



LESSON PLAN

CHEMICAL VS. PHYSICAL CHANGES

GRADES 3-5

SUMMARY

Students observe and compare a variety of chemical and physical reactions to recognize the difference between chemical and physical changes.

DURATION

Two 45-minute classroom periods (Engage, Explore, Explain—one 45-minute classroom period; Elaborate, Evaluate—second 45-minute classroom period).

PRE-ASSESSMENT QUESTIONS

Please see discussion questions located under the video. These can be discussed as a group or answered individually in student science notebooks.

MATERIALS

- Small plastic bottle (12–16 ounce size)
- Funnel
- Hydrogen peroxide (3%)
- Dish soap
- One package of dry yeast
- Warm water
- Shallow pan
- Science notebooks & pencils
- Plate
- Baking soda
- Vinegar
- Latex-free gloves
- Measuring cup
- 8oz plastic cups
- Bottle of seltzer water
- Mentos candy



ENGAGE

Watch the Generation Genius video without the students prior to the lesson. The phenomena you will share is a smaller version of the chemical reaction that Izzy performs at the start of the video. To create this reaction, you will first need to add one package of yeast with warm water and mix until it becomes frothy. This will be the catalyst (the substance that sparks the reaction). Do this shortly before you plan to use it. When you are ready to show the students, place a small plastic bottle in a shallow pan and pour hydrogen peroxide (a few inches) into the bottle. Then squirt in some dish soap and swirl together gently to mix. Now add about 3 tablespoons of the yeast/water mixture, and watch as the reaction takes place and foam is slowly formed.

Ask students, what is going on here? Explain to students that clearly a change or reaction has taken place. In this lesson, they will explore changes to matter—both chemical and physical. Ask students, was this an example of a chemical or physical change? They should write down their answer in their science notebooks and explain their thinking. Tell students we will learn more about this reaction later in the lesson.



EXPLORE

Facilitate a short discussion with students about the difference between chemical and physical changes. Chemical changes result in the formation of a new substance while physical changes do not. Students will now get a chance to explore several changes and try to determine whether they are chemical or physical. Set up four stations around the room.

STATION 1

When students are ready to start have them fill a cup **no more than 1/4 of the way full** of seltzer water. Students can then drop in a Mentos candy, watch the foaming, and record their observations in their notebook.

STATION 2

At this station place pieces of paper. Allow students to rip, crumple, and cut the paper. Are these examples of chemical or physical changes?

STATION 3

At this station all you need is a lamp with a transparent light bulb that students will be able to turn on and off with a switch. A light bulb produces light because the wire coil heats up, but no new substance is produced. This is a physical change. **(WARNING: Light bulb can become hot. Do not allow students to touch bulb.)**

STATION 4

For this station provide small cups, a carton of baking soda, and a bottle of vinegar. Students will mix vinegar into the baking soda and observe the fizzing reaction. This happens because the two chemicals form new substances, including carbon dioxide gas which makes the mixture fizz. This is a chemical reaction.

STATION 1

In your science notebook, sketch and label what you observe at this station. Does this represent a chemical or physical change? Explain your reasoning.

STATION 2

In your science notebook, sketch and label what you observe at this station. Does this represent a chemical or physical change? Explain your reasoning.

STATION 3

With the light bulb off, examine what is inside. Now turn the light bulb on and see what happens. Is the light produced through a chemical or physical change? Explain your observations and reasoning in your science notebook.

STATION 4

At this station, measure two tablespoons of vinegar into a cup containing one teaspoon of baking soda. Make observations about what happens in your science notebook. Is this a physical or chemical change? Explain your reasoning.





EXPLAIN

After students have visited all the stations, gather the group and facilitate a discussion about their observations. Which stations were chemical changes? Which were physical? How did they know (what evidence did they observe)?



WATCH THE GENERATION GENIUS CHEMICAL VS. PHYSICAL CHANGES VIDEO AS A GROUP.

Then facilitate a conversation using the Discussion Questions. Then return to your discussion about what the students observed in the stations. Does anyone want to change any of their answers? Why? Ask students to make notes in their science notebooks indicating what changes they made and why.



ELABORATE

Use the DIY Activity so that students can now create their own secret message, just like Zoe's from the video. Then challenge the students to come up with other science tricks using chemical or physical reactions.



EVALUATE

Students have observed the hydrogen peroxide/dish soap/yeast phenomena twice - once during the Engage portion of the lesson, and again during the video. Yet they have not determined whether this phenomenon is the result of a physical or chemical reaction. Students should watch a video of the demonstration again and answer the following questions in their science notebook:

- What do you need to know to tell whether this is a physical or chemical reaction? (To be able to tell whether the reaction is physical or chemical, we need to know if the substance produced is a new substance.)
- What evidence have you observed in a physical change? Chemical change? (Students can make a chart in their notebook.)

How might you be able to investigate to find evidence that helps you determine whether this is a physical or chemical reaction? (We know that the substance in the tube was hydrogen peroxide and dish soap, but we don't know what the catalyst is. If we knew what the catalyst was, and we knew what the substance produced was, we would be able to tell if a new product was produced.)

Have the students turn in their science notebooks for your review. Then at the end of class give them one or more of the exit ticket questions found below the video or use the provided paper quiz or online quiz game.