

Chemistry 212

Experiment 4

DETERMINING THE ACID CONTENT OF ASPIRIN

BACKGROUND

Aspirin is a common choice of treatment for headaches, low-grade fevers, and general aches and pains. It is a drug that is marketed without the need of a doctor's prescription. The beneficial effects of aspirin generally result from a normal dose of 0.3 to 1.0 gram. Aspirin enters the body through the stomach, and this absorption is usually accompanied by a loss of blood. Depending upon weight, age, and sensitivity to aspirin, a 10 to 30 gram dose can lead to severe internal bleeding and death.

The chemical name for aspirin is acetylsalicylic acid. It is a large molecule containing 9 carbon atoms, 8 hydrogen atoms, and 4 oxygen atoms. Figure 1 shows aspirin's molecular structure:

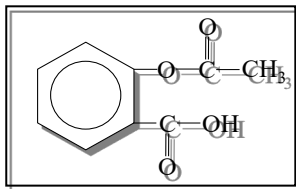


Figure 1. The molecular structure of aspirin.

Like any acid, aspirin undergoes a neutralization reaction when combined with a base such as sodium hydroxide. The reaction occurs as follows:

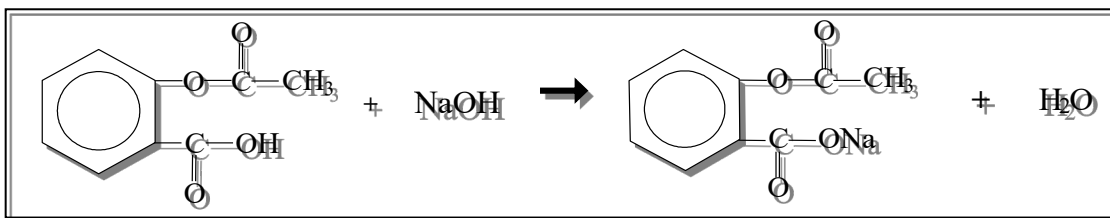


Figure 2. Acetylsalicylic acid reacts with sodium hydroxide to form sodium acetylsalicylate and water.

The reaction in Figure 2 shows that **one molecule of base neutralizes one molecule of aspirin**. To determine the amount of acid in an unknown sample, all that you would need to do is add a known amount of base until the acid and base are neutralized. This technique is known as *titration*, and it is widely used in chemistry and other natural sciences.

Aspirin is available under several brand names, and variations in strength exist from one product to another. Federal law requires each tablet to contain at least 0.0648 grams (5 grains) of acetylsalicylic acid. Filler such as starch is usually added to give each tablet enough bulk to be easily picked up, placed in the mouth, and swallowed.

In this exercise you will use titration to experimentally determine the amount of acetylsalicylic acid in aspirin tablets. You can compare your results to the amount of ingredient listed on the aspirin bottle.

SAFETY PRECAUTIONS

General laboratory safety precautions apply to this experiment. Be sure to wear goggles at all times.

EXPERIMENT

You are the quality control chemist at the aspirin manufacturing company. Confirm the mass of acetylsalicylic acid in an aspirin tablet is as specified on the label. Are your results accurate and precise?

You will need to develop your own procedure for this experiment (*work on this ahead of time* as you will be asked about what you plan to do and what equipment you will need). Make sure to add a procedure section to this report. This experiment is very similar to the previous experiment.

REPORT

Group written report. See format on webpage. Include notes and any other ancillary material generated for the report.

