

## Copper Metal Experiment

In this experiment we will put steel nails and copper sulfate into water and observe how the reaction between the steel nails and copper sulfate solution change the water's pH and temperature. Write down all notes in your lab notebook. Groups will be 2 to 3 people.

Measure the pH and temperature of the water before doing anything.

Step 1. Fill up the beaker with water and copper sulfate.

Step 2. Put a piece of litmus paper in the water and record the color.

Step 3. Compare the color of the litmus paper to the scale and record the pH.

Step 4. Place a thermometer in the water and record the temperature.

Measure the pH and temperature of the water after doing the experiment.

Step 1. Place a thermometer in the water and record the temperature.

Step 2. Place a piece of litmus paper in the water and record the color.

Step 3. Compare the color of the litmus paper to the scale and record the pH.

Place steel nail into beaker, make sure top of nail is sticking up out of the water. Count to 60 and write observations down in lab notebook.

Leave nail in beaker, and we will observe on Wednesday.

Clean up

Clean up area including thermometer and throw away used litmus paper.

Analysis

Did the water become warmer or cooler because of the reaction? Why?

Did the water become more basic or more acidic because of the reaction? Why?

What happened to your nail after 60 seconds? Why?

## Sodium Metal Experiment

In this experiment we will put pure sodium metal into water and observe how the reaction will change the water's pH and temperature. Write down all notes in your lab notebook. Groups will be 2 to 3 people.

Measure the pH and temperature of the water before doing anything.

Step 1. Fill up the beaker with water.

Step 2. Put a piece of litmus paper in the water and record the color.

Step 3. Compare the color of the litmus paper to the scale and record the pH.

Step 4. Place a thermometer in the water and record the temperature.

Conduct the experiment:

Step 1: Your teacher will place a small chunk of sodium metal on your scale. (The piece of metal should be about half the size of a pencil eraser or slightly larger than the head of a pin).

Step 2: Measure the weight of your sodium metal.

Step 3: Using tongs, pick up the metal and place it in the beaker of water.

NOTE: stand as far away from the beaker as possible and make sure your safety goggles are on.

Measure the pH and temperature of the water after doing the experiment.

Step 1. Place a thermometer in the water and record the temperature.

Step 2. Place a piece of litmus paper in the water and record the color.

Step 3. Compare the color of the litmus paper to the scale and record the pH.

Clean up

Clean up area including thermometer and throw away used litmus paper.

Analysis

Did the water become warmer or cooler because of the reaction? Why?

Did the water become more basic or more acidic because of the reaction?  
Why?

Sodium is a very reactive metal which must be handled with care. Sodium will react with oxygen in the atmosphere to make sodium oxide [ $4\text{Na(s)} + \text{O}_2\text{(g)} \rightarrow 2\text{Na}_2\text{O(s)}$ ]. Sodium will also react with water to make sodium hydroxide base and hydrogen gas [ $\text{Na(s)} + \text{H}_2\text{O(l)} \rightarrow \text{NaOH(aq)} + \text{H}_2\text{(g)} + \text{heat}$ ]. The reaction is exothermic enough to cause the flammable hydrogen gas to ignite explosively with oxygen in the atmosphere to make new water molecules [ $2\text{H}_2\text{(g)} + \text{O}_2\text{(g)} \rightarrow 2\text{H}_2\text{O(g)}$ ]. For these reasons, sodium is usually kept under mineral oil to keep it from reacting with these common substances.