Free synthesis of aspirin report sample

Sociology, Community

\n[toc title="Table of Contents"]\n

\n \t

\n[/toc]\n \n

Introduction

Aspirin is a commonly used drug. One of the properties of aspirin is that it is an analgesic, meaning that it relieves of pain. Aspirin is also an antipyretic drug meaning that it relieves on of fever. It also has anti-inflammatory properties meaning that if readily relieves swelling from tissues (Ahluwalia, Sunita & Adarsh 231). Salicylic acid has two functional groups. One of the functional groups is the phenolic group while the other functional group is carboxylic acid group. The presence of these two functional groups means that salicylic acid can undergo esterification in two different reactions.

In one reaction, salicylic acid can act as the alcohol partner of the reaction. Salicylic acid can also act as the acid partner of the esterification reaction. Reacting salicylic acid acetic anhydride, produces acetyl salicylic acid, commonly known as aspirin, the product of the esterification reaction is. This experiment will use the esterification reaction where salicylic acid is reacted with acetic anhydride to produce acetyl salicylic acid. The purpose of this experiment is to synthesize aspirin in an esterification reaction by reacting salicylic acid with acetic anhydride.

Results

The percentage yield of salicylic acid from the reaction was 0. 019mol. The product was white in color and did not have any odor. The yield of acetic anhydride was 5. 4 grams. The product was colorless. Additionally, 0. 05mol of colorless and odorless concentrated sulfuric acid was yielded.

The theoretical yield of aspirin is 2. 52 grams.

2g of salicylic acid x 1mol138g = 0. 019 mol

5 ml of acetic anhydride x 1. 08g/ ml = 5. 4 g

5. 4 g x 1mol102 = 0. 05 mol

0. 014 mol x 180gmol = 2. 52 g

Discussion

The experiment works when the hydrogen group of the carboxylic acid is replaced with an acetyl functional group, effectively forming an ester. When the reactants were added into the volumetric flask, they were swirled. The swirling was intended to ensure that the reactants mixed thoroughly. A few drops of concentrated sulfuric acid were added to the reactants. The addition of concentrated sulfuric acid was in order to introduce hydrogen ions into the reaction. The reactants were heated for ten minutes. The importance of this part of the procedure was to introduce the energy required in the reaction to exceed the activation energy for the acetylation reaction (Ahluwalia, Sunita & Adarsh 231). The application of heat to the reactants helped speed up the reaction. The following is the reaction mechanism for the reaction:

As highlighted above, concentrated sulfuric acid was used in the reaction. The purpose for which the concentrated sulfuric acid was used in the reaction was to introduce hydrogen ions into the reaction. Concentrated sulfuric acid has an abundance of hydrogen ions to donate into the reaction. The presence of hydrogen ions from the concentrated sulfuric acid acts as a catalyst that speeds up the reaction (Ahluwalia, Sunita & Adarsh 231). The purity of the aspirin produced is very important. From time to time, when a bottle of aspirin is opened, there is a distinctive odor of vinegar. The presence of vinegar odor has implications on the purity of the aspirin in the bottle. The purification process in the synthesis of aspirin is done to rid the final product of residues of unreacted salicylic acid, acetic acid product, acetic anhydride that did not react and any excess sulfuric acid.

The vinegar odor in the sample means that there are residues of acetic acid. This implies that the aspirin is not entirely pure. The theoretical value and the experimental value were similar. This shows that the reaction was optimum and all the reactants took part in the reaction. As highlighted earlier, the purity of the aspirin produced is very important given the medicinal importance of the compound. As such, estimating the purity of the aspirin is important. The purity of the aspirin produced can be estimated by checking the melting point of the product. Impure compounds have a lower melting point compared to pure substances. If the compound has a lower melting point than the known melting point of pure aspirin, this is an indication that the product is impure. This is necessary, especially in industrial manufacturing of aspirin in order to ensure that only pure products are sold on pharmacies (Beran 232).

In an instance where the theoretical appearance is different from the experimental value, the indication is that the acetylation reaction did not go optimally. Different experimental appearance and value could be because of contaminated reactants. Additionally, the difference in the experimental value and appearance could be because of a partial reaction where some of the reactants did not take part in the reaction, hence the reduced yield.

Experimental Methods

I put 2 grams 0. 015m of salicylic acid in a 125 ml beaker. Then I added 5 ml of 0. 05m acetic anhydride. I added 5 drops of concentrated sulfuric acid to the reactants in the flask. Then I swirled the flask until the crystals of salicylic acid were entirely dissolved in the acetic anhydride. After the contents were dissolved, I heated the beaker in a warm water bath for fifteen minutes and then allowed it to cool at ambient temperature. At this point, crystallization of the product had begun in the beaker. After the crystallization was complete, I put the crystals in a Buchner funnel and ran ice cold water in order to rid the product of the solvent. I then removed the crystals and dried them for a week.

Works cited

Ahluwalia, V K, Sunita Dhingra, and Adarsh Gulati. College Practical Chemistry. Hyderabad: Universities Press, 2005. Print.

Beran, J A. Laboratory Manual for Principles of General Chemistry. Hoboken, NJ: Wiley, 2011. Print.