

Physical & Chemical Changes

Major Topic and SOL **Physical & Chemical Changes in Matter**
Science SOL PS.5a, b

Length of Activity **90 minutes**

Major Understanding

- Students will investigate and understand changes in matter and the relationship of these changes to the Law of Conservation of Matter and Energy.
- Chemical changes involve the change in electron configurations of molecules so that different substances are formed from the same elements.
- Physical changes involve molecules that stay the same even though their appearance may change.
- The Law of Conservation of Matter & Energy states that matter/energy cannot be created nor destroyed, only transformed/transferred.
- The four basic types of chemical reactions are: synthesis, decomposition, single replacement, double replacement.
- Some chemical changes may release or consume energy.
- Endothermic reactions absorb heat resulting in a decreased temperature.
- Exothermic reactions generate heat resulting in an increased temperature.

Essential Questions

- Explain the difference between and list examples of physical and chemical changes.

Student Objectives

- Students will be able to list examples of both physical and chemical changes.
- Students will investigate how the temperature changes during endothermic and exothermic reactions.
- Students will analyze data to determine matter in an unknown substance.

Bloom's Taxonomy Skills	21 st Century Learning Skills
<ul style="list-style-type: none"> • Evaluating • Analyzing • Applying • Understanding • Remembering 	<ul style="list-style-type: none"> • Critical Thinking • Problem Solving • Communication • Collaboration • Contextual Learning

Assessment Evidence*Performance Tasks*

Students will

- Predict how substances, such as a First Aid hot/cold packs, changes temperature without an oven/freezer.
- Brainstorm why salt is used on roadways during a winter storm.
- Describe changes in matter that occur when substances are combined.
- Explain the difference between chemical and physical changes in matter.
- Distinguish the difference between endothermic and exothermic reactions.
- Identify the type of chemical reaction when given the chemical equation of the reaction.
- Apply the Laws of Conservation to the reactions observed.
- Analyze data collected from an unknown substance.

Other Evidence

- Create an experiment to determine if a reaction is endothermic or exothermic using given supplies.
- Construct a paragraph comparing and contrasting the similarities and differences between physical and chemical changes.

Technology Temperature probes, computers

Internet Resources

- Online activity: <http://itsisu.portal.concord.org/activities/3156>

Note: The teacher will need to have an [account set up](#), as well as a class for their students to enroll in with this activity assigned. Once you create a teacher account, you can access the ITSI-SU [help guides](#) to get you set up your class with assigned activities.

Supplies/Materials

- Temperature probe
- Calcium chloride (ice melting pellets)
- Sodium bicarbonate (baking soda)
- Antacid tablets
- Universal indicator (such as Phenolphthalein)
- Small water bottle
- 50mL graduated cylinder
- Small spoon (5mL)
- Zip-lock plastic baggies (or small beakers)
- Chemical toe-warmer and/or First Aid cold pack (optional)
- Goggles
- Paper

Lesson: Physical & Chemical Changes (1-90 minute period)

Engage:

- Have students login and launch the activity from the website:
<http://itsisu.portal.concord.org/activities/3337>
- Show students examples of items that change temperature, such as warm/ice packs used for first aid.
- Ask them if they know how or why these items change temperature.
- Ask students if they know why salt is used on roads during winter storms.

Explore:

- Give students a temperature probe and listed lab materials. Make sure they each understand how to use and collect data with the temperature probe.
- Have students put the materials in the plastic baggie (or beaker) as directed in procedures, and collect temperature data as noted.
- Students should make observations and note physical and chemical changes that occur with each mixture/reaction. (Any gas released during reaction will be more easily observed if using a zip-lock plastic baggie, but the students may find this method difficult to do. The teacher might consider modeling the steps in a zip-lock baggie, while having the students mix and measure using a beaker.)

Explain:

- Have students list the observed physical and chemical changes in the prompt boxes after each step.
- The students will answer each of the questions in the activity after completing the lab procedures.

Elaborate:

- The students will answer the analysis questions in order to make connections between the activity and their knowledge of the concepts learned. The questions probe them to think beyond what they observed during the lab experience.

Evaluate:

- The students will complete the conclusion section of the activity.
- The students will be given the opportunity to collect data, including temperature change, when water is added to an antacid tablet. They will analyze the collected data to determine which of the tested substances is present in the antacid.
- The teacher should run an ITSI-SU report to read and assess student responses to all predictions and questions. This report could be used in conjunction with a rubric observation of students' behaviors during the actual activity. (Note: The teacher might consider having a print copy of questions for students to use if they have time constraints or for students who have trouble with computer use.)