Titration – preparation,neutralisation and applications in industry essay sample

Aim: To make an accurate Sodium Hydroxide solution ready for titration.

Apparatus: Sodium Hydroxide pellets, Pipette, Distilled water, Volumetric Flask, Spatula, Weighing scale, Goggles.

NaOH: 23+16+1= 40g. 40g NaOH in 1 litre (1000ml) 10g in 250ml 1g in 250ml 0. 1 molar

Method: Firstly we weighed out exactly 1 gram of the Sodium Hydroxide pellets ensuring accuracy to its highest to prevent any flaws in our results. We then carefully put the pellets into a volumetric flask. After that we poured approximately 100ml of distilled water into it and shook the solution for approximately a minute till the pellets were fully dissolved. Then we added approximately 150ml of water to make it 250ml we used the meniscus to maintain accuracy by putting the line to 250ml. We ensured our glassware was calibrated correctly to the measurement marks by using reliable manufacturers. Finally our Sodium Hydroxide solution was ready for neutralisation.

Sodium Hydroxide Titration Experiment. P2.

Aim: To make the Sodium Hydroxide solution turn green (neutral)

Apparatus: Boss, Clamp, Retort stand, Burette, Universal indicator, Sodium Hydroxide solution, 1molar HCL,

Method: Firstly we set up out Retort stand by attaching the Clamp, Boss and Burette. We then poured 10ml of Hydrochloric Acid into the Burette. We then placed our Sodium Hydroxide solution underneath the Burette in a conical

flask and added 2 drops of universal indicator turning the solution purple (alkali).

Results:

First try

Second Try

Third Try

Average

3. 3ml

3. 1ml

2. 9ml

3. 1ml

2. 5 x 10 – 3 / 3. 1 x 10 – 3 = 0. 81molar (out by 0. 19 moles)

Evaluation: Our result was out by 19% we could have improved this by measuring the sodium hydroxide solution and hydrochloric acid more accurately. Also whilst mixing the solution we should have used a magnetic stirrer. I will keep these factors in mind if I plan t repeat the experiment.

Sodium Hydroxide Titration Experiment 2. P2.

Aim: To make the Sodium Hydroxide solution turn green (neutral)

Apparatus: Boss, Clamp, Retort stand, Volumetric Burette, Universal indicator, Sodium Hydroxide solution, 0. 1molar HCL,

Method: Firstly we set up out Retort stand by attaching the Clamp, Boss and Burette. We then poured 25ml of Hydrochloric Acid into the Burette. We then placed our Sodium Hydroxide solution underneath the Burette (ensuring the bottom was sealed) in a conical flask and added 2 drops of universal indicator turning the solution purple (alkali). We then slowly opened the bottom and the Hydrochloric acid began to drop in we kept a slow speed to maintain high levels of accuracy as if too much HCL was added the solution could turn acidic. Whilst each drop was added we would shake the conical flask so the solution would mix properly. After approximately 1-2 minutes of doing so the solution turned green (neutral) and our titration was done we closed the burette and wrote down our 1st result, we repeated this experiment 3 times.

Results:

First try

Second Try

Third Try

Average

22. 8

23. 4

22. 2

22. 8ml

2. 5 x 10 – 3 / 22. 8 x 10 – 3 = 0. 11molar (out by 0. 01 moles)

Evaluation: Our result was out by 1%. This shows our experiment was carried out correctly and our results are reliable and accurate.

Different indicator: The first try of our experiment we used a different indicator (mephyll). Our result was 22. 8ml. The colour of this indicator was red unlike the universal indictor which was a dark purple. To improve and make my results accurate, I would carry the experiment out a few times and also clean the funnel each time after being used as it can still contain drops of the indicators after using it each time and by doing this can make the results look more similar and reliable. Our results showed we were very close to the 0. 1 molar experiment as we got: 2. 5×10-3÷22. 8×10-3= 0. 11molar. This shows that our results were reliable and quite accurate.

Research how Titrations are used in industry and the equipment that is needed. D1.

Titrations are used in all types of industries. There are many different types of Titrations all with different goals. The most common being the Acid-base Titration which depends on the neutralization between an acid and a base and an indicator being added. This is used when making biodiesel the waste vegetable oil must be neutralised before it is processed. A portion of the waste oil is titrated with a base to determine how acidic it is so the rest of the batch is done correctly. This process removes fatty acids from the waste

oil. Redox Titrations are a little less popular in industry they are based on a reaction between a reducing agent and an oxidizing agent. A Redox indicator is used to establish the endpoint of the Titration. Redox titrations come in use in industry when extracting metals from their ore. There are many industries that require the use of titrations on a daily basis. For example Wineries, Pharmacies, Food & Drink makers, Cosmetics and Mining these are only a few from a massive list. It is specifically used in environmental studies to check how contaminated rain, water or snow is due to pollution.

Another example of a different Titration is the Gas phase Titration which is done using a thermodynamic system; this is where the reactions take place. This is usually done to determine how reactive gases are and how they react with other gases which act as the titrant. Gas phase Titrations would be useful in the environmental and science industry it is vital for ozone analysis.

Acid-base Titration on an industrial level is still carried out in a lab using standard equipment such as a Burette, Burette holder, Erlenmeyer flask, Plastic bottle of distilled water, pH indicator and Beakers to hold the solutions. An acid and a base would be required when adding the acid to the base.

Titration is used to analyse products that are going on the public market. Products such as fruit juice, vinegar and antacid tablets are all titrated before public use. There are a lot of strict government guidelines for products that are new to the market; this is to ensure the health and safety of the public. This helps control the quality of products released into the market.

When carrying out Titrations in the wine industry, the wine is titrated against Sodium hydroxide, where the pH end point would be in-between 8-10, usually around 8. 2/8. 3 This is called the phenolphthalein endpoint. This method is similar to the standard acid/base titration but the way the results are expressed is different. The acidity is not expressed in molars but in g/100ml, this is an industrial standard for the wine industry.

When producing pharmaceutical products it is important prepare standard solutions and carry out titrations because these are needed to comply with official guidelines which are in place to protect the consumer. If there is a little error with a pharmaceutical product then it can cause serious illness or even death. Companies such as Metrohm one of the world's leading pharmaceutical company use parameters of various active ingredients or various excipients of products using basic titrations. They also use Karl Fischer Titrations where the parameter is the water content.

This is the PharmPAC table from the Metrohm website:

http://gyazo. com/35a63edde694304b292ec94cac6c4fdc. png

It shows different types of titrations and there uses in the production of pharmaceutical products.

When performing titrations the Metrohm Company uses tiamo for its equipment leading control and database software for titrators and dosing devices. One in particular is The Titrando which can sample preparations at the touch of a button.