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Pre-laboratory Questions

I. Classify each of the following reactions as Redox, SR (single replacement), DR (double replacement), C (combination), D(decomposition) reactions. If a reaction falls into more than one classification, you need to indicate both of them.

- 1) $4 \text{HNO}_3(aq) + \text{Cu}(s) \Rightarrow \text{Cu}(\text{NO}_3)_2(aq) + 2 \text{NO}_2(g) + 2 \text{H}_2\text{O}(l)$
- 2) $\text{Cu}(\text{NO}_3)_2(aq) + 2 \text{NaOH}(aq) \Rightarrow \text{Cu}(\text{OH})_2(s) + 2 \text{NaNO}_3(aq)$
- 3) $\text{Cu}(\text{OH})_2(s) + \text{heat} \Rightarrow \text{CuO}(s) + \text{H}_2\text{O}(l)$
- 4) $\text{CuO}(s) + 2 \text{HCl}(aq) \Rightarrow \text{CuCl}_2(aq) + \text{H}_2\text{O}(l)$
- 5) $\text{CuCl}_2(aq) + \text{Mg}(s) \Rightarrow \text{MgCl}_2(aq) + \text{Cu}(s)$

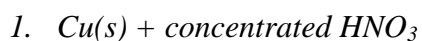
II. For the ones you have identified as Redox reactions above, further identify the oxidizing and reducing reagents and the number of electrons exchanged by using the oxidation number method.

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Data Sheet and Questions

OBSERVATIONS AND EQUATIONS

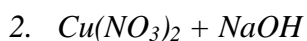


Observation:

Reaction Equation: _____

Reaction Type: _____

What is in the solution after reaction is complete? _____



Observation:

Reaction Equation: _____

Reaction Type: _____

What is formed besides Cu(OH)_2 ? In what form does it exist?

Observation:

Reaction Equation: _____

Reaction Type: _____

What is removed by the washing and decanting processes?

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Data Sheet and Questions

4. $\text{CuO} + \text{HCl}$

Observation:

Reaction Equation: _____

Reaction Type: _____

What is in the solution after reaction is complete? _____

5. $\text{Mg} + \text{CuCl}_2$

Observation:

What happens when magnesium is added? _____

What is the gas produced in the reaction? _____

Reaction Equation: _____

Reaction Type: _____

Other reaction:

6. *Cu metal generated*

What is removed by the final three washing steps & why?

1) washing with water: _____

2) washing with ethanol: _____

3) washing with acetone: _____

What color is the recovered copper?

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Quantitative Data, Calculation and Problems

Data:

Mass of empty evaporating dish: _____ g

Mass of evaporating dish and recovered copper: _____g

Mass of recovered copper: _____g

Calculations:

1. We started the reaction with 20 mL 0.100 M $\text{Cu}(\text{NO}_3)_2$ stock solution. Based on this information, what should be the theoretical yield of copper?
2. What is the percent yield of Copper?
3. What steps/factors in the experiment could have increased or decreased your obtained percent yield of Copper?