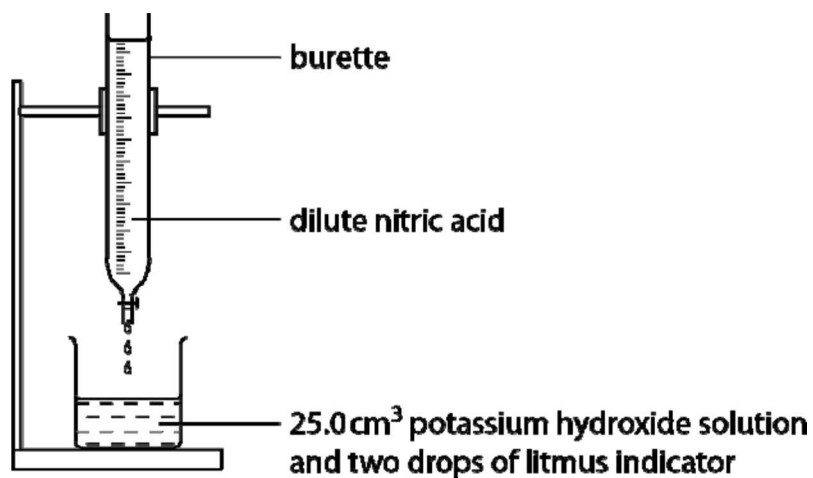


8 This question is about acid-base titrations.

Issy wants to find out the concentration of a sample of dilute nitric acid.

Look at the apparatus she uses.



She adds dilute nitric acid slowly until the litmus suddenly changes colour.

She repeats the experiment two more times.

Look at Issy's results table.

titration number	1	2	3
final burette reading in $\text{cm}^3$	29.7	27.0	34.8
initial burette reading in $\text{cm}^3$	8.5	6.9	24.9
volume of acid used (titre) in $\text{cm}^3$	21.2	20.1	19.9

(a) Issy does two experiments (1 and 2) and looks at her results.

She decides that she needs to do a third experiment (3).

Explain why she needs to do **three** experiments.

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..... [2]

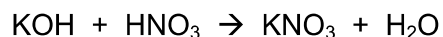
- (b) Litmus is a single indicator but universal is a mixed indicator.

In the titration experiment litmus suddenly changes colour from blue to red at the end-point.

If Issy uses universal indicator instead of litmus how would the colour change be different?

..... [1]

- (c) Look at the balanced symbol equation for the reaction between potassium hydroxide and nitric acid.



Issy uses 25.0 cm<sup>3</sup> of potassium hydroxide solution.

The concentration of the potassium hydroxide is 0.100 mol/dm<sup>3</sup>.

Use the mean titre to calculate the concentration, in mol/dm<sup>3</sup>, of the nitric acid.

Give your answer to **three** significant figures.

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concentration of nitric acid = ..... mol/dm<sup>3</sup> [4]

**[Total: 7]**