

## Station 1: Dry ice

### Safety Instructions



Everyone must wear safety goggles.

Return droppers and spatulas to their appropriate containers.

Do not touch the dry ice with your fingers. It causes burns. Calcium hydroxide,  $\text{Ca(OH)}_2$ , is caustic. Do not get it on your skin. Rinse spills thoroughly with water.

- $\text{CO}_2(s) \longrightarrow \text{CO}_2(g)$ 
  - Put a spatula tip of powdered dry ice into a test tube.
  - Record your observations.
- $\text{CO}_2(s) \longrightarrow \text{CO}_2(g)$   
 $\text{CO}_2(s) + \text{H}_2\text{O}(l) \longrightarrow \text{H}_2\text{CO}_3(aq)$ 
  - Put a spatula tip of powdered dry ice in a test tube.
  - Add about 1 in. (2.5 cm) of water to the same test tube.
  - Record your observations.
- $\text{Ca(OH)}_2(aq) + \text{CO}_2(s) \longrightarrow \text{CaCO}_3(s) + \text{H}_2\text{O}(l)$ 
  - Pour saturated  $\text{Ca(OH)}_2$  solution into a test tube to a height of about 1 in. (2.5 cm).
  - Add a spatula tip of powdered dry ice to the same test tube.
  - Record your observations.

### Cleanup

When you are finished, dump the contents of the test tubes you used in the waste container provided, and rinse the test tubes with water from the wash bottle.

## Station 2: Calcium chloride

### Safety Instructions



Everyone must wear safety goggles.

Return droppers and spatulas to their appropriate containers.

Sodium hydroxide, NaOH, is caustic. Do not get it on your skin.

- $\text{CaCl}_2(s) \longrightarrow \text{CaCl}_2(aq)$ 
  - Put a spatula tip of solid  $\text{CaCl}_2$  in a test tube.
  - Add about 1 in. (2.5 cm) of water to the same test tube.
  - Record your observations.
- $\text{CaCl}_2(aq) + 2\text{NaOH}(aq) \longrightarrow \text{Ca}(\text{OH})_2(s) + 2\text{NaCl}(aq)$ 
  - Pour 1 in. (2.5 cm) of 1.0 M  $\text{CaCl}_2$  solution into a test tube.
  - Add about 1 in. (2.5 cm) of 1.0 M NaOH solution to the same test tube.
  - Record your observations.
- $\text{CaCl}_2(s) + \text{CuSO}_4(s) \longrightarrow \text{CaCl}_2(s) + \text{CuSO}_4(s)$ 
  - Put a spatula tip of solid  $\text{CaCl}_2$  in a test tube.
  - Add a spatula tip of solid  $\text{CuSO}_4$  to the same test tube.
  - Record your observations.

### Cleanup

When you are finished, dump the contents of the test tubes you used in the waste container provided, and rinse the test tubes with water from the wash bottle.

### Station 3: Copper (II) sulfate

#### Safety Instructions



Everyone must wear safety goggles.

Return droppers and spatulas to their appropriate containers.

Ammonium hydroxide,  $\text{NH}_4\text{OH}$ , is caustic. Do not get it on your skin.

- $\text{CuSO}_4(s) \longrightarrow \text{CuSO}_4(aq)$ 
  - Put a spatula tip of solid  $\text{CuSO}_4$  in a test tube.
  - Add about 1 in. (2.5 cm) of water to the same test tube.
  - Record your observations.
- $\text{CuSO}_4(s) + 4\text{NH}_4\text{OH}(aq) \longrightarrow \text{Cu}(\text{NH}_3)_4\text{SO}_4(aq) + 4\text{H}_2\text{O}(l)$ 
  - Put a spatula tip of solid  $\text{CuSO}_4$  in a test tube.
  - Add about 1 in. (2.5 cm) of 1.0 M  $\text{NH}_4\text{OH}$  to the same test tube.
  - Record your observations.
- $\text{CuSO}_4(aq) + \text{Zn}(s) \longrightarrow \text{Cu}(s) + \text{ZnSO}_4(aq)$ 
  - Put a spatula tip of solid Zn in a test tube.
  - Add about 1 in. (2.5 cm) of 1.0 M  $\text{CuSO}_4$  to the same test tube.
  - Record your observations.

#### Cleanup

When you are finished, dump the contents of the test tubes you used in the waste container provided, and rinse the test tubes with water from the wash bottle.