Chemical and Physical Changes

Observing Reactions and Determining Common Indicators

This activity dives into physical and chemical change by having students learn and participate in labs that practice the concept. Physical and chemical change can be difficult concepts to teach students due to differences happening at the molecular level. These lab activities will allow students to see the differences between physical and chemical change that challenge their observations and understandings.

This unit is broken up into three lab activities. The pre lab activity of this unit will introduce physical and chemical change and allow students to observe a demonstration of a physical change with dry ice and participate in creating a chemical change with formation of a gas. The main lab activity centers around explosions caused by either chemical or physical changes.. The post activity will challenge students once again by having them create hot ice. They will use the same ingredients in the first activity to create sodium acetate, but this time it will be used to demonstrate a physical change through phase change.

**LEARNING OBJECTIVES**

**Students will know:**

* The common examples of physical change
* The common indicators of chemical change
* Mixing acetic acid and sodium bicarbonate is a chemical change
* Hot ice is a physical change that uses a chemical change product.

**Students will understand:**

* Appearance or form of matter changes in a physical change, but not the kind of matter in a substance
* Kind of matter changes in a chemical change and at least one new product or substance with new properties is formed
* That nothing is lost from the original substances in a chemical reaction

**Students will be able to:**

* Precisely measure and mix acetic acid and sodium bicarbonate in a sandwich bag to create two new products.
* Use common examples of physical and chemical change to identify whether a new reaction is physical or chemical change, and cite evidence in support.
* Create hot ice

**UNIT PLAN**

**Pre-Laboratory Engagement (45-60 minutes)**

1. Students will watch a MooMooMath and Science’s [introduction to physical and chemical changes video](https://www.youtube.com/watch?v=yIJ2qnUOOwQ) (2:35)
   1. Students will complete this [worksheet](https://drive.google.com/open?id=1X8OlinRMeXf-4_XBc9_vapD8oxPIFDwNsQkqfVlF9k0) while watching the video.
      1. [Worksheet Key](https://drive.google.com/open?id=16fOe47MOG8Gjemhn3hCdlL7oHYQ1qx6Kosk7C_-DHXc)
2. Students will be introduced to an example of a physical change and a chemical change.
   1. Students will write their observations on their [student handout](https://drive.google.com/open?id=12map5X4IEYmkfciZha9gw4ItFs5sNBxg0zHZRtrx3JE).
      1. [Student Handout Key](https://docs.google.com/document/d/1UnbJ_WGBpW9p88ty7nQFOE2dqDufPpmzTxeoW2GpOOw/edit?usp=sharing)
3. Students will complete this[Crossword Puzzle](https://drive.google.com/open?id=1iKtghNeU6AlvWYHgreqlwpQjYQwcFmA9)
   * 1. [Crossword Puzzle Key](https://drive.google.com/open?id=16UuYxcPV9vrK_UuEoemLtMTkSdtd4DHAgxCAsQZOfhY)

**Laboratory Engagement**

1. Students will watch “[Chemical and Physical Changes Part One”](https://vimeo.com/424086649) (4:30)and complete Part I of the [student handout.](https://drive.google.com/open?id=1tAgSCVjVztMyRK_3nW-B8WNuBbBD1DG8sXaRiUUfZr4)
2. Students will watch “[Chemical and Physical Changes Part Two](https://vimeo.com/424088536)” (13:56) and complete Part II, III, and IV of the [student handout.](https://drive.google.com/open?id=1tAgSCVjVztMyRK_3nW-B8WNuBbBD1DG8sXaRiUUfZr4)
3. Students will have the opportunity to try both of the filmed reactions at home with the following procedures:
   1. [Mentos and Coke](https://docs.google.com/document/d/1vtzE5Ayy7CynSLUbDbQi9gsFIDqskhY39NM-2bqlvhE/edit?usp=sharing)
   2. [Hydrogen Peroxide and Yeast](https://docs.google.com/document/d/1POWo4W0ncsSNpqG-ZUAkcTrDKnVtH1_ajlwM4vt5JgI/edit?usp=sharing)
4. Students can watch the [walk through video](https://vimeo.com/425172334) of the student handout for understanding assistance. This can be provided before or after students submit work.
   1. [Student handout key](https://docs.google.com/document/d/1tiHXTx7NLFDunUW7FY5UTnxFjQEvP6vZOt3FpyBYEBY/edit?usp=sharing)

**Post-Laboratory Engagement**

1. Students will watch Sci Guys’ [video on Hot Ice](https://www.youtube.com/watch?v=znsPa1BSaIM) (6:17) and complete the [accompanying worksheet.](https://drive.google.com/open?id=1qySpBeHpIgPlOnI8-9NwX9BG9fhBHHbTcrwoOCrM4KU)
   1. Students then have the opportunity to try to make hot ice at home.
      1. [Making Hot Ice KEY](https://drive.google.com/open?id=1XVQ4jKK6gpOVsAteYOF2dnpe4pmW4VVvWKiRSJUODcg)

**STANDARDS ALIGNMENT**

**NGSS CONNECTIONS**

**MS-PS1-2.** Analyze and interpret data on the properties of substances before and after the substances interact to determine if a chemical reaction has occurred.

**MS-PS1-5.** Develop and use a model to describe how the total number of atoms does not change in a chemical reaction and thus mass is conserved.

**TEKS CONNECTIONS**

**6.5(C).** Identify the formation of a new substance by using the evidence of a possible chemical change such as production of a gas, change in temperature, production of a precipitate, or color change.

**7.6.** The student knows that matter has physical and chemical properties and can undergo physical and chemical changes. The student is expected to distinguish between physical and chemical changes in matter.

**8.5(E).** Investigate how evidence of chemical reactions indicates that new substances with different properties are formed and how that relates to the law of conservation of mass.

**LOUISIANA STANDARDS FOR SCIENCE CONNECTIONS**

**7-MS-PS1-2.** Analyze and interpret data on the properties of substances before and after the substances interact to determine if a chemical reaction has occurred.

**7-MS-PS1-5.** Develop and use a model to describe how the total number of atoms does not change in a chemical reaction and thus mass is conserved.