Laboratory Report Format[1]

Formal laboratory reports should follow the basic form on the next page. The report should be single-spaced with one-inch margins using a 12 pt font. The contents of the sections of a formal laboratory report are:

Introduction. The introduction is a concise statement of the theory/reason behind the experiment.

Procedure. The procedure refers the reader to the procedure outlined in the laboratory handout. Describe any changes to this procedure.

Data and Results. Give all results and numerical calculations in data and results. For each set of calculations, provide one sample calculation. Table and graphs should be included in this section. (Reproduce any data tables found in the laboratory handout.)

Discussion. The discussion section should analyze the results of the experiment. Integrate the Data Analyses questions into the narrative of the discussion. Why were the experimental values not the same as the literature values. What were the sources of error? Could these problems have been avoided?

Reference(s). Reference the laboratory handout (below is an example of a Chemistry lab manual):

Nam, E.; Hill, M.; Randall, J. *Organic chemistry with Vernier: Organic Chemistry Experiments Using Vernier Sensors*; Vernier Software & Technology: Beaverton, 2012: pp 5-1 to 5-4.

[1]Adopted from Grossie, D.A.; Underwood, K.A. *Laboratory Guide for Chemistry;* Wright State University: Dayton, 2010; pp xv-xviii.

Alum from Aluminum Cans

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CHM 103

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Introduction

The purpose of this laboratory is to illustrate a method of obtaining alum from scrap aluminum. Alum, a double salt, supplies K^+, SO_4^{2-}, and $Al(H_2O)_6^{3+}$ ions when dissolved. Historically, alum was used in the pickling process; in addition, it has also been utilized in the dyeing of various fabrics. Through recycling of aluminum, useful products can be obtained from previous materials generally regarded as refuse.

Procedure

The procedure was found on pages 27-28 of the lab book. (See references.) The only deviation from the book's procedure was in using concentrated sulfuric acid to achieve acidification, as opposed to a more dilute 2M H_2SO_4 (see below).

In the experiment, aluminum foil was dissolved in a hot aqueous solution of KOH as described by the following equation:

$$2\ Al + 2\ KOH + 6\ H_2O \rightarrow 2\ KAl(OH)_4 + 3\ H_2 \uparrow$$

From here, the solution was acidified by use of 9M H_2SO_4 until the precipitate (alum) was recovered.

$$2K^+ + 2\ Al(OH)_4^- + H_2SO_4 \rightarrow 2\ K^+ + 2\ Al(OH)_3 \downarrow + H_2O + SO_4^{2-}$$
$$2\ Al(OH)_3 + 3\ H_2SO_4 \rightarrow 2\ Al^{3+} + 3\ SO_4^{2-} + 6\ H_2O$$
$$K^+ + Al^{3+} + 2\ SO_4^{2-} + 12\ H_2O \rightarrow KAl(SO_4)_2 \cdot 12H_2O \downarrow \text{ (alum)}$$

Upon obtaining the desired product, a recrystallization process was run to eliminate impurities.

(Note: The procedure could be briefer, i.e., simply reference the laboratory handout. However, do write up changes from the laboratory handout.)

Data and Results

(Note: In this particular experiment, no graphs, tables, or calculations were necessary. Normally this is where you place them in the report.)

Discussion

By performing the experiment, insight was gained into a basic recycling process, in this case, aluminum reverting into alum.

During the experiment, it was found that cutting the aluminum into small pieces sped up the reaction involving KOH since the surface area was greatly increased. By increasing the area available for the reaction, much time was saved in this step. It was also noted that filtering the liquid with glass wool before reacting it with sulfuric acid removed the impurities and yielded a cleaner product.

In conclusion, the lab was successful in that it went smoothly with an acceptable product obtained. The recycling of aluminum is only one of several processes used today in industry. By recycling various "waste" materials, one cannot only eliminate in part the problem of excess waste material but also help solve the problem of dwindling natural resources.

References

Grossie, D.A.; Underwood, K.A. *Laboratory Guide for Chemistry;* Wright State University: Dayton, 2010; pp 27-28.