

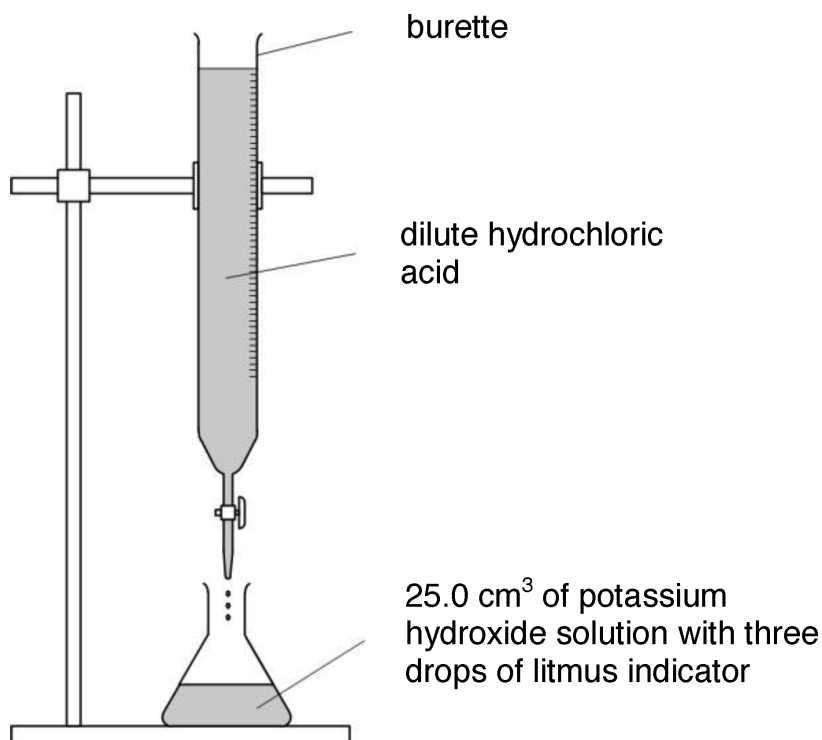
GCSE Chemistry A (Gateway Science)

J248/02 C4-C6 and C7 Foundation (Foundation Tier)

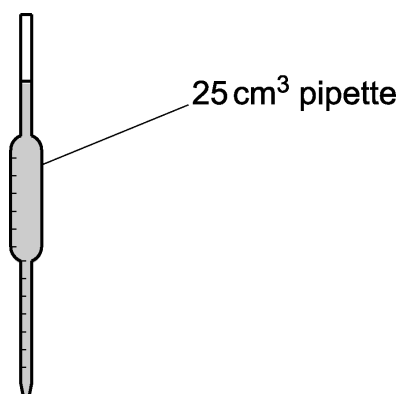
Question Set 12

- 1 A student does three titrations with dilute hydrochloric acid and potassium hydroxide solution.

Look at the apparatus she uses.



- (a) She uses a pipette to measure out the 25.0 cm³ of potassium hydroxide solution.



Describe and explain **one** safety precaution that she should use with the pipette.

Pipette filler should be used because potassium hydroxide can cause burn skin

[2]

- (b) In her first titration the student measures the initial volume of hydrochloric acid in the burette.

She slowly adds the acid until the potassium hydroxide is just neutralised. She then measures the volume of the hydrochloric acid again.

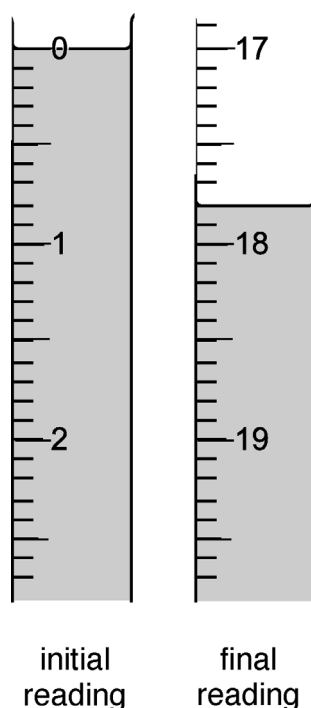
Describe how she can tell when the potassium hydroxide solution is just neutralised.

When one last drop makes the litmus change colour from blue to red

[2]

- (c) Look at the diagrams. They show parts of the burette during the first titration.

first titration



Here is the student's results table.

Titration number	1	2	3
final reading in cm ³	<i>17.8</i>	37.5	32.1
initial reading in cm ³	<i>0.0</i>	20.4	15.0
titre (volume of acid added) in cm ³	<i>17.8</i>	17.1	17.1

- (i) **Complete** the table by recording the burette readings from the diagrams.

[2]

(ii) The student thinks the mean titre is 17.1 cm³. Is she correct?

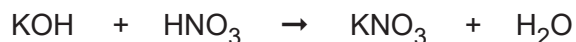
Explain your answer.

$$\frac{\text{titration 2} + \text{titration 3}}{2} = 17.1$$

[1]

(d) The student does another titration to make a fertiliser called potassium nitrate, KNO₃.

Look at the equation for the reaction she uses.



The relative formula masses, M_r , of each compound are shown in the table.

Compound	Formula	Relative formula mass
potassium hydroxide	KOH	56.1
nitric acid	HNO ₃	63.0
potassium nitrate	KNO ₃	101.1
water	H ₂ O	18.0

What is the atom economy for the reaction to make potassium nitrate?

Assume that water is a waste product.

$$\text{Atom economy} = \frac{\text{Mr of desired products}}{\text{Mr of all products}} \times 100$$

$$= \frac{101.1}{119.1} \times 100$$

Answer = 84.9 %

$$= \boxed{84.9\%}$$

[2]

Total Marks for Question Set 12: 9

OCR

Oxford Cambridge and RSA

Copyright Information

OCR is committed to seeking permission to reproduce all third-party content that it uses in its assessment materials. OCR has attempted to identify and contact all copyright holders whose work is used in this paper. To avoid the issue of disclosure of answer-related information to candidates, all copyright acknowledgements are reproduced in the OCR Copyright Acknowledgements Booklet. This is produced for each series of examinations and is freely available to download from our public website (www.ocr.org.uk) after the live examination series.

If OCR has unwittingly failed to correctly acknowledge or clear any third-party content in this assessment material, OCR will be happy to correct its mistake at the earliest possible opportunity.

For queries or further information please contact The OCR Copyright Team, The Triangle Building, Shaftesbury Road, Cambridge CB2 8EA.

OCR is part of the Cambridge Assessment Group; Cambridge Assessment is the brand name of University of Cambridge Local Examinations Syndicate (UCLES), which is itself a department of the University of Cambridge