



For Supervisor's use only

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90189



NEW ZEALAND QUALIFICATIONS AUTHORITY
MANA TOHU MĀTAURANGA O AOTEAROA



National Certificate of Educational Achievement
TAUMATA MĀTAURANGA Ā-MOTU KUA TAEĀ

Level 1 Science, 2005

90189 Describe aspects of chemistry

Credits: Five

9.30 am Friday 18 November 2005

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 answer ALL the questions in 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.

A Table of Ions and a Periodic Table are provided in the RESOURCE BOOKLET attached in the centre of this booklet. You may detach the RESOURCE BOOKLET.

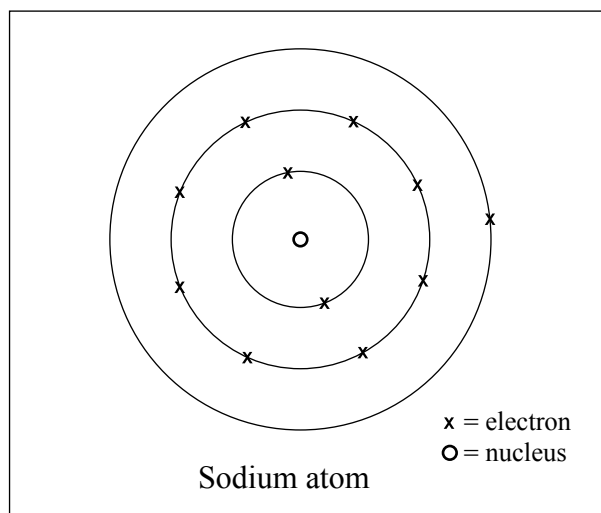
Check that this booklet has pages 2–8 in the correct order and that none of these pages is blank.

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

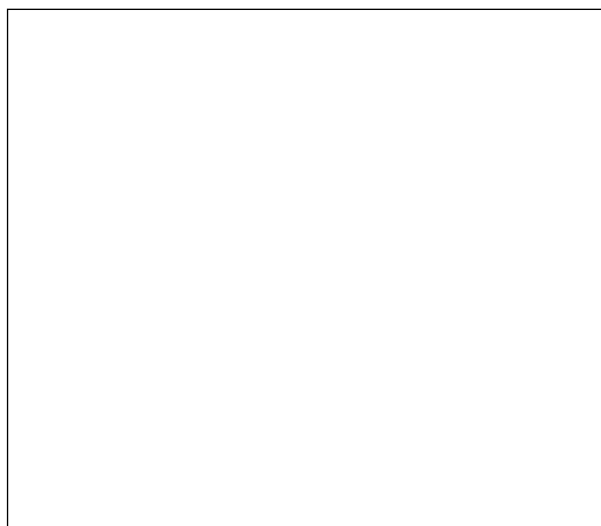
For Assessor's use only		Achievement Criteria			
Achievement		Achievement with Merit		Achievement with Excellence	
Describe aspects of chemistry.	<input type="checkbox"/>	Explain aspects of chemistry.	<input type="checkbox"/>	Discuss aspects of chemistry.	<input type="checkbox"/>
Overall Level of Performance <input type="checkbox"/>					

You are advised to spend 40 minutes answering the questions in this booklet.

QUESTION ONE: ATOMIC STRUCTURE



- (a) The diagram above can be used to represent the arrangement of electrons in levels around the nucleus of a sodium atom.
- (i) The atomic number of sodium is 11. How many **protons** are there in the nucleus of the neutral atom? _____
- (ii) How many **neutrons** are there in a sodium atom with a mass number of 23? _____
- (iii) How many electrons does a sodium atom lose to form a sodium **ion**? _____
- (b) A **neutral** oxygen atom has 8 electrons in the arrangement 2,6.
- (i) What is the atomic number of oxygen? _____
- (ii) How many electrons does oxygen gain to form an oxide **ion**? _____
- (iii) Draw a diagram like the one above for the arrangement of electrons around the nucleus of an oxide **ion**.



- (c) The formula of aluminium oxide is Al_2O_3 . Explain why the formula has TWO aluminium atoms for every THREE oxygen atoms.

- (d) Use the table of ions in the Resource Booklet to work out the formulae for the following compounds.

Potassium oxide _____ Magnesium nitrate _____

Calcium sulfide _____ Ammonium sulfate _____

- (e) Name these compounds:

CuCl_2 _____

$\text{Zn}(\text{OH})_2$ _____

KF _____

- (f) Refer to the positions of oxygen and fluorine in the Periodic Table provided in the Resource Booklet.

Comparing oxygen and fluorine, discuss how the electron arrangement, the atoms' positions in the Periodic Table and the charges on their ions are related.

QUESTION TWO: METALS

Assessor's
use only

- (a) Metals have characteristic **physical** properties. In the table below, state the **physical** property that makes each of the following metals suitable for the use given. The first one has been done for you.

Metal	Use	Property
lead	fishing sinker	high density
iron	to reinforce concrete	
copper	electrical wiring	
aluminium	kitchen foil	

- (b) Copper is sometimes used on the bottom of pots and pans. It is a pinkish metal when the pan is new, but when heated it turns brown or black due to the reaction of the copper with oxygen in the air.

Complete the **word equation** for the reaction of copper and oxygen.

copper + →

- (c) Copper metal does not react with hydrochloric acid, even when the acid is hot. Iron does react with acid, and iron pots and pans would react with acids in foods.

- (i) What gas is produced when **iron** reacts with hydrochloric acid?

- (ii) Write a **balanced symbol** equation for the reaction of iron with hydrochloric acid that produces the salt FeCl_2 .

_____ →

- (d) Magnesium metal would not be suitable for making pots and pans as it reacts with air and water.

- (i) Describe what you would see when a piece of magnesium is heated in a bunsen flame.

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- Discuss why the solution makes the red litmus paper turn blue. You should consider what causes the litmus to change colour.

[illegible]

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(a) Colourful indicators

James then added dilute sodium hydroxide to the boiling tube, a drop at a time, until the solution turned purple.

- (i) James obtained three more colours as he added the sodium hydroxide to the acid. These colours were green, blue and yellow. **Write the colours** in the correct order in the spaces on the chart below.

Acid			Base	
<i>Red</i>	_____	_____	_____	<i>Purple</i>

- (ii) Which colour on the chart corresponds to a pH of 1–2?

- (iii) Discuss what effect adding the sodium hydroxide has on the **pH** of the solution in the boiling tube.

This image shows a blank sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

(b) Problem solving

- (i) A student has one test tube containing magnesium oxide and another containing magnesium carbonate. Both substances are white powders.

The student has to identify which test tube contains magnesium oxide and which test tube contains magnesium carbonate, using only sulfuric acid.

Explain how the student would do this.

- (ii) Magnesium hydroxide also reacts with sulfuric acid. Write a **balanced symbol** equation for this reaction.

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