (i.e., students will have had experience with this CCC if they were previously taught this Grade 4 PE) is: *4-ESS2-1. Make observations and/or measurements to provide evidence of the effects of weathering or the rate of erosion by water, ice, wind, or vegetation.*

#### CCC - Scale, Proportion, & Quantity

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- **Prior learning from K-2:** Students are expected to have experience describing objects in terms of a property that can be described using relative scales (e.g., bigger than..., smaller than...) and using an absolute scale to describe the property of length.
  - In Grades K-2, students use relative scales (e.g., bigger and smaller; hotter and colder; faster and slower) to describe objects. They use standard units to measure length [Appendix G].
- **Prior learning from this grade band (e.g., Grades 3 & 4):** Minimal/not applicable.
  - Only 1 PE (3-LS4-1) in Grades 3 and 4 use the SPQ CCC and it's not directly relevant/preparatory for the CCC's use in the two Grade 5 PEs for this unit.

*SEP- Planning and Carrying out Investigations*

- **Prior learning from K-2:** Students are expected to have had opportunities to plan and carry out simple investigations, based on fair tests, which provide data to support explanations or design solutions. More specifically, students should be able to:
  - With guidance, plan and conduct an investigation in collaboration with peers (for K).
  - Plan and conduct an investigation collaboratively to produce data to serve as the basis for evidence to answer a question.
  - Evaluate different ways of observing and/or measuring a phenomenon to determine which way can answer a question.
  - Make observations (firsthand or from media) and/or measurements to collect data that can be used to make comparisons.
  - Make observations (firsthand or from media) and/or measurements of a proposed object, tool, or solution to determine if it solves a problem or meets a goal.
  - Make predictions based on prior experiences.
- **Prior learning from this grade band (Grades 3 & 4):** During Grades 3-5, students are expected to include investigations that control variables and provide evidence to support explanations or design solutions.
  - 5 PEs in Grades 3 and 4 use this practice. They are: 3-PS2-1, 3-PS2-2, 4-PS3-2, 4-ESS2-1 and 3-5-ETS1-3.

*SEP- Constructing Explanations and Designing Solutions*

- **Prior learning from K-2:** Students are expected to have had opportunities to design multiple simple solutions to a problem associated with wind or water and its impact on the shape of the land.
    - Students can construct a device to address a problem in a way that mimics the way plants or animals survive, grow, and meet their needs.
    - Students can develop evidence-based accounts of the way multiple solutions can address a problem.
  - **Prior learning from this grade band (Grades 3 & 4):** During Grades 3-5, students are expected to include investigations that design solutions to problems using appropriate information.
    - Multiple PEs in Grades 3 and 4 use these SEP. These include two PEs (4-ESS3-2 and 4-PS3-4) which ask students to consider multiple solutions based on how they meet criteria and constraints in the context of the impact of natural Earth processes on humans or to develop a
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device for energy conversion (These also integrate the Influence of Science, Engineering, and Technology on Society and the Natural World).

*SEP- Asking Questions and Defining Problems*

- **Prior learning from K-2:** Students have had opportunities in the context of asking questions about systems and defining a simple problem. More specifically, students should be able to:
  - Define how a new or improved object or tool can be developed.
- **Prior learning from this grade band (Grades 3 & 4):** During Grades 3-5, students should progress in their ability to define problem statements and to identify how objects or tools can be used to address the problem [Appendix F].
  - 4 PEs in Grades 3 and 4 use this practice. They are: 3-PS2-3, 3-PS2-4, 4-PS3-3, and 3-5-ETS1-1.

*SEP- Analyze and Interpret Data*

- **Prior learning from K-2:** Students are expected to have had opportunities to collect, record, and share observations. More specifically students should be able to:
  - Use observations (firsthand or from media) to describe patterns and/or relationships in the natural and designed world(s) in order to answer scientific questions and solve problems.
- **Prior learning from this grade band (Grades 3 & 4):** During Grades 3-5, students are introduced to quantitative approaches to collecting data and conducting multiple trials of qualitative observations. When possible and feasible, digital tools should be used.
  - 4 PEs in Grades 3 and 4 use this practice. They are: 3-LS3-1, 3-LS4-1, 3-ESS2-1, and 4-ESS2-2.

*SEP- Obtaining, Evaluating, and Communicating Information*

- **Prior learning from K-2:** Students have had opportunities to use observations and texts to communicate new information. More specifically, students should be able to:
  - Read grade-appropriate texts and/or use media to obtain scientific and/or technical information to determine patterns in and/or evidence about the natural and designed world(s).
  - Describe how specific images (e.g., a diagram showing how a machine works) support a scientific or engineering idea.
  - Obtain information using various texts, text features (e.g., headings, tables of contents, glossaries, electronic menus, icons), and other media that will be useful in answering a scientific question and/or supporting a scientific claim.
  - Communicate information or design ideas and/or solutions with others in oral and/or written forms using models, drawings, writing, or numbers that provide detail about scientific ideas, practices, and/or design ideas.
- **Prior learning from this grade band (Grades 3 & 4):** During Grades 3-5, students are expected to progress to evaluating the merit and accuracy of ideas and methods [Appendix F].
  - Two PEs (3-ESS2-2; 4-ESS3-1) focus on obtaining, evaluating, and communicating information in the domain of earth and space science.

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**Key Vocabulary**

Students build conceptual meaning with and use key tier II and tier III vocabulary terms as they make sense of phenomena and phenomena-based design problems. This is not an exhaustive list of terms and should be reviewed and modified by educators, as appropriate.

- Matter
- Chemical change
- Conservation of mass
- Substance

**Targeted Stage 1 Learning Goals**

**Acquisition Goals (AG)**

A1: Describe how properties of matter can be used to compare and contrast materials.
A8: Make observations and measurements to produce data about what happens when two (or more) substances are mixed.
A12: Describe how properties of matter can be used to compare and contrast materials and describe the outcomes of combining substances.
A14: Conduct an investigation to determine whether the mixing of two or more substances results in new substances. [5-PS1-4]
A16: Make observations and measurements to produce data about which property (or properties) of substances changed after being mixed.
A18: Analyze and interpret data to identify the pattern that the total weight of substances before they are mixed is equal to the total weight of the substance(s) that are formed after they are mixed.
A20*: Identify/develop testable questions about what happens when two (or more) substances are mixed.

**Common Core State Standards (CCSS):**

W.5.7	MP.2
W.5.8	MP.5

**Enduring Understandings (EU)/ Essential Questions (EQ):**

EU2	EU3/EQ3
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Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
<input checked="" type="checkbox"/> Analyze & Interpret Data <input type="checkbox"/> Ask Questions <input checked="" type="checkbox"/> Construct Explanations <input type="checkbox"/> Define Problems <input type="checkbox"/> Design Solutions <input checked="" type="checkbox"/> Planning and Carrying Out Investigations <input type="checkbox"/> Develop & Use Models <input type="checkbox"/> Engage in Argument from Evidence <input type="checkbox"/> Mathematics & Computational Thinking <input type="checkbox"/> Obtain, Evaluate, & Communicate Information <input type="checkbox"/> Plan & Carry Out Investigations	<input checked="" type="checkbox"/> PS2 B: Chemical Reactions <ul style="list-style-type: none"> <li>• No matter what reaction or change in properties occurs, the total weight of the substances does not change. (Boundary: Mass and weight are not distinguished at this grade level.) (5-PS1-2)</li> <li>• When two or more different substances are mixed, a new substance with different properties may be formed. (5-PS1-4)</li> </ul>	<input checked="" type="checkbox"/> Cause & Effect <input type="checkbox"/> Energy & Matter <input type="checkbox"/> Patterns <input checked="" type="checkbox"/> Scale, Proportion, & Quantity <input type="checkbox"/> Stability & Change <input type="checkbox"/> Structure & Function <input type="checkbox"/> Systems & System Models

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 **Formative Assessment Opportunities**

<b>Monitoring</b>	<b>Success Criteria</b>	<b>Possible Instructional Adjustment</b>
<ul style="list-style-type: none"> <li>• As students list properties, the teacher should take note of which categories of properties are suggested and which are not.</li> <li>• Listen as students discuss in groups the implication that the weight is different.</li> </ul>	<p>Students can:</p> <ul style="list-style-type: none"> <li>• Identify the physical properties of the reactants and products.</li> <li>• Document their observations in a table within their notebooks.</li> <li>• Recognize that the weight is different between the product and reactants and identify possible implications.</li> <li>• Accurately identify and/or describe properties of matter after combining substances.</li> <li>• Make appropriate observations and/or measurements to produce data that supports the claim that the total weight of substances before they are mixed is equal to the total weight of the substance(s) that are formed after they are mixed.</li> <li>• Draw appropriate conclusions from data about whether the total weight of substances before they are mixed is equal to the total weight of the substance(s) that are formed after they are mixed.</li> </ul>	<ul style="list-style-type: none"> <li>• Use questioning strategies to encourage students to list the categories of physical properties and name properties that have not been suggested.</li> <li>• Have a student write on a sheet of chart paper or the board a table that students who need additional support can copy into their notebook with the data from the experiment.</li> </ul>
<ul style="list-style-type: none"> <li>• Listen and observe students working in small groups to</li> </ul>	<p>Students can:</p>	<ul style="list-style-type: none"> <li>• Utilize heterogeneous groupings of students to encourage support and</li> </ul>

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<p>develop a plan to modify the opening demonstration.</p> <ul style="list-style-type: none"><li>• Ask probing questions to understand student choices in the experimental design process.</li><li>• Ask probing questions during whole class discussions to encourage students to build on each other's ideas, to respectfully challenge ideas, and to consider other ideas and approaches.</li><li>• Ask probing questions that encourage students to consider how the experiment connects back to the anchoring phenomenon.</li><li>• Encourage students to persevere with separating the products into the reactants, but then use questions and affirming statements to support students in recognizing that their plan of action does not work. Encourage students to consider the idea that science plans do not always work, and to consider the implications of what that means for chemical changes.</li></ul>	<ul style="list-style-type: none"><li>• Modify an experiment to gather different but related data.</li><li>• Recognize that the weight of products and reactants are the same when all reactants are included and use this as evidence to support the idea that matter is conserved.</li><li>• Use scientific thinking to create a plan to attempt to reverse a chemical reaction using physical processes and then recognize that their plan did not work.</li></ul>	<p>participation from all individuals.</p> <ul style="list-style-type: none"><li>• Monitor students' stress/anxiety at being presented with a challenge that is not doable and provide guidance if they become overwhelmed, such as taking a break, reconsidering their ideas, and recognizing that just because something does not work does not mean we did not learn from it.</li><li>• Provide students with a new list of materials that they can use based on the <i>Messin' with Mixtures</i> experiment if they cannot recall what was used in the past.</li></ul>
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**Instructional Plan**

**Lesson Overview**

In this lesson, students experience a chemical reaction and document observations before, during, and after the reaction. Students gather evidence to prove that the total weight of the products and the reactants are the same to show the conservation of mass. Students then attempt to separate the products back into the reactants, establishing the experience that they cannot do this, and generate

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questions that they will seek to answer while conducting research and reviewing materials in the lesson *What Happened?*

**Materials & Set-Up**

- Baking soda
- Acids such as lemon juice or vinegar
- Glass flask (1 per group, 1 for demonstration).
- Materials for modifying the demonstration, such as:
  - Balloon, 1 per group
  - Plastic wrap
  - Larger flasks
  - Rubber stoppers
  - Plastic tubing
  - Other materials that students may find useful or may suggest.
- Materials for attempting to separate the products after the chemical reaction:
  - Spoons
  - Coffee filters
  - Different face masks (to act as filters)
  - Cups
  - Water
  - Sand
  - Straw
  - Paper towels/napkins
  - Heat source
  - Funnel
  - Magnifying glass
  - Other materials that students may find useful or may suggest.
- Video
  - [PBS.org Example](#)


**Anchor or Investigative Phenomenon:** The reaction of baking soda and vinegar when mixed, producing diluted sodium acetate and carbon dioxide (investigative phenomenon). Understanding the processes of bread baking to find the “mistake” made when baking a loaf of bread (anchoring phenomenon).

**Driving Question:** What occurs when we combine baking soda and an acid? How might we separate the baking soda and acid after we mix them together?

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	Teacher Does	Students Do
<p><b>Engage</b></p> <ul style="list-style-type: none"> <li><input checked="" type="checkbox"/> Introduce object, event, phenomenon, problem, or question</li> <li><input checked="" type="checkbox"/> Build background knowledge</li> <li><input checked="" type="checkbox"/> Facilitate connections</li> </ul>	<p>To open class, the teacher sets up and demonstrates a simple acid/base chemical reaction between baking soda and vinegar or lemon juice. Start by modeling how to measure the weight of the container and each of the reactants for students. As a class, students list the different physical properties that they see and have them record the weight of the reactants, container, and physical properties in their science notebooks.</p> <p>Demonstrate for students the chemical reaction and allow it to complete. As the reaction occurs, students document observations of the reaction in their notebooks.</p> <p>After the reaction, measure the mass of the container and the reaction product and have students make observations on the physical properties of the product. Again, have students document this in their notebooks.</p> <p>Finally, draw students' attention to the final weight which should be different. Ask students to turn and talk in their small groups about why they think the weight is different and what that means.</p>	<p> Students observe the demonstration and document their notices/observations, being sure to document the weight of the reactants and products. As a class, they discuss the differences in weights and what the implications may be. Students are likely to recognize that some of the material is lost as a gas, which will help lead into the next section where students are asked to change the apparatus to capture the gas.</p>
<p><b>Explore</b></p> <ul style="list-style-type: none"> <li><input checked="" type="checkbox"/> Explore object, event, phenomenon, problem, or question</li> <li><input checked="" type="checkbox"/> Guided exploration with hands-on activities</li> </ul>	<p>Provide each group of students with materials to repeat the experiment on their own. Give them the challenge this time of capturing the gas. Provide students with an assortment of</p>	<p>Working in small groups, students modify the apparatus to capture the gas created in the reaction and then rerun the experiment to see what happens with the mass.</p>

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**Suggested Time to Complete:** 100 minutes

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resources to use to design an experiment that will allow them to capture the escaping gas and make observations about all the products of the experiment. Have students rerun the experiment to establish that the total weight of reactants and products is the same and gather additional observations on the properties of the products. Discuss as a class what this reaction means, and have students document their thinking in their notebooks. Use questioning strategies to support students recognizing that the weight (mass) of the material is the same as before, even though some were turned to gas. Support students in making the connection back to Segment 1, where we learned that matter has weight and takes up space, and here we see gas being made. Also, support students in making connections to the anchoring activity on bread making. How do you think this reaction of baking soda and an acid like lemon juice or vinegar connects to the baking of bread and our challenge from the start of the unit? This is a question that students may not see fully, but segment 4 should be revisited until students start to see how the process of baking bread involves both chemical and physical changes, with the chemical reaction creating gas bubbles in the dough and giving it rise.



Students should utilize resources provided by the teacher to change the apparatus and then gather data before, during, and after the reaction.

Following gathering data on the reactants and products, students talk in their small groups about what it means and write down what they think is occurring to create this gas that happens to have the missing mass. Students record their thinking in their notebooks, then talk about their thinking as a class. Students also discuss connections between this phenomenon and the anchoring phenomenon.

Next, students are challenged to find a way to separate this “mixture/solution” (it isn’t a mixture/solution) back into its individual parts. Students are provided with an assortment of materials that they used in *Messin’ with Mixtures* to try and find a way to separate out the remaining material.

After students have attempted to separate the products back into the reactants, they will find that they are not able to. Students should turn and discuss this within their small groups and then document their thinking in their science notebooks.

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As students work in their small groups, cycle around the classroom and encourage students to consider different approaches or resources. Use questioning strategies to support students in creating an apparatus that will collect all the gas created in the reaction, so that students can find that the total weight of the products and containers are the same as the reactants and containers.

Next, challenge students to separate the final product back into the reactants. Encourage students to experiment with different tools to separate the mixture, the goal being to get the baking soda back out of the liquid. Encourage students to consider what they did in *Messin' with Mixtures* to separate the solutions there. As they brainstorm and test, remind students to document what they are doing and what their thinking is. Note: students will not be able to accomplish this. The goal of this activity is for students to see that when a chemical reaction occurs you cannot separate out the products to get back the original reactants. Some students may suggest boiling off the water to separate the baking soda from the acid. In that case, students would create "hot ice" (See: [ThoughtCo.](#) for background information on hot ice). If students do try this, encourage them to experiment with the sodium acetate to test if it is baking soda or not.

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**Explain**

- Explain understanding of concepts and processes
  - Introduce new concepts and skills to seek conceptual clarity
- 

**Elaborate**

- Build on or extend understanding and skill
  - Apply concepts in new or related contexts
- 

**Evaluate**

- Self-assess knowledge, skills, and abilities
  - Evaluate student development and lesson effectiveness
- 

**Closing**

After students make their different attempts to separate the mixture, have them document the results of their attempts and then as a class brainstorm the questions they have. For example, students may want to know how someone else would reverse this process. They might want to know what tools they could use to reverse this process, and they also might want to know why the properties of the product are different from the reactants. Have students document their questions about this on a driving question board with the goal of finding answers to our questions during the next lesson, *What Happened?*

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**Differentiation Strategies and Resources**

“Universal Design for Learning (UDL) is a framework to improve and optimize teaching and learning for all people based on scientific insights into how humans learn” (CAST, 2022). Taking time to reflect on prior instruction when planning for accessible, differentiated, and culturally responsive instruction for diverse learners and culturally diverse classrooms serves to identify ways to improve future instructional practices. The UDL Guidelines provide a framework for this reflection. The guidelines include three principles as ways to focus on variety and flexibility in instructional practices:



Multiple Means of Engagement



Multiple Means of Representation







Multiple Means of Action & Expression



By examining instruction and instructional materials through the lens of each of these principles, teachers can identify and thus reduce or remove barriers to diverse learners.

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Learning Opportunities	UDL Principle	Example Differentiation Strategies & Resources
<b>Engage</b>		
<p><i>Students observe the demonstration and document their notices/observations being sure to document the weight of the reactants and products.</i></p>		<ul style="list-style-type: none"> <li>• Use a flexible way to present information.               <ul style="list-style-type: none"> <li>○ Display a chart showing examples of chemical reactions that include graphic examples.</li> </ul> </li> </ul>
		<ul style="list-style-type: none"> <li>• Supply or activate background knowledge.               <ul style="list-style-type: none"> <li>○ To allow students to share and make connections with their personal and cultural experiences with mixing substances, ask students to share their experiences such as cooking, crafts, construction, etc.</li> </ul> </li> </ul>
<b>Explore</b>		
<p><i>Students are provided with an assortment of materials that they used in Messin' with Mixtures to try and find a way to separate out the remaining material.</i></p>		<ul style="list-style-type: none"> <li>• Allow ownership of parts of instructional tasks.               <ul style="list-style-type: none"> <li>○ Have students set their own goals (academic or behavioral) that work towards the goals and objectives of the unit.</li> <li>○ Have students identify and choose sources to locate information on signs of chemical change.</li> </ul> </li> <li>• Make the work authentic and relevant.               <ul style="list-style-type: none"> <li>○ Explain the goal in clear and simple terms (e.g., <a href="#">Example of mixing two substances to make a new substance to solve a problem. Soap example</a>).</li> <li>○ Present the goal and objectives in multiple ways (e.g., write on whiteboard, read aloud, include on handouts).</li> <li>○ Highlight a diverse group of scientists and their roles (e.g., incorporate in presentation, show videos, wall posters, etc.).</li> <li>○ Resources: <a href="#">Ten Black Scientists that Science Teachers Should Know About</a>, <a href="#">Disabilities Don't Stop These Experts in Science and Tech</a>, <a href="#">20 Immigrants &amp; Refugee Scientists Who Made America Greater (Part 1)</a></li> </ul> </li> </ul>
<p><i>Students are challenged to find a way to separate this "mixture/solution.</i></p>		<ul style="list-style-type: none"> <li>• Present clear and important goals and objectives.               <ul style="list-style-type: none"> <li>○ Have students write goals into simple I can statements (e.g., I can describe how properties of matter can be used to compare and contrast materials.).</li> </ul> </li> </ul>

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		<ul style="list-style-type: none"> <li>○ Explain scientific terms along with the goals so that students understand what they are working towards.</li> </ul>
<p><i>Students would create “hot ice” and the teacher can have student interpret their data using resources.</i></p>		<ul style="list-style-type: none"> <li>● Provide options for accessing instructional activities and materials Support planning and strategy skills. <ul style="list-style-type: none"> <li>○ Ensure that all students can physically access and interact with all activities and materials (e.g., a table high enough to allow wheelchair access, an adaptation that allows access to print material, space to move to all areas in a classroom or lab, book holder, adapted keyboard, single switch, etc.).</li> <li>○ Ensure access is available for students who have a hearing impairment or visual impairment, who are blind, deaf, or deaf/blind (e.g., include an audio description for video content, closed captions for video content, alternative text for graphics, preferential seating, an American Sign Language (ASL) interpreter, screen reader, enlarged text, etc.).</li> <li>○ Allow for differences in rate, timing, speed, and range of motion (e.g., allow enough time for all students to process the question and formulate their responses; allow enough time for all students to move from one activity to the next, or to perform a task.).</li> </ul> </li> <li>● Include prompts to check their thinking and strategy for solving a task.</li> </ul>
		<ul style="list-style-type: none"> <li>● Provide support for decoding written text and symbols. <ul style="list-style-type: none"> <li>○ Have peers read to each other, read aloud to the class, provide an audio version, provide a summarized version, etc.</li> <li>○ Digitize text and have students use a screen reader.</li> </ul> </li> <li>● Support transfer and generalization of skills and knowledge. <ul style="list-style-type: none"> <li>○ Use a variety of materials to investigate mixtures and describe physical properties.</li> </ul> </li> </ul>

**Resources**

- [PBS.org Example](https://www.pbs.org/parents/crafts-and-experiments/inflate-a-balloon-with-baking-soda-and-vinegar)  
[https://www.pbs.org/parents/crafts-and-experiments/inflate-a-balloon-with-baking-soda-and-vinegar]

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- [ThoughtCo.](https://www.thoughtco.com/equation-for-the-reaction-of-baking-soda-and-vinegar-604043)  
[https://www.thoughtco.com/equation-for-the-reaction-of-baking-soda-and-vinegar-604043]
- [PBS Learning Media: Chemical Reactions](https://dptv.pbslearningmedia.org/subjects/science/physical-science/matter-and-interactions/chemical-reactions/)  
[https://dptv.pbslearningmedia.org/subjects/science/physical-science/matter-and-interactions/chemical-reactions/]
- [Utah Education Network: Chemical Change Lesson](https://www.uen.org/lessonplan/view/2688)  
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- [Education.com—How to Inflate a Balloon Using Baking Soda and Vinegar](https://www.education.com/science-fair/article/balloon-gas-chemical-reaction/)  
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  - [Physical and Chemical Changes – BrainPOP Jr.](https://youtu.be/JjPCoOQ0LIE)  
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  - [Beyond the Elements: Reactions](https://www.pbs.org/wgbh/nova/video/beyond-the-elements-reactions/) PBS, NOVA  
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  - [CK12: Physical and Chemical Changes in Matter](https://www.ck12.org/book/ck-12-fifth-grade-science/section/1.7/)  
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