Write your name, centre number and candidate number in the boxes below.

Surname	Other names

Centre number | | | | | |

Candidate number | | | | |

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Titration calculations

Time allowed: 10 minutes

Subject code **0620**

Chemistry

Paper 2 (Extended)

You must have: a soft pencil, an eraser and a pen.

Total marks

/ 8

Instructions

- There are 8 questions. Each has four options: A, B, C and D.
- Choose one option for each question and record it as your teacher directs.
- If you change a choice, rub out the first one completely.

Information

- This paper has 8 questions worth 8 marks in total.

Advice

- Read every question through once before you write anything.
- If you finish early, go back and check your working.

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Print at 100% (Actual size) so diagrams keep their real measurements.

1 The concentration and volume of an aqueous alkali are known.

Which additional information is required to calculate the number of moles of acid needed to neutralise the aqueous alkali?

A the concentration of the acid

B the equation for the acid–alkali reaction

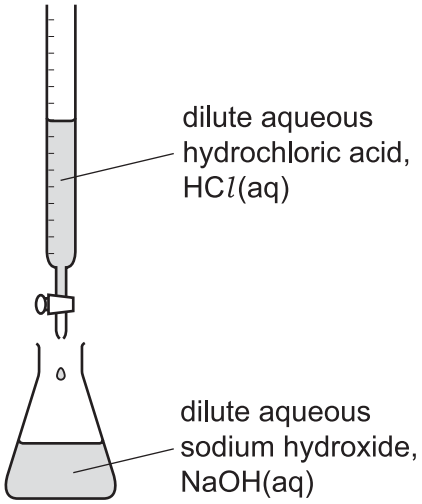
C the formula of the acid

D the volume of the acid required for neutralisation

Moles and chemical calculations Click for more variations

2 The concentration of a sample of dilute aqueous sodium hydroxide is found by titration.

The apparatus used is shown.



Which information is needed to calculate the concentration of the dilute aqueous sodium hydroxide in mol / dm^3?

	concentration of HCl	volume of HCl used	molar mass of HCl	volume of NaOH used	molar mass of NaOH
A	✓	✓	✓	✓	✓
B	✓	✓	✗	✓	✗
C	✗	✓	✓	✓	✗
D	✓	✗	✗	✗	✓

key

✓ = needed

✗ = not needed

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3 A known volume and concentration of aqueous sodium hydroxide is titrated against dilute hydrochloric acid.

The volume of dilute hydrochloric acid needed to exactly neutralise the sodium hydroxide is measured.

Five calculation steps are shown.

1 Calculate the amount of hydrochloric acid in moles.

2 Calculate the relative formula mass of hydrochloric acid.

3 Calculate the concentration of hydrochloric acid in g/dm^3.

4 Calculate the amount of sodium hydroxide in moles.

5 Calculate the concentration of hydrochloric acid in mol/dm^3.

What is the order of these steps to calculate the concentration of the hydrochloric acid in g/dm^3?

A $1 \rightarrow 4 \rightarrow 3 \rightarrow 5 \rightarrow 2$

B $1 \rightarrow 2 \rightarrow 4 \rightarrow 5 \rightarrow 3$

C $4 \rightarrow 1 \rightarrow 5 \rightarrow 2 \rightarrow 3$

D $4 \rightarrow 2 \rightarrow 1 \rightarrow 3 \rightarrow 5$

Moles and chemical calculations Click for more variations

4 $25\,cm^3$ of $0.1\,mol/dm^3$ hydrochloric acid exactly neutralise $20\,cm^3$ of aqueous sodium hydroxide.

The equation for this reaction is:

$$NaOH + HCl \rightarrow NaCl + H_2O$$

What is the concentration of the sodium hydroxide solution?

A $0.080\,mol/dm^3$

B $0.800\,mol/dm^3$

C $0.125\,mol/dm^3$

D $1.25\,mol/dm^3$

Moles and chemical calculations Click for more variations

5 Sodium hydroxide reacts with sulfuric acid.

The equation for the reaction is shown.

$$2NaOH + H_2SO_4 \rightarrow Na_2SO_4 + 2H_2O$$

Which volume of $0.4\,mol/dm^3$ sodium hydroxide reacts with $50.0\,cm^3$ of $0.1\,mol/dm^3$ sulfuric acid?

A $12.5\,cm^3$ **B** $25.0\,cm^3$ **C** $50.0\,cm^3$ **D** $100.0\,cm^3$

Moles and chemical calculations Click for more variations

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6 The equation for the reaction between dilute ethanoic acid and aqueous lithium hydroxide is shown.

$$CH_3COOH + LiOH \rightarrow CH_3COOLi + H_2O$$

In an experiment, 20.0 cm^3 of 0.050 mol/dm^3 aqueous lithium hydroxide is exactly neutralised by 12.5 cm^3 of dilute ethanoic acid.

Which statement is correct?

A The amount of lithium hydroxide is equal to $0.050 \times \frac{1000}{20}$ mol.

B The amount of ethanoic acid reacted is 0.0010 mol.

C The concentration of the dilute ethanoic acid is 0.16 mol/dm^3.

D The volume of aqueous lithium hydroxide used is 0.20 dm^3.

Moles and chemical calculations Click for more variations

7 Aqueous barium hydroxide, $Ba(OH)_2$, reacts with dilute nitric acid, HNO_3. The products are aqueous barium nitrate, $Ba(NO_3)_2$, and water.

In a titration, 15.2 cm^3 of 0.75 mol/dm^3 aqueous barium hydroxide is required to neutralise 20.0 cm^3 of dilute nitric acid.

What is the concentration of the nitric acid?

A 0.29 mol/dm^3

B 0.57 mol/dm^3

C 1.14 mol/dm^3

D 2.03 mol/dm^3

Moles and chemical calculations Click for more variations

8 25.0 cm^3 of 0.100 mol/dm^3 aqueous sodium hydroxide is neutralised by 24.6 cm^3 of dilute sulfuric acid.

What is the concentration of the dilute sulfuric acid?

A 0.0508 mol/dm^3

B 0.0984 mol/dm^3

C 0.102 mol/dm^3

D 0.203 mol/dm^3

Moles and chemical calculations Click for more variations

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