

Conservation of Mass Online Lab Submission

Name: Kevin Zhang

Class: Chem 1212

Section: Mondays, 10:30 AM – 1:25 PM

Report Sheet

Weight of copper metal initially taken: .300g

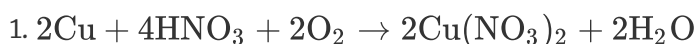
Weight of cleaned evaporating dish: 39.041g

Weight of copper metal and evaporating dish: 39.299g

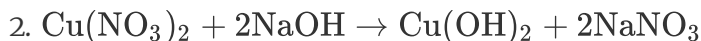
Weight of copper metal recovered: $39.299g - 39.041g = 0.258g$

% of copper metal recovered: $\frac{0.258}{0.300} \times 100\% = 86.0\%$

Reactions:



- Copper (II) Nitrate remains in the solution after the reaction is complete
- Observations: The solution is now blue, and there is a brown gas emitted

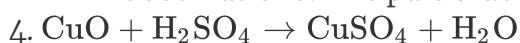


- Reaction Type: Double replacement
- $\text{HNO}_3 + \text{NaOH} \rightarrow \text{NaNO}_3 + \text{H}_2\text{O}$
- Reaction Type: Double replacement
- Besides Copper Hydroxide, Sodium nitrate is formed
- Observations:

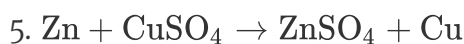
- The clear blue solution has turned to a milky blue.
- There is a pale blue precipitate at bottom of beaker



- Reaction Type: Decomposition
- Washing Away: Dissolved Ions that have not reacted, as well as Sodium Nitrate from the previous reaction.
- Observations: The pale blue precipitate has turned brown/black



- Reaction Type: Double Replacement
- Copper (II) Sulfate is in the solution, along with Water
- Observations: As the sulfuric acid reacts with precipitate, a clear blue solution is formed.



- Reaction Type: Single replacement

- $\text{Zn} + \text{H}_2\text{SO}_4 \rightarrow \text{ZnSO}_4 + \text{H}_2$
- The Zinc is less electronegative than Copper, so the sulfate ions bond with Zinc instead, leaving behind solid copper metal. Unreacted Sulfuric acid also bonds with Zinc, releasing Hydrogen gas
- Washing Away: The Zinc Sulfate is washed away, along with unreacted ions, leaving behind the copper metal.
- Observations: The clear blue solution has become colorless, and the surface of the Zinc has small copper-colored particles.

Pre-Lab Questions

1. Nitrogen dioxide gas may be formed during the reaction, which is toxic to humans.
2. The Law of Conservation of Mass states that Mass can neither be created nor destroyed.
3. Hazards:
 1. NaOH is toxic and corrosive. It can cause severe skin burns and damage to eyes
 2. H_2SO_4 is toxic and corrosive. It can cause severe skin burns and damage to eyes.
 3. HNO_3 is toxic, corrosive, and an oxidant. It can cause severe skin burns and turn skin yellow on contact.
4. Percent Recovery = $\frac{0.327\text{g}}{0.385\text{g}} \times 100\% = 84.9\%$

Post-Lab Questions

1. Affected recovery:
 1. Assuming the student doesn't lose any of the undissolved copper metal, the copper should remain throughout the process, so the end result shouldn't be changed by much. Excess Nitric acid will react with the Sodium Hydroxide instead.
 2. The mass would be less, because there would be less Copper Hydroxide in the solution. When the heating process happens, the only precipitate that forms comes from this copper hydroxide. The solution is washed away, taking the unreacted Copper Nitrate with it.
 3. The mass would be less, because the student has lost some copper on the filter paper.
 4. The mass would be unchanged.
2. Answers:
 1. $\frac{0.325\text{g}}{63.546\text{g/mol}} = 0.00511 \text{ mol}$
 2. 0.00511 mol , because the ratio of Cu to Cu ions is 1:1
 3. 0.00511 mol , because the ratio of Cu ions to $\text{Cu}(\text{OH})_2$ is 1:1
 4. $0.00511\text{mol} \times 65.38\text{g/mol} = 0.334\text{g Zn needed}$
 - $1.00\text{g} - 0.334\text{g} = 0.67\text{g excess}$
 5. $0.00511\text{mol} \times 24.305\text{g/mol} = 0.124\text{g Mg needed}$