**Cu to Cu**

Topics covered by this laboratory:

* Equation writing – balanced, ionic, net ionic
* Limiting reagents
* Kinetics
* Enthalpy

**Procedure**

1. measure ~ 0.5 g Cu metal and add 4-6 mL of concentrated HNO3 in the hood
2. after reaction is complete, add 75-100 mL of distilled H2O
3. add 30 mL of 3 M NaOH to the Cu2+ solution
4. gently and carefully heat the Cu(OH)2 solid (frothing may occur), add a boiling chip and the heat beaker and contents until it is totally black
5. allow the black precipitate to settle and decant, wash precipitate with warm H2O and decant again
6. slowly add 15 mL of 6 M H2SO4 to the black solid, stir
7. add 2 g of Zn powder to the Cu2+ solution
8. when reaction is complete, filter, wash Cu solid with H2O then acetone
9. allow to dry overnight and mass the following day

**Safety Alert**

1. All solutions contain nitric acid which is very corrosive to skin and eyes. Wash spills off of yourself with lots of water. Neutralize spills on the lab table with baking soda.
2. Solutions are toxic, so wash your hands before you leave the lab.
3. If pipettes are used to measure solutions, always use a pipette bulb. Never pipette by mouth.
4. Sodium hydroxide is a strong base and is hazardous to skin and eyes. If you get any on yourself, wash off with large amounts of water. Neutralize spills on the counter with vinegar.
5. You will be using solutions with high concentration of sulfuric acid which is highly damaging to the skin and eyes. Be careful when handling them. If you spill any on yourself, wash off with lots of water. Neutralize spills with baking soda.
6. **Wear closed-toed shoes, splash resistant goggles and a chemical resistant apron at all times during this lab.**

**Sample Data Table**

|  |  |
| --- | --- |
| Mass of Cu metal |  g |
| Mass of filter paper and dried Cu |  g |
| Mass of filter paper |  g |
| Mass of dried Cu |  g |
| % yield |  % |

**Postlab Questions**

1. What are you removing when you decant and wash the precipitate in step #5?
2. Which step(s) is/are exothermic reactions? Which is/are endothermic?
3. What gas is evolved in step #7?
4. Write the equation for the production of this gas in step #7.
5. Give reasons to explain why your percent yield was not 100%.