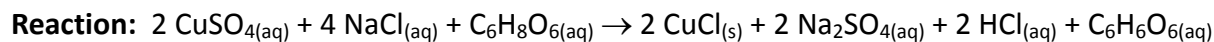


Name _____

Synthesis of Copper (I) Chloride by Reduction of Copper (II) Sulfate with Ascorbic Acid (Vitamin C)



Introduction: In previous labs, you have seen orangish-brown colored Cu metal, an example of the copper (0) oxidation state. You have also seen blue-green Cu^{+2} ion, representing the copper (+2) oxidation state. In this lab, we will reduce the Cu^{+2} ion to the colorless Cu^+ ion by reaction with ascorbic acid (Vitamin C).

1) Cu^+ ion is an example of the copper (_____) oxidation state.

Procedure:

A. Weigh out 10 grams of CuSO_4 into a cup or weighing boat. Weigh out 7.5 grams of NaCl into another cup or weighing boat.

B. Dissolve the CuSO_4 in a beaker containing 50 mL of water. Do not add more water than this, or your final product may not precipitate later! You should stir the mixture until the CuSO_4 completely dissolves. If you would like to speed this up, you may gently heat the mixture on a hotplate. Do NOT boil it.

C. Add the NaCl to your solution of CuSO_4 . You should see a color change, indicating the production of CuCl_2 in solution.

2) The color changes from _____ to _____.

3) CuSO_4 and CuCl_2 both contain copper (+2). Was this a redox reaction? [Yes] [No]

D. If this solution is not perfectly clear, filter it into a second beaker.

E. Weigh out 7.5 grams of ascorbic acid (Vitamin C) and dissolve it in 50 mL of water. You can use your first beaker for this – make sure it is clean first.

F. Add the Vitamin C solution to your solution of copper (II). You should see a color change and a precipitate should form.

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4) The color changes from _____ to _____

5) You converted copper (+2) to copper (+1). Was this a redox reaction? [Yes] [No]

G. Allow the solution to settle. Clean out your filter funnel and add a fresh piece of filter paper. Collect your precipitate on the filter paper.

H. Squeeze the filter paper dry between pads of paper towels and spread it out to dry.

6) What is the appearance of your precipitate? Is it different from the CuSO_4 you started with?

I. Hand in your CuCl product for collection. Wash all glassware and clean up your lab area.

7) You reduced copper (+2) to copper (+1). In any redox reaction, something must be oxidized and something else must be reduced.

What was oxidized in this reaction?

J. Hydrogen peroxide (H_2O_2), when mixed with acids, is an oxidizing agent: it can oxidize other substances. If we react acidic hydrogen peroxide with our CuCl product, what do you expect will happen? What color do you think the product of this reaction will be?
