Aim: The aim of the courework is to find the unknow concentration of HCl

Introduction

Chemical procedure is used for determining the concentration of a solution. A known volume of a solution of unknown concentration is reacted with a known volume of a solution of known concentration (standard). The standard solution is delivered from a pipette so the volume added is known. This technique is known as titration. Often an indicator is used to show when the correct proportions have reacted. This procedure is used for acid–base, redox, and certain other reactions involving solutions.

Making the standrad solution

A stadard solution is a solution which the concentration is accurately known.the concertration is usely in **mol dm .** when making the standard solution it's in important that the correct mass is substanced acuratley and all of the solution successfully transferred to the volummetic flask.

Uses of volumetic solution

Volumetric solution can be used in many purposes, but it can also be used to find the following:

- Concentration
- Molecules mass of a substance
- Percentage of an element present
- Stoichiometry of an equation
- Quality control

Procedure

Apparatus

- Watch glass
- Goggle
- Balance
- Volumtric flask
- De-ioned water
- Beaker
- Glass rod
- Teat pippette
- Anhydrous sodium carbonate
- Label
- Spatual
- Filter funnel
- Bench mat

Method

1. Using the + 0.1g balance, weighing approximately between 1.2g and and 1.4g of sodium carbonate into the small beaker. (Do not record the mass)
2. using the + 0.1 balance, weighing the small beaker and its contents accurately, then recording the mass.
3. then transfer the content to the small beaker in to the large beaker. Weigh the small beaker again using the + 0.1 balance so I get a accurate result.
4. Next I add de-ionised water cautiouly down the side of the large beaker. Use about 150cm3 of water, and swirl the beaker to mix the contents.
5. after this stir using a glass rod to dissolve it completely
6. lastly transfer the solution in to volumaetric flask using the funnel.

Remember

pour down the glass rod

Remove the last drop of solution from the glass rod on to the funnel. Wash the beaker, rod and funnel several times using de-ioned water from the wash bottle, letting the washing go in to the flask.

7. make up the mark on the volumatric flask with de-ionised water. Stopper firmly, and shake the flask throughlyto mix the contents.
8. label the flask clearly, with your name, the date, and the contents of the flask.

Risk assessment

Hyrocholoric acid (corrovise)	May cause burns. The vapour is very irritating to the respiratory system. Solutions equl to and greater that 6.5 M are corrovise and those equal to and greater that 2 M but less than 6.5 M are irritant. It could be deemed sesible to label 1M solutions are irrtant as well.
If swallowed	Wash out mouth and give drick a glass or two of water. Do not induce vomoting. Seek medical attension as soon as possible.
If vapour inhalded:	Move vitim to fresh to rest. Seek medical attention if breathing is all affected.
If liquid gets in eyes:	Flood the eyes with gently running tap water for 10 minutes. Seek medical attention.
If spilt on skin or clothes:	Flood effected area with large quantites of water. Remove contaminated clothings. If a large area is effected or blisting occurs, seek medical attention.
Sodium caronbate	Safe handling Wear safety glasses if required by local rules
	Principal hazards: Sodium carbonate powder may irritate the lungs if inhaled Eye contact: Immediately flush the eye with water. If irritation

	persists, call for medical help. Skin contact: Wash off with water. If swallowed: Call for medical help if the amount swallowed is large. Disposal: Small amounts of sodium carbonate can be flushed down the sink unless local rules prohibit this Protective equipment Safety glasses if required

Titration

Part 2

Titration is a common laboratory method of quantitative/chemical analysis which can be used to determine the concentration of a known reactant. Because volume measurements play a key role in titration, it is also known as *volumetric analysis*. A reagent, called the *titrant*, of known concentration (a standard solution) and volume is used to react with a measured quantity of reactant (Analyte). Using a calibrated burette to add the titrant, it is possible to determine the exact amount that has been consumed when the *endpoint* is reached. The endpoint is the point at which the titration is stopped. This is classically a point at which the number of moles of titrant is equal to the number of moles of analyte. In the classic strong acid-strong base titration the endpoint of a titration is when the pH of the reactant is just about equal to 7, and often when the solution permanently changes color due to an indicator.
After complating the standard solution experiment, we have to find the unkown subsnce by using the titration method.

Apparatus

- Pipette
- Pipette filler
- Burette
- Granduated flask
- Beaker
- Methole (organe)
- Hydrchloric acid
- Sodium carbonate
- Goggles
- Clamp

Method

- Place the clamp and make sure it is secure and stable, so it is vertical. Make sure yo uhave rinsed the portions blow the tap and tipped the washing away. This needs to be undertaken before rinsing with distilled water.
- Repeat this procedure; the reason for repeating being that this cleans the burette of any impuritites that may have accumulated when not in use.

- Obtain a beaker (which has been rinsed twice with de-ionised water) and a white tile.
- Place the white tile under burette and then place the beaker on top of the white tile.
- Next the burette casn be filled as close to 0.00 as possible. (make sure the tap is closed)
- Fill the pippette with de-ionised water to clean any impurities away.
- Using the pipette filler fill the pipette with your standard solutuion (sodium caronate) and pour it in the beaker.
- Pour a couple of drops of methyl (orange)
- open the for a few seconds at a time until the sandard solution changes from orange to pink.
- lastly read the measurments of the hydrochloric acid in the burette and record the amount left.

Burette:

The precision of a burette makes careful measurement with a burette very important to avoid systematic error. When reading a burette, the viewer's eyes must be at the level of the graduation to avoid parallax error. Even the thickness of the lines printed on the burette matters; the bottom of the meniscus of the liquid should be touching the top of the line you wish to measure from. A common rule of thumb is to add 0.02 mL if the bottom of the meniscus is touching the bottom of the line. Due to the precision of the burette, even a single drop of liquid hanging from the bottom of a burette should be transferred to the receiving flask, usually by touching the drop to the side of the receiving flask and washing into the solution with the experimental solvent (usually water). Through careful control of the stopcock and rinsing, even partial drops of liquid can be added to the receiving flask.

Pipette:

A **pipette** is a laboratory instrument used to transport a measured volume of liquid. Pipettes are commonly used in chemistry and molecular biology research as well as medical tests. Pipettes come in several designs for various purposes with differing levels of accuracy and precision, from single piece flexible plastic transfer pipettes to more complex adjustable or electronic pipettes. A pipette works by creating a vacuum above the liquid-holding chamber and selectively releasing this vacuum to draw up and dispense liquid

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Dangerous with	Aluminium, magesium, calcium, sodium, and many otherphosphoric acids.
Methole (orange)	Eye contact: Immediately flush the eye with water. If irritation persists, seek medical attention. Skin contact: Wash off with plenty of water. If swallowed: Drink plenty of water and call for medical help. Safety glasses: Methole orange can be dangerous if it goes in the eyes, so for safety reasons safety glasses should cover the eyes at all times.
Glass equipment	In the lab we well be using long glass bruettes and can be dangerous walking around with. To over came this place it a safe place and aslo so it doen't role down.

Results

This the resultes that I got from the titration test:

	Test	Test 1	Test 2	Test 3
Final volume	A	25.45	25.30	25.00
Initial volume	B	0.05	0.00	0.05
Average	(A-B)	25.40	25.30	24.95
Main average	25.22			

To find the mean of the main average you add up test 1, test 2, test 3, and then divid it by 3

Concultion:

All together I think the experiment went every well and my results came to be 1.040 mol/ dm

Evaluation:

I think my courework went very well but had same problems on the way, but I was able to over came it and get the results that I wanted.

The procedure went very well indeed. I can tell this because my results were very reliavle giving a nearly perfect results. I do not thing the procdure needs any changing if I had to do it again, as there is nothing I can see that needs improving.

I repeated my experiment three times, each set of my results very simlar. Genrally the results was not different by more than same mol/dm between them. This indicates that all my results are vey reliable overal. I also measured everything carefully using the burette and pipette.

Same of the problems that I faced was that the people that I was wok with which created same problem for and for the experiment. Also the other problems that I faced was tdue to the equipment was given to do the experiments. Same of the that was given equipments was not neeeded in the experiment and on the other hand there were equipment that was not given to us which slowed down the experiment. Other than that the experiment went very smoothly to the last minutes.

Background calculations:

Step 1: weigh the beaker with the Na CO and then weigh the beaker

Mass of beaker and Na CO = 36.60g
Mass of beaker = 35.20g
After getting the mass you take it away
36.60 – 35.20 = 1.40

Step 2: Find the RAM of Na CO

Na = 23 mulitply by 2
C = 12
O = 16 mulitply by 3 = 48
So you add 23 + 23 + 12 + 16 + 16 + 16 = 106

Step 3: to find the number of moles in Na CO you divide 1.40 by 106 which you get 0.0132 moles

Step 4: Next we find the concentration of Na CO soution you divide 0.01323 by 0. 025 which you get 0.0528 mol/dm

Step 5: I need to balance the equation

Na CO + 2HCl $\longrightarrow$ 2NaCl + CO +H O

Step 6: After finding the concentration of Na CO we need to find the number of moles. So you do
No of moles = concentration   volume

= 0.0528   0.025 = 0.00132

Step 7: In addition, we had to find the number of moles of HCl. To find this
NO of moles of HCl = 0.00132 2
= 0.00262

Step 8:lastly you get the volume of HCl from the titration which is25.22, to give you final results
HCl concentration = moles divided by volume dm

$$\frac{0.00264}{0.002522} = 1.046 = 1.050 \text{ mol/ dm}$$