**Chemical and Physical Changes Lab**  Name: \_\_\_\_\_\_\_\_\_\_\_\_

Partner(s): \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Activity 1: Heating**

Melting is a *change of state* and therefore a physical change. It can be changed back to solid. Some substances burn when they are heated. Burning is a chemical change because bonds are broken and new substances are formed.

**Materials:** Bunsen burner, striker, crucible tongs, safety goggles, small piece of magnesium and aluminum pie plate.

**Procedure**:

* + - 1. Before you begin, make observations on both the aluminum and magnesium metals (state, colour, luster). Record in chart below.
      2. Light a Bunsen burner. Adjust to proper flame.
      3. Using crucible tongs, hold a piece of aluminum pie plate in the hottest part of the flame (just over the inner blue cone). Observe any changes in chart below.
      4. Repeat with a piece of magnesium metal. Record observations below.

\*\*\*NOTE: if anything starts to burn, do not stare directly at flame.

**Observations**

|  |  |  |
| --- | --- | --- |
|  | Before Heating | After Heating |
| Aluminum |  |  |
| Magnesium |  |  |

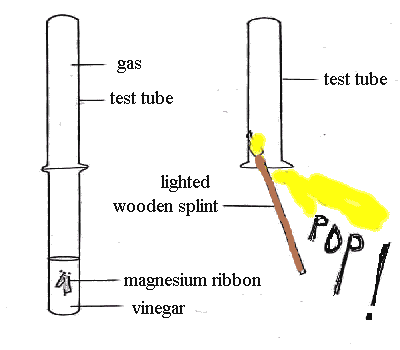
**Chemical or Physical change?:**

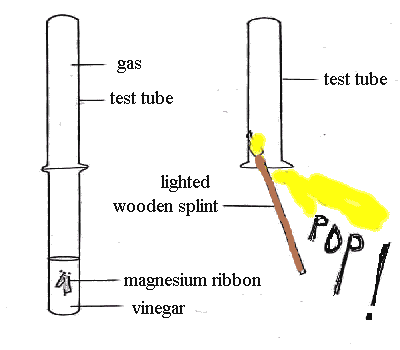
Claim: Aluminum went through a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ change. The EVIDENCE was \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Reasoning: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Claim: Magnesium went through a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ change. The Evidence was \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_Reasoning**:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Activity 2: Reactivity to Acid**

**Materials**: safety goggles, test tube rack, 1 medium test tube, 1 large test tube (that fits over smaller test tube), 3M Hydrochloric Acid (HCl), small piece of zinc metal, wooden splint, match

**Procedure:**

* + - 1. Record observations of your piece of zinc metal in chart below.
      2. Pour about a 1 cm of HCl acid into smaller test tube. Record observations below.
      3. Drop zinc into small test tube containing acid and immediately invert larger tube overtop smaller tube (to catch the bubbles). It should look like the diagram on the right. One partner should hold the tubes in place while the other partner records observations below. Switch, keeping tubes in place so other partner can write.
      4. When enough gas has collected, partner holding tubes: KEEP TOP TUBE INVERTED, place bottom tube in rack. Other partner: Bring a burning splint to the opening of the inverted tube to test the gas:
* Carbon dioxide will make a flame go out
* Oxygen will reignite a glowing splint
* Hydrogen will cause a bark/pop/squeak sound

Observations:

|  |  |
| --- | --- |
|  | Observations (state, lustre, colour, sound) |
| Zinc metal before acid |  |
| Hydrochloric acid (HCl) alone in tube |  |
| Zinc when in acid |  |
| When flame brought to test tube |  |

**Chemical or Physical change?**

The combination of zinc and HCl was a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ change because \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Magnesium went through a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ change. The Evidence was \_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Was the flame test of the gas a chemical or physical change? The flame test was a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ change because \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**\_\_**

**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

The gas produced was \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ because \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Clean up:** Pour the contents of the tube onto a strainer over the drain so the metal does not go down the drain. Rinse and return the zinc to the cart. Scrub out test tubes with soap and brush.

**Activity 3: Reactivity to Base**

**Question:** Do substances react to strong bases?

**Materials:** 2 small test tube, rack, Ca(NO3)2 (calcium nitrate), Cu(NO3)2, copper (II) nitrate, sodium hydroxide (NaOH) base solution.

**Procedure:**

Add 20 drops of Ca(NO3)2 (calcium nitrate) to one tube. Make observations in chart below.

Add 20 drops of Cu(NO3)2, copper (II) nitrate to the other tube. Make observations in chart below.

Add a squeeze of NaOH (sodium hydroxide base) to each tube. Observe.

Observations:

|  |  |  |
| --- | --- | --- |
|  | The solution alone | When mixed with NaOH |
| Ca(NO3)2 |  |  |
| Cu(NO3)2 |  |  |

**Chemical or physical changes**?

Ca(NO3)2 went througha \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ change when base was added. The evidence was \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Cu(NO3)2 went througha \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ change when base was added. The evidence was \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Reasoning:** Why does the evidence above suggest a physical or chemical change?

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**Clean up:** Pour tube with blue copper solution into filter at front of lab. Wash out tubes with Sparkleen detergent and a scrub brush. Hang on drying rack.

**Apply:**

Devise a test you could perform to capture and identify the gas produced when vinegar and baking soda are mixed. Below are some properties of three different gasses:

|  |  |  |
| --- | --- | --- |
| Carbon dioxide | Helium | Oxygen |
| Heavier than air,  Not flammable,  Odorless, colorless, tasteless | Lighter than air – used in birthday balloons  Not flammable,  Odorless, colorless, tasteless | Heavier than air,  Flammable – will ignite a glowing splint,  Odorless, colorless, tasteless |

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_