

Physical and Chemical Changes

Name: _____

Matter can change both physically and chemically. Physical changes involve changes to physical properties. Chemical changes involve changes in the composition of the substance. This lab will investigate both physical and chemical changes in matter and will also utilize knowledge of these types of changes to develop a procedure to separate a mixture.

Materials:

| | |
|--|-----------------------------------|
| 1 stopwatch | 3 large test tubes |
| 2 medium test tubes | 1 50 ml beaker |
| 1 glass stir rod with rubber policeman | 1 dropper bottle of HCl |
| 1 dropper bottle of coloring | 1 small piece of magnesium ribbon |
| distilled water | tap water |
| barium nitrate | potassium sulfate |
| ice cube bath | hot water bath |
| digital thermometer | electronic balance |
| 1 mixture sample | computers/internet access |

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 15 degrees Celsius.
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 chart 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 nitrate is toxic if ingested. Wash hands thoroughly after this lab.

1. Measure 15 mL of Distilled Water into each of 2 medium test tubes placed carefully in a test tube rack.
2. Label your test tubes A and B.
3. Into test tube A, place a pencil eraser sized amount of barium nitrate. Swirl/stir the test tube to assist in the dissolving if necessary.
4. Into test tube B, place a pencil eraser sized amount of potassium sulfate. Swirl/stir the test tube to assist in the dissolving if necessary.
5. Next, in a 50 mL beaker, carefully combine the solutions you made in steps 3 and 4, by pouring them into the 50 mL beaker.
6. Carefully observe what happens and record your observations.
7. Allow the beaker to sit undisturbed for at least 5 minutes. Record what you see now.
8. Do **NOT** dispose of beaker contents. Allow to sit at your lab station for Ms. Neiman to dispose of later.

Part D. Separate a Mixture

1. Obtain a mixture sample. This sample contains sand, salt, rubbing alcohol, iron filings and water. You will not actually be separating the mixture, just use the sample for inspiration!
2. In your group, devise a procedure for separating these items.
3. You may want to look up chemical and physical properties of the mixture components to help you devise a plan for the separation.
4. Write a detailed procedure for how to separate the mixture. Include a list of materials you would need.
5. Return mixture sample to Ms. Neiman. Do **NOT** dispose of contents.

Questions Involving Properties of Matter

1. Color changes, bubbles, solid formation from liquids, and temperature changes can all indicate that a chemical change **MAY** have occurred. Using this knowledge, decide which type of change, chemical or physical, occurred in Part A, Part B and Part C. **Explain** your choices.
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.**
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?