The experimental procedure referenced above was slightly altered during the first step of the preparation of the carbonate free NaOH. For this step 1.5L of distilled water was boiled and began being used immediately after boiling rather than allowing it to cool.

Table 1: Masses recorded during the experiment

| Compound | NaOH | KHP 1 | KHP 2 | KHP 3 | Aspirin Tablet 1 | Aspirin Tablet 2 | Aspirin Tablet 3 | Aspirin Powder |
|---|---|---|---|---|---|---|---|---|
| Mass (g) | 5.0807 | 0.7093 | 0.7119 | 0.7013 | 0.4144 | 0.4195 | 0.4115 | 0.4109 |

The masses recorded in table 1 were measured using the same analytical balance in order to minimize the uncertainty associated with the balance.

**Results and Discussion:**

The first calculation of the experiment was to determine the concentration of the prepared carbonate free NaOH solution. To do this, three titrations were performed, as well as a blank titration. The burettes used during all the titrations have an uncertainty of 0.02 mL. During each titration the initial and final burette readings were recorded and from this information the volume of NaOH used in the titrations could be found, as is displayed in table 3. The concentrations of KHP used during each titration can be found in table 2. Using the masses of KHP in table 1, along with the volume of NaOH used in table 3, the concentrations of each NaOH solution could be calculated. The average of the three concentrations was calculated and is the concentration of the stock solution of NaOH, as shown in table 4. The standard deviation calculated with the concentration of NaOH is 0.0002967. Table 5 shows information regarding the blank titration carried out between sodium chloride and NaOH. The blank titration was done in order to account for any errors in the solution. As shown in the table, there was not even a drop of titrant needed to complete the blank titration. The sodium chloride turned very dark pink after this small drop, meaning that error from the solution was almost non-existent.

Table 2: Calculated concentrations of KHP

| | | | |
|---|---|---|---|
| Concentrations KHP (M) | 0.05041 | 0.05705 | 0.06359 |

Table 3: Volumes of NaOH during the standardization of NaOH using KHP

| | | | |
|---|---|---|---|
| Initial Volume NaOH (mL) | 0.48 | 0.59 | 0.15 |
| Final Volume NaOH (mL) | 35.18 | 35.60 | 34.65 |
| Volume NaOH used (mL) | 34.70 | 35.01 | 34.50 |

Table 4: Calculated values from the standardization of NaOH using KHP

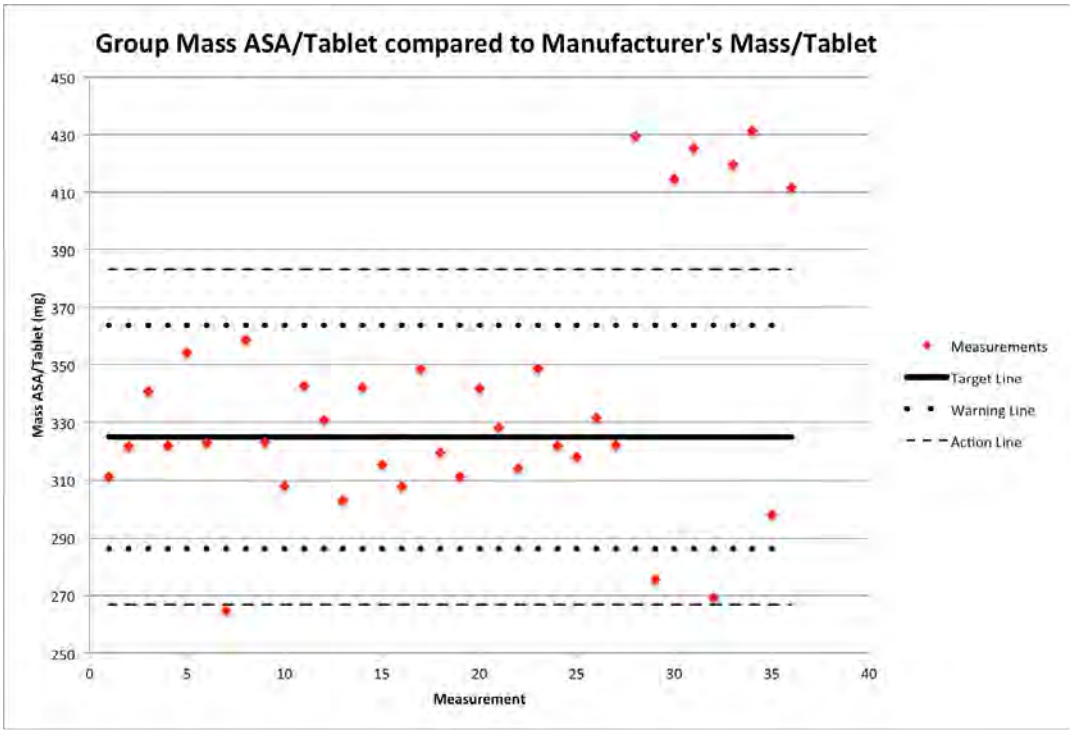
| | | | |
|---|---|---|---|
| Moles NaOH (mol) | 0.003473 | 0.003486 | 0.003434 |
| Concentration NaOH (M) | 0.1001 | 0.09960 | 0.09957 |
| Concentration of NaOH stock solution (M) | 0.09976 | | |

Table 11: T-test results for compared data

| | |
|---|---|
| Individual mean mg/tablet and manufacturer's mg/tablet (325 mg/tablet) | 2.97 |
| Group mean mg/tablet and manufacturer's mg/tablet (325 mg/tablet) | 0.0496 |
| Group mean %wt/powder and group mean %wt/tablet | 0.963 |

Figure 1 below displays the Shewhart table for the group mass ASA/tablet compared to the manufacturer's mass/tablet. The target line in the centre is 325 mg/tablet, the mass the manufacturer says they put into aspirin tablets. This chart shows that the presence of ASA in the tablets varies slightly, between the upper and lower warning lines. There are several points far outside the action line, which further reiterates the previous decision to exclude such data points from the calculations. Shewhart charts are useful for this reason. They can identify errors in the measurements and show when it is necessary to stop and re-evaluate what is being done, which is a very useful thing to do know as an analytical chemist.

Figure 1: Shewhart Chart of Group Mass ASA/Tablet compared to Manufacturer's Mass/Tablet




**Conclusion:**

Through experimental methods it has been determined that aspirin tablets contain approximately 80% or 325 mg/tablet of acetylsalicylic acid. This is good considering that that is what the manufacturer's say they should contain. It is also good for the public because an 80% weight concentration should ensure the effectiveness of aspirin tablets