**Safety information:**

Zinc chloride has serious health warnings. If it comes into contact with the skin it needs to be washed with soap and water for several minutes. If it comes into contact with the eyes wash for 15 minutes in the eyewash and seek immediate medical attention. Gloves should be used when handling zinc chloride.

**Educational Goal:** Students will understand…

* The process of oxidation reduction.
* How to carry out calculations involving stoichiometry to find the theoretical yield of a product.
* Using actual data to calculate percent yield.

**Student Objectives:** Students will…

* Look at an oxidation-reduction reaction in a single displacement reaction
* Calculate theoretical results through stoichiometry and calculate percent yield.
* Compare the toxicity data between the copper/magnesium chloride reaction and the more traditional example of copper and silver nitrate.
* Practice lab safety

**Background:**

The magnesium is losing electrons and therefore being oxidized and the zinc ions in solution are gaining electrons therefore being reduced. The zinc ions present in the water cannot be seen because they are in the ionic state, and when they receive electrons from the Magnesium, the zinc then precipitates and can be seen in its solid state. Look up the word precipitate.

**Materials: (per lab group -2 students)**

* 125mL of 0.15M solution of zinc chloride (ZnCl2)
* 0.15g of magnesium ribbon (Mg)
* DiH2O
* Electronic balance
* 250-ml beaker
* Glass stir rod
* Forceps
* Filter (vacuum filtration recommended)
* Filter paper
* 250 ml Erlenmeyer flask

**Time required:** 2 class periods (90 minutes) + drying time

**Student Lab Procedure, Data Collections and Questions**

**Procedure:**

1. Obtain 0.15g magnesium metal and polish with steel wool until shiny.
2. Measure 125mL of 0.15M ZnCl2 into a beaker.
3. Place Mg strip into beaker and allow to react for 20 minutes. During this time, you should be stirring every 2 minutes.
4. After 20 minutes remove the Mg strip and wash any solid off into the beaker.
5. Set the Mg aside to dry.
6. Set up the funnel system and pour the contents of the beaker through the filter. Using a wash bottle, wash the remaining contents of the beaker into the filter. When the filtering is complete, set the filter paper aside to dry overnight.
7. Find the mass of the Mg strip.
8. The next day, find the final mass of the filter paper.

**Data:**

|  |  |
| --- | --- |
| Object | Mass (g) |
| Mass of Mg strip start |  |
| Mass of Mg strip finish |  |
| Mass of Mg reacted |  |
| Mass of filter paper |  |
| Mass of filter paper + zinc |  |
| Mass of solid zinc formed |  |

**Questions for thought:**

1. Write a balanced equation for this reaction.
2. Which reactant was the limiting reactant?
3. Theoretically, what mass of zinc should have been produced (in grams)? (Show your work)
4. What was the percent yield of your experiment? (Show your work)
5. What reactant was oxidized in this reaction? What reactant was reduced?
6. Explain the redox reaction that occurred in this experiment.
7. This experimental concept used to be shown using copper wire and a silver nitrate solution, explain why this reaction is a greener reaction.
8. List sources of error in this experiment.