Chemistry 264
Practical 4

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Abstract

In this practical a sodium thiosulphate solution was standardised and the percentage hypochlorite of a commercial bleach was determined.

Contents

1 Introduction

In this practical we carry out a titration in order to standardise a sodium thiosulphate solution using potassium iodate. This solution was then used in a titration to determine the mass percentage hypochlorite in a commercial bleach.

2 Results

2.1 Part 1

We find that our titrations for part 1 were relatively consistent, figure 1 shows the concentration of $Na_2S_2O_3$, calculated over seven titrations. These values have a relative standad deviation of 7.951 as can be seen in table 1, which also shows the mean and CI values.

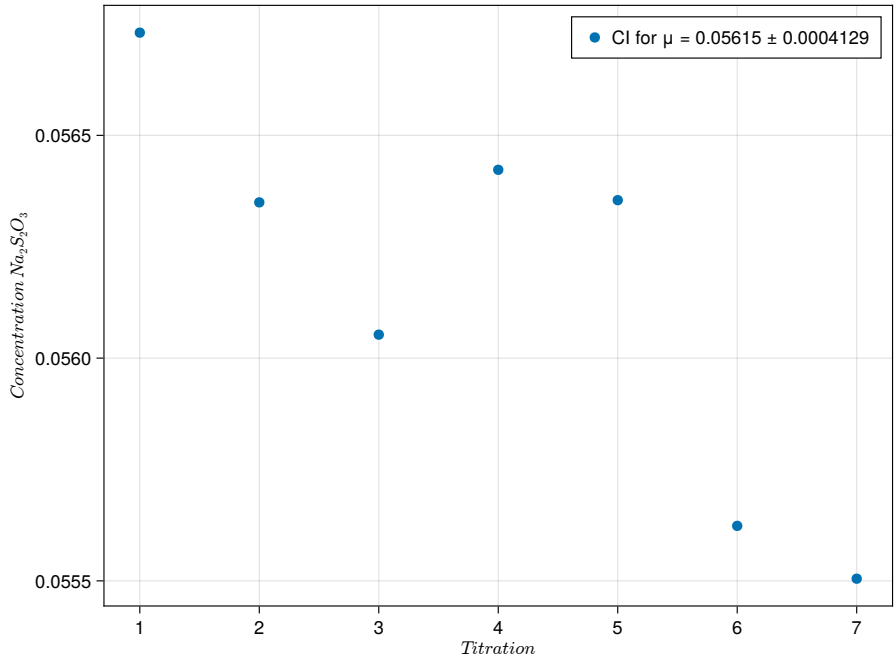

Figure 1: Concentration of $Na_2S_2O_3$

Table 1: Supplementary Data

Mean	RSD	CI
0.05615	7.951	0.05574 - 0.05656

2.2 Part 2

From the two titrations that were carried out we find that the commercial bleach analysed has a mean percent $NaOCl$ by mass of 2.948%

A static export of the notebook containing all analysis and figures is availible at `https://adammenne.github.io/chemistry_264/practical_4/notebook.html`. With full source code availble at `https://github.com/AdamMenne/chemistry_264/tree/master/practical_4`

3 Discussion

From the titrations that were carried out, the metrics of relative standard deviation and confidence intervals for the mean, show that the titrations were consistent and precise for part 1. However in part 2 there is a more substantial deviation between the two titrations carried out

However improvements are possible by increasing the number of titrations carried out (especially in part two), and utilising a more accurate and precise method of identifying when the equivalence point has been reached.

Appendix A Flow diagram

Part 1

1. Weigh out $\sim 0.355g\ KIO_3$, prepare 200 cm^3 solution.
2. Add $5cm^3$ of 5% KI solution and $10cm^3$ $0.5M\ H_2SO_4$ to a Erlenmeyer flask.
3. Fill a burette with the KIO_3 solution, and another with thiosulphate solution
4. Tap $\sim 5\ cm^3\ KIO_3$ into flask, the solution will turn yellow-brown. Tap thiosulphate until the solution is close to colourless. Repeat until 25-30cm^3 of each solution has been used.
5. Add 2 cm^3 of starch indicator
6. Titrate until the solution has become colourless
7. Titrate using double-burette technique, tabulating data.

Part 2

1. Tap 5 cm^3 bleach solution into an Erlenmeyer flask
2. Add 50 cm^3 distilled water
3. Add 10 cm^3 $6M$ acetic acid
4. Stir well, and add 10 cm^3 $2M$ potassium iodide
5. Fill a burette with the thiosulphate solution, and Titrate
6. Repeat procedure once more

Appendix B MSDS

Potassium iodate

- Oxidising, corrosive, harmful
- avoid contact with eyes
- may intensify fires
- do not ingest
- if in eyes, wash continuously for several minutes

Potassium iodide

- Irritant, health hazard, environmental hazard
- avoid contact with skin and eyes, do not inhale or ingest
- wash immediately if contact occurs

Hydrochloric acid

- Corrosive, harmful
- may cause skin burns, eye damage and respiratory irritation, do not inhale
- if in contact with skin or eyes wash for several minutes

Sodium thiosulphate

- Harmful
- causes skin, eye, and respiratory irritation
- if in contact with skin or eyes wash for several minutes

Sodium hypochlorite

- Corrosive, environmental hazard
- may cause skin burns, and eye damage, do not ingest or inhale
- if in contact with skin or eyes wash for several minutes

Acetic acid

- Flammable, corrosive

- may cause skin burns, and eye damage, do not ingest