Chem CP2

Neutralising an acid
Core Practical

Your teacher may watch to see if you can…

- carry out an experiment appropriately
- use apparatus accurately and safely.

Aim

Powdered calcium hydroxide reacts with hydrochloric acid. Calcium chloride solution and water are produced:

$$Ca(OH)_2(s) + 2HCl(aq) \rightarrow CaCl_2(aq) + 2H_2O(l)$$

You will investigate what happens to the pH of a fixed volume of dilute hydrochloric acid when you add calcium hydroxide to it.

Apparatus

- eye protection
- 100 cm^3 beaker
- 50 cm^3 measuring cylinder
- ±0.1 g balance
- spatula
- stirring rod
- white tile
- universal indicator paper
- pH colour chart
- dilute hydrochloric acid
- calcium hydroxide powder
- graph paper

⚠ Safety

Wear eye protection.
Calcium hydroxide is an irritant with a risk of serious damage to eyes.
Dilute hydrochloric acid is an irritant.

Method

A Use the measuring cylinder to add 50 cm^3 of dilute hydrochloric acid to the beaker.

B Estimate and record the pH of the contents of the beaker:

- Put a piece of universal indicator paper onto the white tile.
- Dip the end of the glass rod into the liquid, then tap it onto the universal indicator paper.
- Wait 30 seconds, then match the colour to the appropriate pH on the pH colour chart.
- Rinse the glass rod with water.

C Measure out 0.3 g of calcium hydroxide powder onto a piece of paper or a 'weighing boat'.

D Add the calcium hydroxide powder to the beaker, stir, then estimate and record the pH of the mixture.

E Repeat step **D** seven times so that you add a total of 2.4 g of calcium hydroxide powder to the acid.

Recording your results

1 Make a table with columns for the mass of calcium hydroxide powder added, and the pH of the mixture. Remember to leave a row for the first pH measurement (before you have added any calcium hydroxide).

Considering your results

2 Plot a line graph to show pH on the vertical axis and mass of calcium hydroxide added on the horizontal axis. Draw a curve of best fit.

3 Describe what happens to the pH of the reaction mixture as calcium hydroxide continues to be added.

4 Use your graph to determine the mass of calcium hydroxide that must be added to reach pH 7.

Evaluation

5 Explain one way to improve the accuracy of the experiment.