

90944



NEW ZEALAND QUALIFICATIONS AUTHORITY
MANA TOHU MĀTAURANGA O AOTEAROA

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SUPERVISOR'S USE ONLY

Level 1 Science, 2012

90944 Demonstrate understanding of aspects of acids and bases

9.30 am Monday 19 November 2012
Credits: Four

Achievement	Achievement with Merit	Achievement with Excellence
Demonstrate understanding of aspects of acids and bases.	Demonstrate in-depth understanding of aspects of acids and bases.	Demonstrate comprehensive understanding of aspects of acids and bases.

Check that the National Student Number (NSN) on your admission slip is the same as the number at the top of this page.

You should attempt ALL the questions in this booklet.

Pull out Resource Booklet 90944R from the centre of this booklet.

If you need more space for any answer, use the page(s) provided at the back of this booklet and clearly number the question.

Check that this booklet has pages 2–10 in the correct order and that none of these pages is blank.

YOU MUST HAND THIS BOOKLET TO THE SUPERVISOR AT THE END OF THE EXAMINATION.

TOTAL

ASSESSOR'S USE ONLY

You are advised to spend 60 minutes answering the questions in this booklet.

QUESTION ONE: ATOMS AND IONS

- (a) Complete the table below for ions formed by Ca, F, and Cl.

Atom	Atomic number	Electron arrangement of atom	Electron arrangement of ion	Ion symbol
Ca	20			
F	9			
Cl	17			

- (b) Explain the charges on ALL three ions, in terms of electron arrangement and number of protons.

- (c) Use their positions on the periodic table to explain why two of the atoms form ions with the **same charge**, AND two of the atoms form ions with the **same electron arrangement**.

QUESTION TWO: SALTS

A student wanted to make the neutral salt, sodium nitrate.

- (a) Explain how to make sodium nitrate by mixing sodium carbonate and nitric acid solutions using school laboratory equipment (your explanation may use notes and diagrams).

- (b) Explain how litmus paper could be used during the process described to show the salt being produced is **neutral**.

- (c) Write a word equation AND a balanced symbol equation for the reaction between sodium carbonate and nitric acid.

Word equation

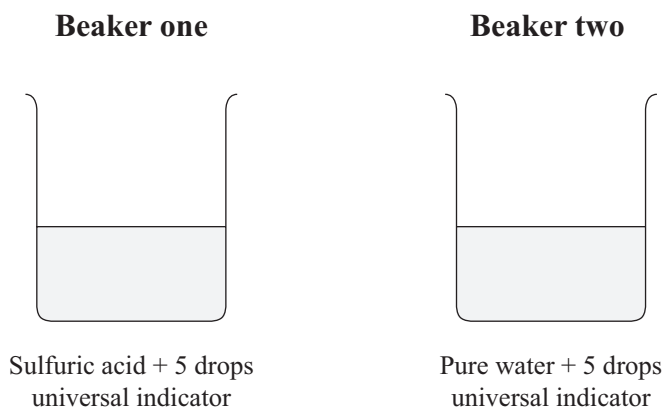
Symbol equation

QUESTION THREE: ACIDS AND BASES

Two beakers are shown below. Beaker one contains sulfuric acid solution and 5 drops of universal indicator.

Beaker two contains pure water and 5 drops of universal indicator.

Sodium hydroxide solution was added to both beakers until no more changes were observed.



- (a) Write a word equation AND a balanced symbol equation for the reaction between sulfuric acid and sodium hydroxide.

Word equation

Symbol equation

- (b) What is the colour of universal indicator in each solution at the **start**?

Beaker one (acid) _____

Beaker two (water) _____

- (c) Describe the colour changes as sodium hydroxide solution is added to each beaker, AND explain what this tells you about the changing pH of each solution.

Beaker one: _____

Beaker two: _____

- (d) Explain the relationship between the pH of the solutions and the **ions** in the solutions, as the sodium hydroxide is added to each of the beakers.

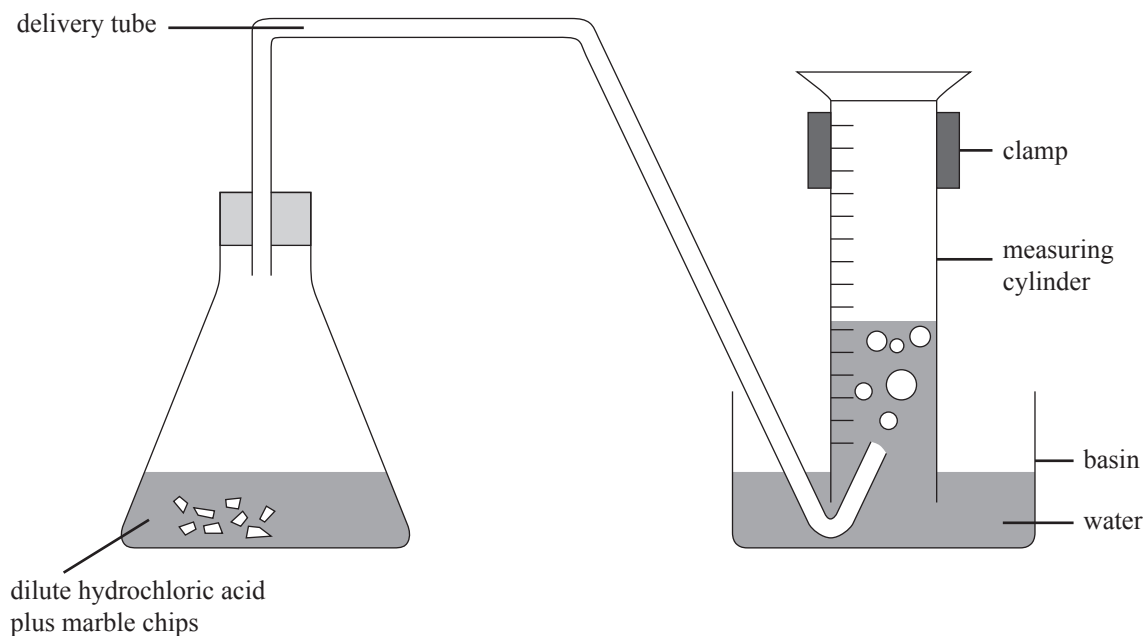
Beaker one: _____

Beaker two: _____

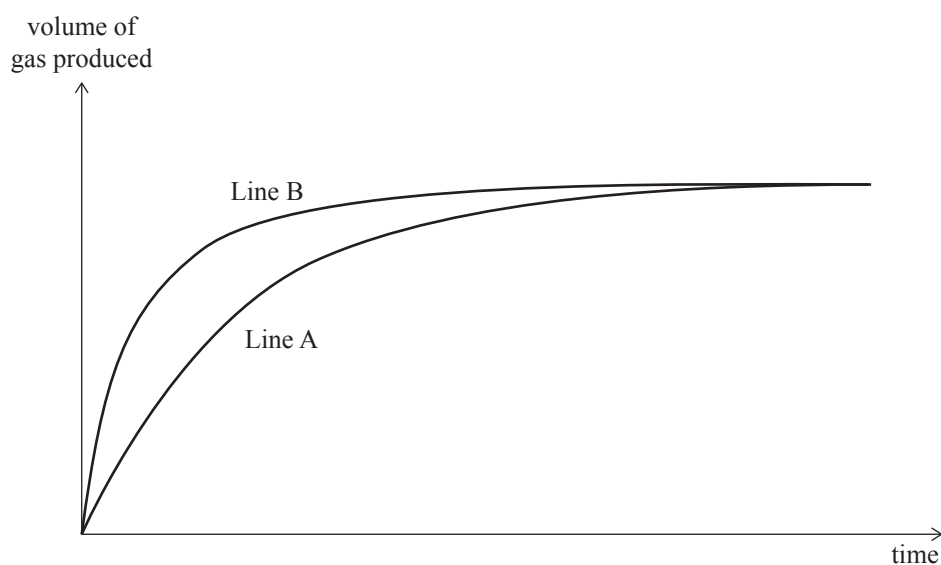
QUESTION FOUR: REACTION RATES

The following experiment was carried out at 20°C and then repeated at 40°C .

Marble chips (calcium carbonate) were added to hydrochloric acid in a conical flask. The mass and size of marble chips, and the concentration and volume of hydrochloric acid used, were the **same** for both experiments. The flask was connected to an inverted measuring cylinder in a basin of water, as shown in the diagram below.



The volume of gas produced at the two different temperatures was measured for a few minutes and the results were used to sketch the graph shown below.



State which line on the graph represents the reaction at 40°C and explain how you worked this out.

In your answer you should:

- identify which line represents the reaction at 40°C
- explain why the line you have identified is the reaction at 40°C
- give reasons for the different rates of reaction in terms of particles
- explain why both lines end up horizontal.

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