

Analysis of a Silver Alloy Lab

Goal: To determine the percent of silver in an alloy using gravimetric analysis

Background Information

Silver coins have historically been made from an alloy of silver and copper. With a little bit of internet research, it would be fairly easy to determine the composition of these alloys. In this experiment, however, you are going to set out to verify the values that can be found on the internet.

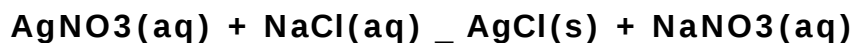
In this experiment, you will analyze a piece of an alloy that contains mostly silver in order to find out what percentage of this alloy is silver. In short, you will determine the mass of the original sample. Then, by carrying out a few simple reactions, you will end up with silver chloride. Using your knowledge of the percent composition of silver chloride, you will determine what the mass of silver was in the original sample.

Materials

A piece of alloy	Wire gauze
6.0 M nitric acid, $\text{HNO}_3(\text{aq})$	Drying oven
sodium chloride, $\text{NaCl}(\text{s})$	Rubber policeman
100 mL beaker	Tongs
400 mL beaker	Wash bottle
stirring rod	Fume hood
watchglass	funnel
Iron ring	filter paper
Ring stand	waterproof marker
Hot plate	

Pre-Lab Questions; Answer on a separate sheet of paper

1. What is a mole?
2. What information do the coefficients in a balanced chemical equation reveal?
3. One of the reactions that will be carried out is the reaction between silver nitrate, AgNO_3 , and sodium chloride, NaCl .



If a 0.250 gram piece of silver were dissolved with nitric acid to form the silver nitrate, then:

- a) what is the mole ratio between the silver ions and the chloride ions
- b) how much sodium chloride would be required to completely precipitate the silver as silver chloride?

Determining the Percent of Silver in an Alloy

Lab Procedure

1. Put on your goggles.
2. Obtain a piece of the metal alloy and determine its mass.
3. Place the metal alloy into the bottom of a 100 mL beaker
4. Carefully add about 10-15 mL of 6.0 M HNO_3 .
5. Place the beaker on a hot plate in the fume hood and gently heat the acid-alloy mixture.
6. Once all of the alloy has dissolved, carefully remove the beaker from the hot plate.
7. Add twice as much sodium chloride, NaCl(s) , as is needed to completely react with the silver in solution.
8. Obtain a piece of filter paper and label it with a waterproof marker.
9. Determine the mass of the filter paper.
10. Carefully pour the solution and the precipitate into the filter paper and using vacuum filtration allow to filter.
11. Use the policeman and the wash bottle to transfer all of the precipitate into the filter paper.
12. Add 2-3 mL of 6.0 M HNO_3 to 150 mL of water in your wash bottle to make a very dilute solution of nitric acid. After all of the precipitate has been transferred to the filter paper and the supernatant liquid is allowed to filter off, rinse the precipitate with the dilute nitric acid.
13. After the precipitate has been rinsed 2 or 3 times, place the filter paper in the drying oven to dry overnight.
14. After the filter paper is dry and cool, determine the mass of the filter paper with the silver chloride.
15. Dispose of the silver chloride as instructed by your teacher.
16. Determine the percent of silver in the alloy sample.

Determining the Percent of Silver in an Alloy

Lab Report

Data

Mass of alloy sample	g
Mass of NaCl added	g
Mass of filter paper	g
Mass of filter paper and silver chloride	g
% silver in alloy	%

Analysis

1. Write the balanced equations for all the reactions that occurred in this experiment
2. Show the calculations that were used to determine the percentage of silver in the alloy.
3. Explain why the procedure called for twice as much sodium chloride than was actually needed.

Determining the Percent of Silver in an Alloy

Conclusion

1. Conduct some research to determine the accepted value for the composition of the alloy that you used. What was that accepted value? Cite your sources.

2. The purpose of this lab was to experimentally determine the percent silver in an alloy.

Explain:

a. how this purpose was accomplished

b. what was the percent error

c. what factors contributed to this error