

ANALYSIS OF ASA

Purpose

To perform an investigation to accurately determine the ASA content of an over-the-counter pain reliever and to compare the result with the quantity stated on the product label.

Prediction

Based on the manufacturer's claim on the label of the bottle of ASA, I predict that the experiment will be 325 mg.

Materials

- Eye protection
- 4 125 ml flasks
- 4 samples of potassium hydrogen phthalate (KHP)
- distilled water
- phenolphthalein
- NaOH(s)
- 500 ml volumetric
- buret
- buret clamp
- stirring rod
- ring stand
- mortar
- pestle
- ASA tablets

Procedure

- Standardizing the base
- Clean four 125 ml flasks. They do not have to be dried. Label them
- Weigh, out 4 samples of reagent-grade KHP, potassium hydrogen phthalate, each having a weigh about 1.2 grams.
- Place one sample on each flask. Dissolve each of the four KHP samples in 25 ml of distilled water.
- Add three drops of phenolphthalein to each flask. The solution will remain colourless.
- Prepare 500 ml of a 1.5 M NaOH solution by adding the appropriate amount of NaOH pellets of a small volume of distilled water in a 500 ml volumetric.
- Prepare your buret for titration by filling it your NaOH solution.
- Titrate 1 of your KHP samples fairly quickly to determine the approximate endpoint.
- Titrate the remaining three KHP samples carefully and slowly, making sure to record the volume of NaOH used each time.
- Calculate the exact concentration of your NaOH solution using the final 3 samples.
- Titration of an ASA tablet with the standardized base.
- Obtain 1 ASA not coated.
- Obtain the mass of the ASA tablet using stoichiometric calculations.
- Using a mortar and pestle, grind the tablet into a fine powder. It will dissolve better.
- Dissolve the ASA tabled in 50 ml of alcohol.
- Obtain NaOH (aq.) in a clean, dry, labelled 100 ml beaker.

- Set up the buret with NaOH (aq.).
- Pipet the necessary amount of diluted ASA into a clean Erlenmeyer flask.
- Add 1 or 2 drops of phenolphthalein indicator.
- Record the initial buret reading to the nearest ml.
- Titrate the sample with NaOH (aq) until a single drop produces a permanent change from colourless to faint pink.
- Stir the sample for 3 minutes to make sure the colour will not disappear.
- Record the final buret reading to the nearest .1 ml
- Repeat steps 6–11 until three consistent results are obtained.
- Obtain the quantity of active ingredient in a commercial ASA tablet using the titration formula using the data obtained.

Observations

Table 1: Standardizing

Trial	Concentration of NaOH	Volume of NaOH	Concentration of KHP	Volume of KHP
1	.13957	.0421 L	.23504	.025 L
2	.14989	.0392 L	.23504	.025 L
3	.14581	.0403 L	.23504	.025 L
4	.14509	.0405 L	.23504	.025 L

Average concentration = .14509

The percentage difference of the actual concentration of NaOH and the desired concentration is:

Table 2:

Trial	Concentration of NaOH	Volume of NaOH	Concentration of acid	Volume of acid
1	.14509	50 ml	.5897	12.3
2	.14509	50 ml	.6096	11.9
3	.14509	50 ml	.5712	12.7
4	.14509	50 ml	.5897	12.3

Average concentration = .59005

Conclusions

- Analysis
 - Use stoichiometric calculations to determine the mass of ASA in a tablet.
- Evaluation
 - ◆ Evaluate the evidence gathered by evaluating the Experimental Design, the materials, the procedure, and the skills of experimenters. Indicate sources of error and suggest ways to improve the investigation.

Sources of error/uncertainties:

- ◆ When the tablet is squashed into powder some of it stays in the paper or the powder may also stick to the walls of the beaker when poured.
- ◆ NaOH is a base which can vary the results because it is hygroscopic, not using a hygroscopic base would make the results more accurate.
- ◆ When the base was being standardized, the results could have been more consistent by using more effectively the pipet.
- ◆ When KHP and NaOH were being weighed, the results were not always as desired.
- ◆ When the meniscus in the pipet was being read the experimenter could have analysed it incorrectly. Making the results to slightly vary.

Options to improve the experiment

- Use a standardized base. Therefore there would be less sources of error.
- Instead of first weighing the tablet and then squash it. The experimenter should weigh the beaker before pouring in the powder and then weigh it after it has being poured, avoiding the source of error when leaving some powder in the paper or outside the beaker.
- Calculate the percentage difference between the predicted and experimental mass.

The percentage difference between the predicted mass and experimental mass is .31%

- Evaluate the Prediction and the manufacturer's claim.

My prediction was based on the manufacturer's claim and the mass predicted that would be obtained was really accurate. In a common ASA tablet the manufacturer claims that it contains 75% of the active ingredients which on this experiment it was discovered to be true. Any discrepancy in the results was based on uncertainties.

◆ Synthesis

◇ Why are some ASA tablets coated or buffered?

Buffered ASA tablets are made because a small percentage of individuals may occasionally experience stomach upset with ASA. Buffered ASA products neutralize stomach acid by raising the PH.

There are two types of coated ASA tablets:

- ◆ Micro-coating refers to the film coating on the ASPIRIN tablet and caplet. This very thin coating makes the tablet easier to swallow for those who have difficulty swallowing uncoated tablets and caplets.
- ◆ Enteric coating is a delayed-release safety coating. It is designed to allow the ASPIRIN tablet or caplet to pass through the stomach to the small intestine (duodenum) before dissolving.

Products with enteric coating are not recommended for quick pain relief; enteric-coated ASPIRIN is most often used by patients who are taking ASPIRIN on a daily basis under their doctor's supervision or recommendation.

- What other ingredients are included in medication tablets, and why?

I could not find the exact ingredients that are included but they are included to counteract the acid in the tablet for people who experience problems with the acid in their stomachs because it is too strong or any type of problem. That is why some

aspirins are buffered and some are coated.

The quantity of active ingredient in a commercial ASA tablet is 75.34% and the rest of the tablet (24.66%) are just inert ingredients.

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