WJEC (Wales) Chemistry A-level

SP 1.7b - Standardisation of an Acid Solution

Methods and images taken from the WJEC practical handbook

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Aim

To find the **concentration** of hydrochloric acid using a **standard solution** of anhydrous sodium carbonate.

Apparatus and Chemicals

Part 1

- 3 decimal place digital balance (minimum 2 decimal place)
- Deionised water
- Weighing bottle/boat
- 250 cm^3 volumetric flask and funnel
- 250 cm^3 beaker and glass rod
- Labels
- Wash bottle containing distilled water
- Pasteur pipette
- Anhydrous Na_2CO_3

Part 2

- 50 cm^3 burette and funnel
- Burette clamp and stand
- 25 cm^3 bulb/volumetric pipette with safety filler
- 2 x 250 cm^3 conical flask
- White tile
- 0.2 mol dm^{-3} HCl solution
- Methyl orange indicator

Safety Considerations

★ Na_2CO_3 - irritant
★ 0.2 mol dm^{-3} HCl solution - irritant

Method

Part 1 - Making up a Standard Solution

1. **Accurately** weigh out approximately 2.75g of anhydrous Na_2CO_3 into a weighing bottle.
2. Record the mass with the correct number of significant figures.
3. Tip the solid into a 250 cm^3 beaker and reweigh the weighing bottle and traces.
4. Dissolve the solid in deionised water, stirring with a glass rod. Ensure you do not add more than 150 cm^3 of distilled water at this stage.
5. Pour the solution into the 250 cm^3 volumetric flask via a funnel.
6. Rinse the beaker and glass rod at least three times, transfer the **washings** into the flask each time.
7. Make the solution up to the mark with distilled water so that the **bottom of the meniscus** is level with the graduation mark. The flask and graduation mark must be at eye level when the final drops are added using a Pasteur pipette.
8. Add the stopper and shake the mixture thoroughly.
9. Label the volumetric flask ready for use during the second part of the experiment.

Part 2 – Titrating the Standard Solution with Hydrochloric Acid

1. Using a funnel, pour a small volume of the HCl solution into the burette. **Rinse** the burette with this solution to remove any water left behind after washing.
2. Now fill the burette with the HCl solution and record the initial burette reading.
3. Rinse the volumetric pipette with a small volume of sodium carbonate solution.
4. **Accurately** pipette 25.0 cm^3 of the Na_2CO_3 solution into a conical flask
5. Add 3 drops of **methyl orange indicator** to the conical flask.
6. The standard solution is titrated with the acid until, on the addition of one drop of acid, the indicator changes colour from yellow to pink/red. Use the white tile to help you see the colour change.
7. Record the burette reading and repeat until the results are **concordant**.