# Pre-Lab Information

**Purpose** Explore the differences between physical changes and chemical changes by performing an experiment.

Time Approximately 45 minutes

Question How can you distinguish a physical change from a chemical change?

**Hypothesis** If a substance undergoes a physical change, then most of its original properties will be retained because a new substance is not formed.

**OR:** If a substance undergoes a chemical change, then it will not retain its original properties because a new substance is formed.

**Summary** You will conduct 8 experiments and determine whether you observed a physical or chemical change.

# Safety

Behavior in the lab must be purposeful. Be sure to do the following:

* Keep work area clear and uncluttered.
* Always wear a lab coat and safety goggles when performing an experiment.
* Use the right gear such as chemical resistant gloves (when handling chemicals) and tongs   
  (when moving hot beakers and crucibles).
* Use caution when handling chemicals and hot materials.
* Check glassware such as beakers and crucibles for cracks and chips prior to use.
* Do not smell or taste any of the chemicals.
* Report all accidents ‒ no matter how big or small ‒ to your teacher.
* Dispose of chemicals as instructed by your teacher.

# Procedure

1. **Materials**

|  |  |  |  |
| --- | --- | --- | --- |
| **Steps 2 and 3**   * 2 inch piece of calcium carbonate (white chalk) * 25 mL 1M  hydrochloric acid * mortar and pestle * spoon * 50 mL beaker | **Step 4**   * 40 mL water * 100 mL beaker * hot plate * hot pad   **Step 5**   * 2 g copper sulfate pentahydrate * spoon * crucible * crucible tongs * clay triangle * tripod * Bunsen burner | **Steps 6**   * 1 spoonful iron filings * 1 spoonful powdered sulfur * spoon (2) * petri dish * magnet   **Step 7**   * 25 mL 0.1M  potassium iodide * 10 mL 0.1M lead nitrate * 50 mL beaker * 25 mL graduated cylinder | **Step 8**   * 25 mL 1M hydrochloric acid * 3 cm magnesium ribbon (2) * 50 mL beaker * thermometer * tweezers   **Step 9**   * 1 candle on dish * matches |

**Step 2: Calcium carbonate**

1. Place a 2-inch piece of calcium carbonate (from chalk) in a mortar. Crush the calcium carbonate with the pestle.
2. Record all changes observed, the type of change, and your reasoning in the data table.
3. Keep for Step 3.

**Step 3: Calcium carbonate and hydrochloric acid**

1. Pour approximately 25 mL of 1M hydrochloric acid into a 50 mL beaker.
2. Use the spoon to add crushed calcium carbonate from Step 2 to the hydrochloric acid.
3. Record all changes observed, the type of change, and your reasoning in the data table.
4. When finished, dispose of the mixture by pouring it into a receptacle provided by   
   your teacher.

**Step 4: Water**

**a)** Fill a 100 mL beaker with 40 mL of water. Note its physical characteristics.

**b)** Using a hot plate, heat the water until it boils.

**c)** Record all changes observed, the type of change, and your reasoning in the data table.

**d)** Use the beaker tongs to remove hot beaker from hot plate and place on a hot pad.

**e)** Turn off the hot plate and dispose of the water in a drain.

**Step 5: Copper sulfate pentahydrate**

**a)** To allow heating, place the clay triangle on top of the tripod and position the Bunsen burner under the tripod.

**b)** Measure 2 g (approximately 1/2 tsp.) of copper sulfate pentahydrate in a crucible. Note its physical characteristics.

**c)** Place the crucible on the clay triangle.

**d)** Turn the Bunsen burner on to heat the crucible to see a change happen.

**e)** Record all changes observed, the type of change, and your reasoning in the data table.

**f )** Use crucible tongs to remove crucible from clay triangle and let cool.

**g)** When cooled, dispose of copper sulfate powder into the receptacle provided by your teacher.

**Step 6: Iron filings and sulfur**

**a)** Measure 2 g (approximately 1/2 tsp.) iron filings on the one side of a petri dish. Note the physical characteristics of the iron filings.

**b)** Measure 2 g (approximately 1/2 tsp.) of sulfur on the other side of a petri dish. Note the physical characteristics of the sulfur.

**c)** Mix the two materials with the spoon. Note the physical characteristics of the resulting mixture.

**d)** Run a magnet over the resulting mixture, but do not allow the magnet to touch the mixture.

**e)** Record all changes observed, the type of change, and your reasoning in the data table.

**f)** Place the iron filings and sulfur separately into receptacles provided by your teacher.

**Step 7: Potassium iodide and lead nitrate**

**a)** Fill a 50 mL beaker with 25 mL 0.1M potassium iodide.

**b)** Measure 10 mL of 0.1M lead nitrate into a 25 mL graduated cylinder.

**c)** Pour lead nitrate into the potassium iodide slowly.

**d)** Record all changes observed, the type of change, and your reasoning in the data table.

**e)** Dispose of the mixture in the receptacle provided by your teacher.

**Step 8: Magnesium and hydrochloric acid**

**a)** Fill a 50 mL beaker with approximately 20 mL of 1M hydrochloric acid.

**b)** Use a thermometer to measure the temperature of the hydrochloric acid in °C.

**c)** Use tweezers to drop the two 3 cm magnesium ribbons in the hydrochloric acid.

**d)** Measure the temperature of the solution again.

**e)** Record all changes observed, the type of change, and your reasoning in the data table.   
(Be sure to consider the change of temperature!)

**f)** Following your teacher’s instructions, dispose of the mixture in a filter set-up provided by   
your teacher.

**Step 9: Candle**

**a)** Clear the area of flammable materials.

**b)** Place the candle on a dish so that it is firmly on it.

**c)** Use a match to light the candle. Let it burn for approximately 1 minute.

**d)** Record all changes observed, the type of change, and your reasoning in the data table.

**e)** Blow out the candle and put the candle and matches in receptacles provided by your teacher.

# Data

Record your data either in your lab notebook or in the space below.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Step** | **Material** | **Change(s) Observed** | **Type of Change (Physical/Chemical)** | **Reasoning** |
| **2** | Calcium carbonate |  |  |  |
| **3** | Calcium carbonate and hydrochloric acid |  |  |  |
| **4** | Water |  |  |  |
| **5** | Copper sulfate pentahydrate |  |  |  |
| **6** | Iron filings  and sulfur |  |  |  |
| **7** | Lead nitrate and potassium iodide |  |  |  |
| **8** | Magnesium and hydrochloric acid |  |  |  |
| **9** | Candle |  |  |  |