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90189

NEW ZEALAND QUALIFICATIONS AUTHORITY
MANA TOHU MĀTAURANGA O AOTEAROA

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

Level 1 Science, 2006

90189 Describe aspects of chemistry

Credits: Five
9.30 am Tuesday 28 November 2006

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 RESOURCE BOOKLET 90189R attached in the centre of this booklet. You may detach the RESOURCE BOOKLET.

Check that this booklet has pages 2–11 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. ☐	Explain aspects of chemistry. ☐	Discuss aspects of chemistry. ☐
Overall Level of Performance ☐		

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

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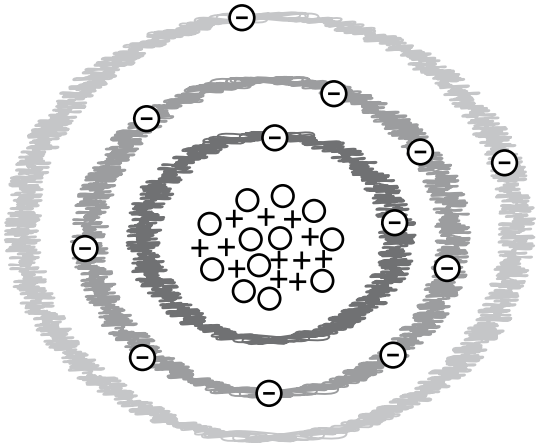
QUESTION ONE: ATOMS

The diagram below represents a model of a magnesium atom, $^{24}_{12}Mg$.



Magnesium atom, $^{24}_{12}Mg$

The symbols in the diagram above represent the proton, electron and neutron.

(a) Write the appropriate symbol from the diagram to complete the key.

KEY	
PARTICLE	SYMBOL
proton	
electron	
neutron	

(b) (i) Referring to the key above, draw a diagram that shows a sodium **atom** $^{23}_{11}Na$.

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(ii) Discuss the similarities and differences between a **sodium atom** and a **sodium ion**. You should consider the number of protons, electrons and neutrons, and the charge of each particle.

(c) Name the compound $Pb(NO_3)_2$ _____

Refer to the Table of Ions in the Resource Booklet 90189R.

(d) Write the formula for potassium sulfide _____

(e) (i) How many atoms are there in $Al(OH)_3$? _____

(ii) How many atoms are there in $2Al(OH)_3$? _____

QUESTION TWO: METALS

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The table below describes the physical properties of four substances A, B, C and D. Use this information to answer the question that follows.

Substance	Conducts heat	Conducts electricity	Density g mL^{-1}	Easy to shape
A	×	✓	2.3	×
B	✓	✓	8.9	✓
C	✓	×	1.0	×
D	×	×	0.8	✓

(a) Wire used for electricity experiments is made of a core material, which carries the electrical current, surrounded by a covering material that stops electric shocks.

(i) From the table above, choose the most appropriate substance that could be used for (1) the core material and (2) the covering material, by circling the appropriate letters below:

(1) **core material** A B C D

(2) **covering material** A B C D

(ii) Explain your answers.

_____

_____

_____

_____

_____

_____

_____

_____

(iii) Name the metal that is most commonly used as the core material in electricity wires in the home.

_____

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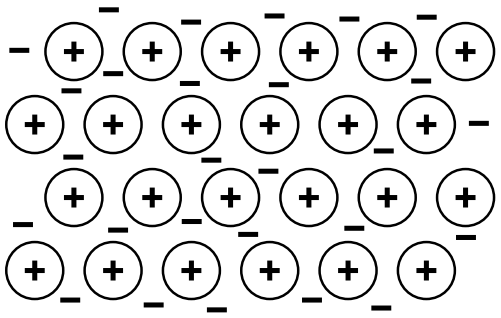
(b) The diagram below represents the structure of a metal.



Refer to the diagram above.

(i) Explain why most metals are good conductors of electricity.

(ii) Explain why most metals have high density.

Calcium is less dense than many other metals. It readily reacts with water. When pure it is shiny, but in the air it quickly forms a thin grey coating.

(c) List the **physical** properties of calcium and the **chemical** properties of calcium described above.

Physical properties of calcium	**Chemical properties of calcium**

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(d) Complete the word equation for the reaction between magnesium and water.

magnesium + water →

(e) Write a balanced chemical equation for the reaction between magnesium and hydrochloric acid.

→

QUESTION THREE: EPSOM SALT

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Epsom salt has the chemical formula $MgSO_4$. It can be prepared by reacting an acid with magnesium hydroxide.

(a) (i) Give the chemical name for $MgSO_4$ _____

(ii) Name the acid used in this reaction _____

(b) Write the word equation for the preparation of $MgSO_4$.

→

This reaction is described as a **neutralisation** reaction.

(c) Explain what is meant by the term **neutralisation**.

_____

_____

_____

_____

QUESTION FOUR: INDICATORS

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The pH values of three substances are given below:

Hydrochloric acid	pH = 1
Potassium carbonate solution	pH = 9
Sodium hydroxide solution	pH = 14

(a) When Universal Indicator solution is added to each of these substances, what colour would result?

(i) Hydrochloric acid _____

(ii) Potassium carbonate solution _____

(iii) Sodium hydroxide solution _____

Potassium carbonate solution is added slowly to the hydrochloric acid (without indicator) in a beaker until no further change is seen.

(b) (i) Describe what you would see happening when potassium carbonate is added to the acid.

_____

_____

(ii) Write a balanced chemical equation for the reaction between potassium carbonate and hydrochloric acid.

In another experiment, sodium hydroxide solution is added **slowly** to the hydrochloric acid to which **Universal Indicator solution** has been added.

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(c) Describe how the colour of the Universal Indicator solution changes as the sodium hydroxide solution is added. Discuss how the **colour** changes relate to the substances present in the solution. Use the substances from the key list.

Key list of substances
water
sodium chloride
sodium hydroxide
hydrochloric acid

At the beginning: _____

_____

_____

When the acid is neutralised: _____

_____

_____

When further sodium hydroxide is added: _____

_____

_____

Extra paper for continuation of answers if required.
Clearly number the question.

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Question number	

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