

GCSE



CCEA GCSE TEACHER GUIDANCE

Chemistry Practical Manual

Unit 3: Practical Skills

C8: Determine the reacting volumes of solutions of acid and alkali by titration and determine the concentration of solutions of acid and alkali by titration

Determining the reacting volumes of solutions of acid and alkali by titration and determine the concentration of solutions of acid and alkali by titration

In this experiment you will use the titration technique to determine the concentration of the provided sodium hydroxide solution. The process of carrying out a titration allows us to accurately measure the volumes of an acid and an alkali required for neutralisation. An indicator will be used to determine the exact volume required for neutralisation.

In order to carry out this practical you will be using two pieces of volumetric apparatus, the pipette and burette. You will also be carrying out the technique of titrating. All these skills require careful understanding and practice in order to ensure that the measurements are as accurate as possible.

For this practical each group will need:-

- Sodium hydroxide solution 100 cm³ (approx. concentration 8.0 g/dm³ – technician- make a note of the exact concentration made up)
- 0.1 mol/dm³ sulfuric acid, H₂SO₄ 100 cm³
- Phenolphthalein indicator
- 25.0 cm³ pipette and filler
- 50.0 cm³ burette, retort stand and burette clamp
- Small funnel
- 250 cm³ Conical flask (x3)
- Distilled Water
- White tile

Safety considerations

Follow safety advice given by teacher

Method

- 1) Rinse the burette with distilled water, then with the supplied alkali. Fill the burette with the alkali taking care to ensure that the bottom of the meniscus is on zero and that the jet of the burette is filled completely
- 2) Rinse the pipette with distilled water, then with the sulfuric acid. Fill the pipette with the acid, taking care with the pipette filler and ensuring that the bottom of the meniscus is on the 'line' of the pipette
- 3) Carefully transfer the acid in the pipette into a conical flask, to remove the final drop from the pipette, gently touch the end of the pipette onto the surface of the liquid in the conical flask
- 4) Add 3 drops of phenolphthalein indicator to the conical flask and swirl gently to mix
- 5) Place the conical flask onto a white tile underneath the burette
- 6) Titrate the alkali with the acid, stop adding the alkali when the indicator turns pink and remains pink
- 7) Record your 'rough' titre value in the results table
- 8) Repeat the process with fresh acid and indicator, adding the alkali dropwise with swirling as the end point is reached
- 9) Repeat once more, or until 2 titre values are within 0.2 cm^3 of each other
- 10) Calculate the average titre

Results table

Burette volume	Rough	1 st Accurate	2 nd Accurate	3 rd Accurate
Initial reading (cm^3)				
Final reading (cm^3)				
Titre (cm^3)				

Average titre = _____ cm^3

Extension work

Analysis of results

- 1) Write a balanced symbol equation for the reaction between sodium hydroxide and sulfuric acid.

- 2) Calculate the number of moles of acid which was present in the conical flask

- 3) Using the equation in (a), calculate the number of moles of sodium hydroxide which would have reacted with the acid in the conical flask

Hint – use the ratio from the equation

- 4) Using the moles from (c) and your average titre value, calculate the concentration of the sodium hydroxide solution
