

ACIDS, BASES & TITRATION 3

Q1. *Drain Buster* is used to clear and degrease drains. Sodium hydroxide is the main chemical substance in *Drain Buster*.



A student planned an experiment to find the concentration of the sodium hydroxide solution in Drain Buster.

The teacher had to dilute the Drain Buster before the student could use it.

Explain why.

(2 marks)

(b) In this question you will be assessed on using good English, organising information clearly and using specialist terms where appropriate.

The student wanted to find the volume of hydrochloric acid that reacts with a known volume of diluted Drain Buster.

Describe how the student could do this by titration.

- In your description you should include:
- the names of pieces of apparatus used
- the names of the substances used

- a risk assessment.

(6 marks)

Q2 Ethanol is the alcohol used in alcoholic drinks.

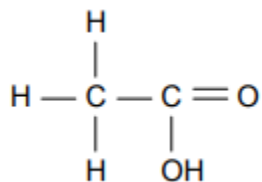
(i) When ethanol dissolves in water the solution formed is not alkaline.

Tick (✓) the reason why the solution formed is not alkaline.

Reason	Tick (✓)
Ethanol can be used as a solvent.	
Ethanol dissolves in water to form hydroxide ions.	
Ethanol has only covalent bonds in its molecule.	

(1 mark)

(ii) Ethanol can be oxidised to produce the compound shown.



Draw a ring around the correct answer to complete the sentence.

When this compound dissolves in water, the solution formed is

acidic.
alkaline.
neutral.

(1 mark)

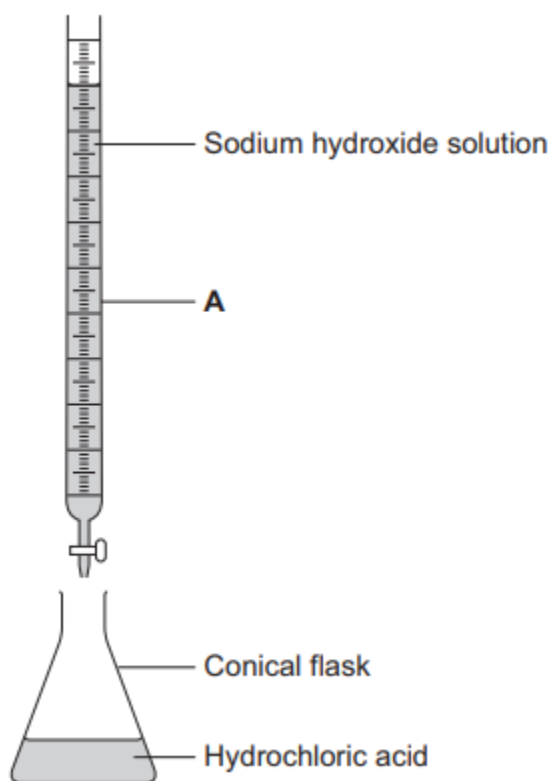
Q3. A student compared the rates at which ethanoic acid and hydrochloric acid react with scale. Both acids had the same concentration.

The student found that hydrochloric acid reacts faster than ethanoic acid with scale.

Explain why hydrochloric acid reacts faster than ethanoic acid.

(2 marks)

Q4. A student used the apparatus in the figure to do a titration.



(a)(i) What is the name of the piece of apparatus labelled A? Draw a ring around the correct answer.

burette

measuring cylinder

test tube

(1 mark)

(ii) What should the student add to the acid in the conical flask? Draw a ring around the correct answer.

catalyst

indicator

water

(1 mark)

(iii) What would the student see when the end point of the titration has been reached?

(1 mark)

(b) The student does the titration three times.

(i) State one variable that the student needs to keep the same to make it a fair test.

(1 mark)

(ii) The student's results are shown in the table.

Titration	Volume of sodium hydroxide solution added in cm³
1	22.40
2	22.20
3	22.30

Calculate the mean volume of sodium hydroxide solution added.

(1 mark)

Q5. Some pollutants cause acid rain.

A student tested 25.0 cm³ samples of three types of rainwater, P, Q and R. The student titrated the samples with sodium hydroxide solution (an alkali).

The student recorded the volume of sodium hydroxide solution needed to neutralise the rainwater. The student's results are shown in the table.

Volume of sodium hydroxide needed to neutralise the rainwater in cm ³					
Type of rainwater	Titration 1	Titration 2	Titration 3	Titration 4	Mean value
P	18.0	15.5	14.5	15.0	15.0
Q	13.0	10.0	11.0	10.5	10.5
R	23.0	19.5	18.5	19.0	19.0

(a)(i) The student calculated the mean value for rainwater R as 19.0 cm³. Show how the student calculated the mean value for rainwater R.

(2 marks)

(ii) Write down P, Q and R in order of their acidity.

Most acidic

.....

Least acidic

(2 marks)

(b) A second student repeated the experiment and recorded the results in the table.

Volume of sodium hydroxide needed to neutralise the rainwater in cm ³		
Type of rainwater	Titration 1	Titration 2
P	17	15
Q	11	9
R	20	18

Use both the tables to suggest two improvements the second student could make to obtain more accurate results.

(2 marks)

(c) The results of the two students show that the experiment is reproducible.

Give the reason why.

(1 mark)

Total marks (24)