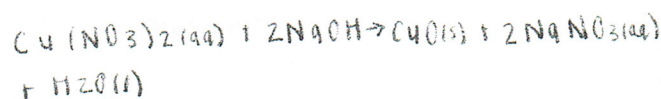
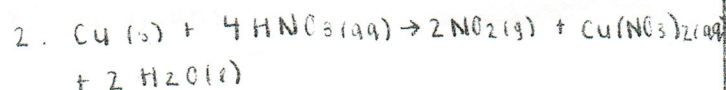


EXP. NUMBER <u>2</u>	EXPERIMENT/SUBJECT <u>Cycles of copper</u>	DATE <u>                    </u>
NAME <u>                    </u>	LAB PARTNER <u>                    </u>	LOCKER/DESK NO. <u>                    </u>
		COURSE & SECTION NO. <u>Chem 1A03</u>

## Pre-Lab Questions

1. (See Observations Table)



$$\begin{aligned} n_{\text{Cu}} &= \frac{m_{\text{Cu}}}{M_{\text{Cu}}} & n_{\text{Cu}} &= \frac{m_{\text{CuO}}}{M_{\text{CuO}}} \\ &= \frac{1.065 \text{ g}}{63.55 \text{ g/mol}} & &= \frac{1.095 \text{ g}}{79.55 \text{ g/mol}} \\ &= 0.0167 \text{ mol} & & \end{aligned}$$

$$\% \text{ Yield} = \frac{n_{\text{actual}}}{n_{\text{theoretical}}} \times 100\%$$

$$= \frac{n_{\text{Cu}}}{n_{\text{Cu}}} \times 100\%$$

$$= \frac{0.01376 \text{ mol}}{0.01676 \text{ mol}} \times 100\%$$

$$= 82.10\% \quad \therefore \text{The percent yield of this process is } 82.10\%$$

## Purpose

To synthesize several copper compounds from elemental copper and later recover the original copper to compare its initial mass to its final mass. Also, to introduce performing simple chemical reactions to the experiments.

## Procedure

Please refer to 2011-2012 1A03/1E03/1A03 Lab Manual for detailed procedure of "cycles of copper".

## Observations

ml of elemental Cu = 0.2534 g

Reaction #	Chemical Equation for Reaction	Qualitative Observations
1	$\text{Cu (s)} + 4 \text{HNO}_3 \text{(aq)} \rightarrow 2 \text{NO}_2 \text{(g)} + \text{Cu(NO}_3)_2 \text{(aq)} + 2 \text{H}_2\text{O (l)}$	- Added nitric acid and copper fizzled immediately and solution turned a greenish-blue colour. Copper dissolved completely leaving a greenish-blue liquid. A brown gas was emitted.
2	$\text{Cu(NO}_3)_2 \text{(aq)} + 2 \text{NaOH (aq)} \rightarrow \text{Cu(OH)}_2 \text{(aq)} + 2 \text{NaNO}_3 \text{(aq)}$	- Added NaOH and solution turned light blue and after sitting a few seconds, a <del>light blue precipitate</del> formed. Litmus paper turned blue, and after stirring for a few minutes continuously, solution turned from green to black on hot plate.
3	$\text{Cu(OH)}_2 \xrightarrow{\text{heat}} \text{CuO (s)} + \text{H}_2\text{O (l)}$	While placed on the hot plate, solution turned from green to black while being stirred. A black precipitate began forming on the base of the beaker while the solution turned clear near the surface (above precipitate). Black precipitate pieces dissolved into finer granules that are dark brown and settled at bottom.
4	$\text{CuO (s)} + \text{H}_2\text{SO}_4 \text{(aq)} \rightarrow \text{CuSO}_4 \text{(aq)} + \text{H}_2\text{O (l)}$	After adding sulfuric acid and stirring, the solution turned a light blue and the precipitate dissolved completely to produce a clear blue solution.
5	$\text{CuSO}_4 \text{(aq)} + \text{Zn (s)} \rightarrow \text{Cu (s)} + \text{ZnSO}_4 \text{(aq)}$	After adding zinc (gray/silver in colour) the zinc fizzed and gas was produced in the beaker. The liquid became cloudy white as the zinc reacted. Eventually the liquid became clear (blue disappeared and colourless). Precipitate that was copper in colour floated on bottom.
6	$\text{Zn (s)} + 2 \text{HCl (aq)} \rightarrow \text{ZnCl}_2 \text{(aq)} + \text{H}_2 \text{(g)}$	- After adding HCl and water, a yellow coloured gas began to show and the copper coloured solution remained at the bottom of the solution.

SIGNATURE <u>                    </u>	DATE <u>                    </u>	WITNESS/TA <u>                    </u>	DATE <u>                    </u>
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