

# Physical and Chemical Changes

Name: \_\_\_\_\_

## Purpose:

Investigate chemical and physical changes.

## Materials:

1 stopwatch	3 large test tubes
Sheet protector with white paper	1 well plate
1 dropper bottle of HCl	1 dropper bottle of sodium sulfate
1 dropper bottle of coloring	2-3 pieces of magnesium ribbon
tap water	1 dropper bottle of sodium carbonate
ice cube bath	hot water bath
digital thermometer	electronic balance
1 mixture sample	graph paper
1 dropper bottle of cobalt (II) chloride	1 dropper bottle of barium chloride

## Part A. The Speed of a Liquid

1. Add 35 mL of water (tap water is OK) to each of three (3) large test tubes.
2. Place one test tube in the boiling water on the hot plate and heat until close to boiling (100 °C).
3. Place one test tube in the ice bath and wait for the temperature to drop at least 25 degrees Celsius from the starting point.
4. Once you have the three test tubes at the desired temperatures, close to 0°C (ice cubes), close to 25 °C (room temp), and close to 100 °C (boiling), place them in your test tube rack and record the exact temperatures.
5. Then allow them to sit on your lab bench, **undisturbed** for no more than one minute. Be satisfied that the water does not appear to be moving.
6. Using a dropping pipette, or dropper bottle, place one drop of coloring into the center of each test tube.
7. Observe and record your observations as a function of time.
8. Create a data table or graph comparing the observations against time for each of the three temperatures.
9. Dispose of the colored water down a sink. Rinse and return test tubes to lab station.

## Part B. Disappearing Metal

**CAUTION: HYDROCHLORIC ACID (HCl) IS CORROSIVE!! BE CAREFUL!!**

1. Place a few drops of HCl in one of the wells of a well plate.
2. Add a small piece of magnesium ribbon to the acid.
3. Carefully observe what happens and record your observations.
4. Dump well plate contents onto towel lined tray, then rinse and return to lab station.

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## Part C. Solution Factory

**CAUTION: Barium chloride is toxic if ingested. Wash hands thoroughly after this lab.**

1. Place sheet protector on lab table and place two drops of sodium sulfate on the page.
2. Add two drops of barium chloride to the sodium sulfate, do not touch dropper tip to the sodium sulfate or you will contaminate the bottle of barium chloride.
3. Carefully observe what happens and record your observations
4. In a separate area on the sheet protector place two drops of sodium carbonate.
5. Add two drops of cobalt (II) chloride to the sodium carbonate, do not touch the dropper tip to the sodium carbonate or you will contaminate the bottle of cobalt (II) chloride.
6. Carefully observe what happens and record your observations.
7. Allow the two mixtures to sit undisturbed for at least 5 minutes. Record any changes.
8. Wipe off the sheet protector with a paper towel and dispose of the paper towel.

## Part D. Separate a Mixture

1. Obtain a mixture sample. This sample contains iron, sand, salt and water.
2. In your group, devise a procedure for separating these four items.
3. You are NOT actually separating the mixture!!! Just decide what you would have to do in order to separate it!
4. Write a detailed procedure for how you would separate the mixture. You may want to look up properties of these items on the internet... if you do so, cite your source(s).
5. Do **NOT** dispose of the mixture.

## Part E. Questions Involving Properties of Matter

1. Which type of change, chemical or physical, occurred in Part A, Part B and Part C. **Explain** your choices.- no credit for question if not explained!
2. Sometimes physical changes involve the same cues as chemical changes. What is always the determining factor in deciding a change is a chemical change?
3. Is the mixture in Part D heterogeneous or homogeneous? **Explain.** No explanation no credit!
4. How can knowledge of the chemical and physical properties of a substance be vital to a scientist if that substance was involved in contaminating an endangered ecosystem?
5. In 2+ sentences, use the terms heat, energy and temperature to explain the results from part A.
6. Classify all the non-equipment materials used in the lab as either an element, compound, homogeneous mixture or heterogeneous mixture.
  - HCl, sodium sulfate, coloring, magnesium ribbon, tap water, sodium carbonate, mixture sample, graph paper, cobalt (II) chloride, barium chloride