

Chemistry Activity Bag

Physical and Chemical Changes: Student Activity Guide

A rusting car and a broken glass are both examples of things changing. Some things change physically, in size or shape, and some things change into something new. The broken glass is an example of a physical change. The rusting car is an example of changing into something new: iron into rust. This activity will explore both types of changes.

These directions will get you started. Your teacher will be in contact to guide you and provide information.

Materials From The Bag

- 1 Steel Wool Pad
- 6 Small Plastic Cups
- 1 Graduated Medicine Cup
- 2 Effervescent Tablets
- 2 Small Plastic Bags

You Will Supply These Materials

- Water
- Vegetable Oil, 60 mL
- Clear Soda (Sprite or 7-up), 60mL
- Vinegar, 60mL

Part 1: Exploration, Iron and Water

In this part of the activity, you will explore what happens when steel wool is put in water.

1. Cut with scissors or tear the steel wool into 8 pieces of about the same size.
2. Place a piece of steel wool in two plastic cups, one piece per cup. Save the other pieces for part 2.
3. Use the graduated cup to measure out 60mL of water. Pour into one of the cups with steel wool. Add nothing to the other cup with steel wool.
4. Note the time, and place both cups on a sheet of paper. Record observations of both cups. Let the cups sit until the same time tomorrow (24 hours).
5. After 24 hours, record observations of each cup. Observe what happened to both the water and the steel wool, and anything in either cup that is different from before.
6. Let sit for a couple more days. Each day at about the same time, record your observations.

What's happening...

Think about when you cut or tore the steel wool. You created a physical change by making smaller pieces of steel wool. Physical changes occur when you change a substance's size, shape, or state (ice melting into water).

A **physical change** is when the form of a substance changes, but not the substance itself.

You may have noticed that the steel wool started to change color while in the water. Change in color is just one way to tell if a chemical change has occurred. A **chemical change** is when a substance reacts with something else and **new** substances are formed. Change in temperature, a gas forming, or precipitate forming (two liquids react and form a solid) indicate that chemical changes have occurred.

Part 2: Steel and other liquids

In this part of the activity, you will explore what happens when steel wool is placed in other liquids.

1. Place a piece of steel wool in 4 different plastic cups. Each cup will get 60mL of a different liquid.
2. Label each cup with one of the following: vinegar, clear soda, vegetable oil, water. Add 60mL of the corresponding liquid to each cup.
3. Place the cups on a sheet of white paper and note the time. Leave them to sit until this time tomorrow.
4. After 24 hours, record observations of each cup. Observe what happened to the liquids and the steel wool, and anything in any of the cups that weren't there before.
5. Let all 4 cups sit for a couple more days. Each day at about the same time, record your observations.

For each cup: water, vegetable oil, soda, and vinegar, determine whether you think you have evidence in your observations for a chemical change or a physical change, or both. Support each of your claims for physical and/or chemical changes with evidence from the observations you wrote down. If you think there was no change, provide evidence to support this.

Part 3: Physical and Chemical Changes

In this part of the activity, you will observe physical and chemical changes during a chemical reaction.

1. Open up **one** small plastic bag.
2. Use the graduated cup to measure out 7.5mL of water into the bag.
3. Place **one** effervescent tablet into the bag and **seal the bag right away**.
4. Observe and record all of your observations of the reaction.

Based on your observations, explain if any physical and/or chemical changes occurred and provide evidence.

5. Open up another small plastic bag.
6. Turn on the hot water in your tap and let it run until it gets hot. Use the graduated cup to measure out 7.5mL of **hot** water into the bag.
7. Place the other effervescent tablet into the bag and **seal the bag right away**.
8. Hold the bag in the **palm of your hand** as the reaction occurs. *What do you notice about the temperature of the water?*

What's happening...

Change in temperature is one way that scientists can tell that a chemical reaction occurred. Chemical reactions can feel cold to us, like our experiment above, and some chemical reactions can feel hot. A chemical reaction that feels cold is called an **endothermic reaction**. It feels cold because the chemical reaction absorbs energy. A chemical reaction that feels hot is called an **exothermic reaction**. It feels hot because the chemical reaction releases energy. If you have ever used instant hand warmers, this is an example of an exothermic reaction.

Based on this information, use evidence to explain what type of reaction occurred above?

Rinse, dry, and save the graduated medicine cup for the “Reaction Rates” activity.