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1

90172

NEW ZEALAND QUALIFICATIONS AUTHORITY
MANA TOHU MĀTAURANGA O AOTEAROA

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

Level 1 Chemistry, 2005

90172 Describe atomic structure and bonding

Credits: Three
9.30 am Wednesday 23 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 metal activity series, solubility rules, a table of ions and a periodic table are provided in the Resource Booklet in your Level 1 Chemistry package.

Check that this booklet has pages 2–7 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 atomic structure and bonding. ☐	Link principles of atomic structure, bonding and selected properties. ☐	Discuss selected properties in terms of atomic structure and bonding. ☐
Overall Level of Performance ☐		

You are advised to spend 35 minutes answering the questions in this booklet.

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QUESTION ONE: ATOMIC STRUCTURE

(a) Complete the following table. Use the periodic table provided in the Resource Booklet to help you.

	Number of protons	**Number of neutrons**	**Number of electrons**
^{37}Cl			
^{35}Cl			
$^{35}Cl^-$			

(b) Describe why the mass number of ^{37}Cl is higher than the mass number of ^{35}Cl.

QUESTION TWO: ELECTRON ARRANGEMENTS

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(a) State **electron arrangements** for the following atoms and ions:

(i) a beryllium atom: _____

(ii) an argon atom: _____

(iii) a magnesium ion: _____

(iv) a fluoride ion: _____

(b) Neon (atomic number 10) and sodium (atomic number 11) are consecutive members of the periodic table.

Discuss why the chemical reactivity of the **neon atom** differs from that of the **sodium atom**.

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QUESTION THREE: LEWIS STRUCTURES

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Draw **Lewis structures** for the following atoms and molecules.

(a) Phosphorus atom, P

(b) Fluorine molecule, F_2

(c) Ammonia molecule, NH_3

(d) Carbon dioxide molecule, CO_2

QUESTION FOUR: BONDING

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(a) (i) For each substance below, state whether the bonding is **ionic** or **covalent**.

Substance	Bonding
magnesium oxide, MgO	
carbon dioxide, CO_2	

(ii) Using the above examples, discuss the difference between an ionic and a covalent bond.

(b) Choose the substance below that would sublime. Circle the correct answer.

MgO **CO_2**

Justify your choice with reference to bonding and attractive forces.

QUESTION FIVE: STATES OF MATTER

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Chlorine, Cl_2, is a gas at room temperature, while sodium chloride, NaCl, is a solid at room temperature.

Discuss this statement in terms of **molecules** and **ions** and the **attractive forces** between each type of particle.

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

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Question number	