

EXPERIMENT 29: SYNTHESIS AND ANALYSIS OF A COORDINATION COMPOUND—REPORT GUIDELINES

You are expected to complete Experiment 29's Advance Study Assignment, follow the lab manual procedure, and fill out the lab manual's data sheets. Note, however, that we will not do the volumetric determination of NH_3 in the second week. The gravimetric determination of Cl^- and the colorimetric determination of cobalt are sufficient for calculating the empirical formula of your coordination compound.

You and your lab partner are also required to do the following:

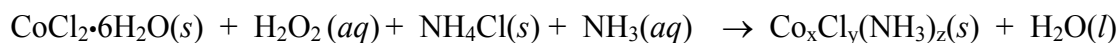
- (1) Keep a detailed written record of all procedures and observations during both weeks of lab work. (If you do not keep a notebook in your lab section, you can use the pages provided at the end of this handout for taking notes.) This includes noting color changes, evolution of gases, odors, formation of precipitates, and other notable events. Be sure to note any deviations from the lab manual procedures.
- (2) Write a scientific report whose contents are described below. Consider your audience to be a classmate who did not have the opportunity to carry out the experiments. (How unfortunate for that person!) In scientific writing, it is common to employ either the passive voice, or the first person plural active voice (or a combination). Strive for a formal tone.

You and your partner may turn in either common or individual reports. They must be typed.

CONTENTS OF SCIENTIFIC REPORT

1. Synthetic Procedure

The synthesis you carried out in the first week followed this (unbalanced) equation:



where the composition of your product (that is, the values of x , y , and z) depends on which procedure you used. Give a brief summary of how you prepared the cobalt complex. Describe your observations, and explain the role of each reagent you used. (Use the above equation as a guide to your discussion.) You can assume the reader will have access to a copy of the lab manual, so you need not reproduce exhaustively the procedure in the lab manual.

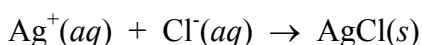
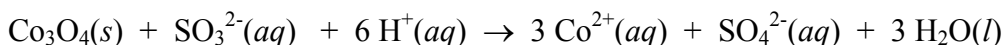
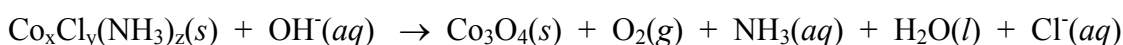
2. Yield and Description of the Product

Report (a) Your experimental yield (in g); (b) The limiting reagent and the theoretical yield (in g); (c) The percent yield; (d) The physical appearance of your product. Try to rationalize the color of your product in terms of coordination chemistry concepts. Report all numbers using the correct number of significant figures (see Chapter 1 of Silberberg to review this concept).

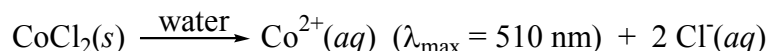
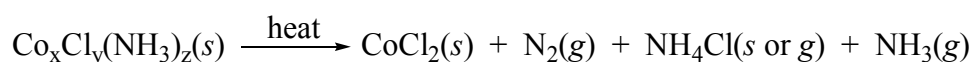
3. Analytical Procedure

Write a brief summary of what you did experimentally to determine the chemical formula of the complex. Describe your observations, and mention any changes that you made to the lab manual's procedures. Discuss the role of the reagents you used. The following equations, which describe the chemistry of your determinations, should aid your discussion of each reagent's role:

Chloride Determination (not all equations are balanced)



Cobalt Determination (not all equations are balanced)



4. Analytical Results

Briefly describe in words your mathematical procedure for determining the empirical formula of your complex. Either here or on the data sheets, show a set of sample calculations.

5. Error Analysis

Discuss sources of both random and systematic error in both your determination of product yield and your determination of the product's empirical formula. Predict and explain the sign of each systematic error. (For example, would incomplete drying of your product lead to too high or too low a yield? Why?) See Chapter 1 of Silberberg to review these concepts.

6. References and Acknowledgments

Cite all materials you used to write this report, including the lab manual. Briefly describe what each team member was responsible for, and mention anyone else who helped you with the report.

7. Appendix

Append the data sheets from the lab manual and the notes you took in lab.

You will be graded on the correctness of your calculations, the quality of your results (both in the synthesis and analysis), the quality of your scientific descriptions and error analysis, and your overall clarity of expression. Because of the extra work, your instructor may make this experiment worth twice (or 2.5 times) a normal experiment. Please talk with any of the Chemistry 11 instructors for help with any part of this report!

Notes from Lab Work

Notes from Lab Work

Notes from Lab Work

Notes from Lab Work