

## Titration level 1

### Aims

In level 1, you'll analyse samples from a river that has been contaminated with acid. You'll perform titration experiments to work out the concentration of acid in the samples.

In each activity you'll be able to collect points. At the end of the level you can restart to improve your skills.

### Video 100 Points

#### Titration screen experiment:

The contaminated stream



### Comprehension 100 Points 1 Attempt

Hydrochloric acid fully dissociates when dissolved in water.

The pH of water is approximately 7 which means it is neutral.

When an acid and alkali react to form water and salt it is called neutralisation.

A titration experiment can be used to determine the unknown concentration of acid using a known concentration of base.

An indicator helps us to see the point of neutralisation during a titration experiment by causing a colour change.

### Acids and alkalis 100 Points

pH 0-2	pH 7	pH 12-14
hydrochloric acid	distilled water	sodium hydroxide
sulfuric acid		potassium hydroxide
nitric acid		calcium hydroxide

Phenolphthalein is an indicator which changes colour close to the point of neutralisation and is used to show the end-point of this titration. When adding a strong acid to a strong base the phenolphthalein indicator changes colour from pink to colourless.

### Measuring Mass 100 Points

You correctly used the balance to accurately weigh:

Mass of sodium hydroxide = 1.00 g

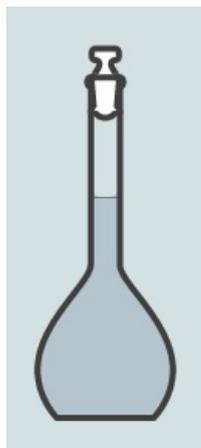
This was transferred to a beaker for you ready for the next step of the experiment.

### Standard solution 90 Points 1 Attempt

First the sodium hydroxide powder was dissolved in distilled water.

Next you transferred to solution to a 250.0 cm<sup>3</sup> volumetric flask and rinsed the beaker with more water.

Finally you made up the standard solution to the to the 250.0 cm<sup>3</sup> level using a dropping pipette



## Alkali concentration 100 Points

You calculated the molar mass for sodium hydroxide as 40 g mol<sup>-1</sup>.

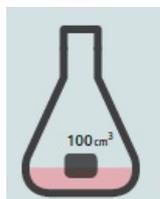
Then you worked out the amount of sodium hydroxide you used was 0.0250 mol.

Finally you calculated the concentration of your stock solution as being 0.10 mol dm<sup>-3</sup>.

## Preparing for titration 100 Points 1 Attempt

First you rinsed a pipette with your sodium hydroxide solution.

Next you used the pipette to transfer exactly 25.00 cm<sup>3</sup> of the solution into a conical flask and added 3 drops of phenolphthalein indicator.



## Burette setup 100 Points 1 Attempt

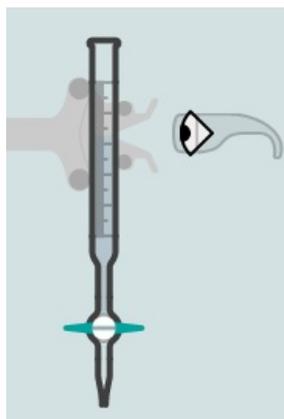
First you rinsed a burette with distilled water.

Next you rinsed the burette with your acidic contaminated river sample.

Then you filled the burette with the river sample and ensured the eye level was good for reading the burette level

Then you removed the funnel.

Finally the burette was filled below the tap by running out some solution.



## Titration experiment 50 Points

You performed titration experiments on contaminated river water from two sites B and C.

Sample site B	Trial	1st accurate titration	2nd accurate titration
Final reading (cm <sup>3</sup> )	26.05	28.70	26.20
Initial reading (cm <sup>3</sup> )	10.35	11.20	8.70
Volume added (cm <sup>3</sup> )	15.70	17.50	17.50
Average volume added (cm <sup>3</sup> )		17.50	

Sample site C	Trial	1st accurate titration	2nd accurate titration
Final reading (cm <sup>3</sup> )	38.60	41.85	39.50
Initial reading (cm <sup>3</sup> )	10.65	11.65	9.30
Volume added (cm <sup>3</sup> )	27.95	30.20	30.20
Average volume added (cm <sup>3</sup> )		30.20	

Number of times that sample B was tested	1
Average volume added for all samples (cm <sup>3</sup> )	17.50

Number of times that sample C was tested	1
Average volume added for all samples (cm <sup>3</sup> )	30.20

## Titration analysis 100 Points

You correctly determined the concentration of acid in the river at sites B and C.

Amount of sodium hydroxide = 0.0025 mol.

Amount of hydrochloric acid = 0.0025 mol.

Concentration of hydrochloric acid at site B = 0.14 mol dm<sup>-3</sup>.

Concentration of hydrochloric acid at site C = 0.08 mol dm<sup>-3</sup>.

The pH of the river is normally neutral.

The pH values increase as the concentration of HCl decreases.

The pH at the site of special scientific interest is bad.

The pH of the river returns to a moderate level by the time it reaches site D.

## **Review**

Things I did well on:

Things I could improve on:

Your titrations and quick response helped protect some of the wildlife at the site of special scientific interest. Three days later you sample the river at all the sites again. What do you predict your results would be?