REAC 480—A Sequence of Chemical Reactions: Transforming Copper

Lab Notes

Goal

To recycle a sample of copper!

Procedural Notes

Step 2: Make a compact ball out of the copper ribbon. Be careful not to cut yourself—the edges are sharp! (Make sure you use 0.35 – 0.40 g of **copper**. If the weighing paper has a mass of around 0.25 g, then you need to make sure that the copper + weighing paper has a mass between 0.60 – 0.65 g!)

Step 4: All of the copper MUST DISSOLVE before you move on to step 5.

Step 6: Add 20–30 drops of NaOH, and then add dropwise and test the solution using red litmus. A blue ppt will form when you add NaOH.

Step 8: Make sure you use 2 rings, just like figure 1 shows.

Step 9: Keep it stirring with a glass rod! The 4-minutes start from when the solution boils. If the solution never boils, make sure the blue ppt has changed to a black ppt before moving on.

Step 12: Swirl the beaker, before pouring a small amount into the filter paper. Swirling helps to keep the ppt in suspension.

Step 13: Skip this step.

Step 14: Don't use too much water. A rubber policeman helps to remove the ppt from the beaker walls.

Step 15: Skip this step.

Step 16: Waste filtrate ⟶ drain.

Step 17: A faster method is to use a plastic pipet to suck up the filtrate from the beaker, and squirt it on the black ppt on the filter paper. Continue, until all the black ppt is gone.

Before Step 19: You will need a boiling water bath in step 24. Now is an excellent time to set up the water bath!

Step 19: Do this step in the FUME HOOD! The copper ions in solution, $Cu^{2+}(aq)$ are blue. When they react with the solid zinc, they form a precipitate of copper, Cu(s) which is reddish-brown. This precipitate tends to coat the surface of the zinc and blocks the reaction. If you keep it stirring, the copper coating falls off the zinc, and the reaction takes place much more quickly!
When the blue color of the solution changes to colorless, you can pick out the excess zinc pieces with tweezers/forceps. Be sure to squirt off any pieces of copper stuck to the zinc with water from a water bottle back into the beaker.

Step 20: The decanted liquid can go down the drain. You probably want to decant into a beaker, rather than directly into the drain… If you spill any copper, it's easier to recover from a beaker than the drain!

Step 23: The drier the copper is at this point, the better! Use a kim-wipe, rather than a piece of paper-towel, to wick off water from the copper.

Step 24: Drying the copper takes at least 20 minutes. Be patient! Once the copper is dry, if you crush the copper granules with a micro spatula, they will have the consistency of powdered sugar. If the copper sticks to the spatula, it is still wet!

Step 28: Discarded copper can go in the solid chemical waste containers on top of the benches.

Possible alternative drying procedure:

Step 23: **Check with your lab instructor before carrying out this alternative procedure.**
A faster way to dry the copper is to wash the solid with small amounts of acetone from a wash bottle before placing the evaporating dish on the water bath. Squirt a small amount of acetone on the copper granules, then carefully decant off the liquid layer leaving behind *as little acetone as possible*! (Acetone is extremely flammable!) This reduces the drying time in step 28 by about 50%.