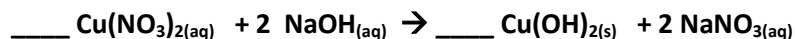


## Copper Odyssey Conversion II

**Conversion II** - Changing copper (II) nitrate to copper (II) hydroxide.

**Pre-lab:** Balance the following reaction.



In a complete sentence describe and name the above compounds.

***Copper (II) nitrate reacts with sodium hydroxide to produce copper (II) hydroxide and sodium nitrate during a double displacement reaction.***

### Data and Observations:

Conversion I product description:

### Conversion II Questions

1. What type of chemical reaction is Conversion II?

***Exothermic reaction going through double-displacement.***

2. Identify each compound as ionic, nonpolar covalent, or polar covalent.

***Copper (II) nitrate – ionic***

***Sodium hydroxide – ionic***

***copper (II)hydroxide - ionic***

***sodium nitrate - ionic***

3. Compare the concentration of hydroxide ion to hydrogen ion in a basic solution.

***In a basic solution, hydroxide ions are high and hydrogen ions are very low.***

4. What test can be done to quickly determine if a substance is an acid, a base or neutral?

***Litmus paper - red or blue***

5. How did we determine whether or not we had added enough sodium hydroxide?

***Kept checking the make sure the overall solution turned from acidic to basic using litmus paper.***

6. Is the reaction exothermic or endothermic? Explain.

***Exothermic, energy is being released from the reaction.***

7. Why did we use an ice bath?

***We used an ice bath to help control the heat being produced from the reaction.***

8. The blue solid formed also had flecks of black. What was that?

***Copper (II) oxide formation.***

9. What is the mole ratio of  $\text{Cu}(\text{NO}_3)_2$  to  $\text{NaOH}$ ?

***1:2***

10.  $\text{Cu}(\text{NO}_3)_2$ ,  $\text{NaOH}$ , and  $\text{NaNO}_3$  are aqueous. What does aqueous mean?

***A solution containing water or "water-like"***

### **Copper Odyssey Conversion III**

**Conversion III** - Changing copper (II) hydroxide to copper (II) oxide

**Pre-lab:** Balance the following reaction.



In a complete sentence describe and name the above compounds.

***Solids copper (II) hydroxide decomposes with the addition of heat into solid copper (II) oxide and water.***

**Data and Observations:**

Conversion II product description:

Conversion III reaction description :

#### **Conversion III Questions**

1. What type of chemical reaction is Conversion III?

***Endothermic, decomposition reaction.***

2. Identify the compounds as ionic, nonpolar covalent, or polar covalent.

***$\text{Cu}(\text{OH})_2$  – ionic***

***$\text{CuO}$  – ionic***

***$\text{H}_2\text{O}$  – polar covalent***

3. Why did we put the bottle in the hot water bath?

***Decomposition reactions usually require the addition of heat or energy; so, the warm water bath added in breaking down copper (II) hydroxide into copper (II) oxide and water. Also, helped to speed up the reaction.***

4. What is the formula of copper (II) oxide?

***$\text{CuO}$***

5. What is the purpose of filter paper?

***The filter paper helps to separate the copper (II) oxide from the water product.***

6. What is the charge of copper in CuO? How do you know?

***Copper is the 2+ charge. This is an overall neutral compound and since oxygen is a 2- we know copper must be a 2+.***

7. What is the charge of copper in copper (I) oxide? What would the formula of copper (I) oxide be?

***Copper (I) oxide would have copper at a 1+ charge with a formula of Cu<sub>2</sub>O. (Criss-Crossing of the charges)***

8. We used a water bath at 37°C. What is the temperature in Kelvin? (Show work)

***37 + 273 = 310K***