

Lab Investigation 6 - What is the best way to remove silver ion from an aqueous solution?

USING CHEMICAL REACTIONS

Guiding Question

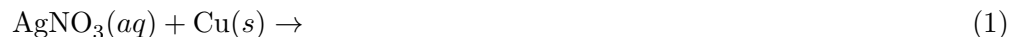
What is the best way to remove silver ion from aqueous silver nitrate?

INTRODUCTION

Chemical reactions can be recognized by a color change, the formation of a solid, the formation of bubbles, or a change in temperature. Chemists describe these reactions using chemical formulas. You have learned how to write and balance chemical reactions. But if we mix two or more reagents together, how can we determine what products are formed? In this investigation, you will determine the identity of the products that are formed as a result of a chemical reaction. It is valuable to know how chemicals react for many reasons; precipitation reactions are used to remove heavy metals from wastewater; and oxidation-reduction reactions are used to recover or plate metals. In both instances, we might want to recover or isolate the precipitate or the metal either for further use or disposal. This week's lab investigation provides the opportunity for you to use many of the skills learned in lab and lecture this semester.

THE PROBLEM

This investigation requires you to use your knowledge of chemical reactions to design a procedure to remove silver ion from an aqueous silver nitrate solution. The two reactions are given below.



MATERIALS AVAILABLE FOR USE

Test tubes & rack

0.5 M CaCl₂

0.5 M AgNO₃

Copper metal

Side-arm filtration flask

Büchner funnel

Filter paper

50 mL beaker
25 mL & 10 mL graduated cylinders
Tweezers
Micro spatula
Watch glass
Stirring rod w/ rubber tip

SAFETY PRECAUTIONS

CAUTION: Always wear **goggles**.

CAUTION: AgNO_3 (silver nitrate) will stain your skin and clothes brown. Gloves are available in the lab.

GETTING STARTED

- 1 Mix the reactants for each reaction in a test tube.
- 2 What type of reaction is occurring and why?
- 3 Write the balanced equation for each reaction.

EXPERIMENTAL DESIGN

Please print the worksheet for this experimental design phase of the investigation.

INTERACTIVE POSTER SESSION

Once your group has completed your work, prepare a whiteboard that you can use to share and justify your ideas. See the handout¹ provided for details on this process.

REPORT

Once you have completed your research, you will need to prepare an *investigation report* that consists of three sections. Your report should answer these questions in 2 pages or less. This report must be typed and any diagrams, figures, or tables should be embedded into the document. Generally, you need one page for the first two sections and the second page for third section.

Section 1: What concept were you investigating, and how does it relate to the guiding question? *What is the best way to remove silver ion from aqueous silver nitrate?* See the introduction for information on chemical reactions. Discuss both types of reactions and issues with separation of solids from solutions. Include both balanced chemical reactions somewhere in your report.

¹../poster/manual.html

Section 2: How did you go about your work, and why did you conduct your investigation in this way? **Discuss your reaction design and show your calculations.**

Section 3: What is your argument? Compare % yield for the two reactions of silver ion removal as well as percent recovery of different teams. You should consider issues that came up with either reaction that may have made that reaction more or less efficient or suitable.

This third section is where you not only present your data, but also **use** the values you obtain as evidence in your reasoning. Statements like, “see data table for values” are not acceptable!