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NZQA
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MANA TOHU MĀTAURANGA O AOTEAROA

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SUPERVISOR'S USE ONLY

Level 1 Science, 2014

90944 Demonstrate understanding of aspects of acids and bases

9.30 am Monday 10 November 2014
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

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QUESTION ONE: ATOMS, IONS, AND FORMULAE

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(a) Write the formulae for the following ionic compounds.

Use the Table of Ions in your Resource Booklet to help you.

(i) Calcium chloride _____

(ii) Sodium nitrate _____

(iii) Zinc nitrate _____

(b) Complete the table below for the ions formed by magnesium, aluminium, and oxygen.

Use the periodic table in your Resource Booklet to help you.

Atom	Atomic number	Electron arrangement of atom	Electron arrangement of ion	Charge on ion
Mg				
Al				
O	8	2,6	2,8	2^-

(c) The formula for magnesium oxide is MgO. The formula for aluminium oxide is Al_2O_3.

Explain why the two formulae are different.

In your answer:

- consider the ratio of ions in each formula and explain how the ratio is related to the charge on the ions
- relate the ratio of ions in the formula to the number of electrons lost or gained by each atom.

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QUESTION TWO: BALLOONS

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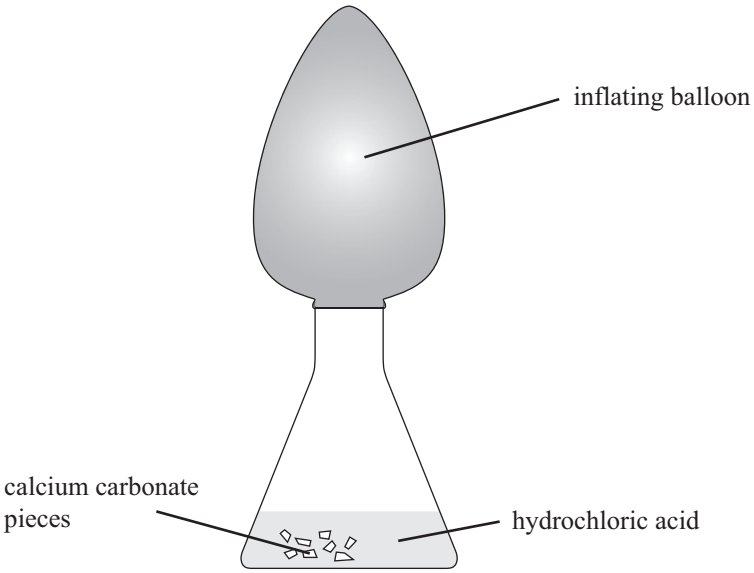
(a) Calcium carbonate pieces are placed in a flask and hydrochloric acid is added. Immediately a balloon is placed over the top of the flask. The balloon then starts to inflate.



(i) Explain why the balloon inflates.

In a second experiment, the same mass of calcium carbonate in a powdered form is used.

(ii) Explain why the balloon inflates faster when powdered calcium carbonate is used.

(b) Using the same chemical substances (calcium carbonate and hydrochloric acid), discuss a different way to make the balloon inflate faster.

In your answer you should refer to rates of reaction and particle collisions.

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(c) Write a word equation AND a balanced symbol equation for the reaction between calcium carbonate and hydrochloric acid.

Word equation:

Balanced symbol equation:

QUESTION THREE: INDICATORS AND pH

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A student has three unlabelled beakers each containing a colourless liquid. One contains **water**, one contains a solution of baking soda (**sodium hydrogen carbonate**), and one contains white vinegar (a solution of **ethanoic acid**).

To work out which liquid is which, the student put a drop from each beaker onto a piece of blue litmus paper and a piece of red litmus paper. She then added universal indicator to each beaker.

The following results were obtained:

	Colour of blue litmus paper	Colour of red litmus paper	Colour with universal indicator	Name of liquid
Beaker 1	stays blue	stays red	turns green	
Beaker 2	turns red	stays red	turns orange	
Beaker 3	stays blue	turns blue	turns blue	

(a) Complete the last column of the table above to identify the three liquids.

(b) Use the information in the table to show how each of the liquids can be identified.

In your answer you should:

- use all of the observations for each beaker
- state the approximate pH from the colour of the universal indicator.

(c) Another student was given two beakers (Beaker 4 and Beaker 5) each containing different liquids. The liquid in Beaker 4 had a pH of 1. The liquid in Beaker 5 had a pH of 6.

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Discuss which liquid is more acidic and how you know this.

In your answer you should:

- use the pH to determine which liquid is more acidic
- compare the amount of hydrogen ions AND hydroxide ions in Beaker 4 (pH 1) with the amount of hydrogen ions AND hydroxide ions in Beaker 5 (pH 6).

QUESTION FOUR: ADDING SULFURIC ACID TO SODIUM HYDROXIDE

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A beaker contains sodium hydroxide solution and 5 drops of universal indicator.

Sulfuric acid was added to the beaker 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:

Balanced symbol equation:

(b) Describe how the indicator colour changes as the sulfuric acid is added to the beaker, AND explain what this tells you about the changing pH of this solution.

(c) Explain the relationship between the changing **pH** of the solution and the **ions** in the solution as the sulfuric acid is added to the beaker.

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Extra paper if required.
Write the question number(s) if applicable.

QUESTION NUMBER

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