For Supervisor's use only

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, 2006

90172 Describe atomic structure and bonding

Credits: Three
9.30 am Monday 27 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.

A metal activity series, solubility rules, a table of ions and a periodic table are provided in Resource Booklet L1–CHEMR.

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 2–7 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 30 minutes answering the questions in this booklet.

Assessor's use only

QUESTION ONE

Use the table below to answer the questions (a) to (e) that follow:

Element	Atomic Number	Mass Number
Sodium	11	23
Potassium	19	39
Oxygen	8	16
Sulfur	16	32

(a) What is the chemical symbol for the **potassium atom**? _____

(b) Write the electron arrangement for the **potassium atom**. _____

(c) State the number of neutrons in the **sodium atom**. _____

(d) What do the electron arrangements of **oxygen** and **sulfur** have in common?

_____

_____

(e) Write the electron arrangement for the **oxide ion.** _____

QUESTION TWO

Oxygen has three isotopes with mass numbers 16, 17 and 18.

Complete the following table:

Isotope	Number of particles present in the nucleus	
	protons	neutrons
^{16}O		
^{17}O		
^{18}O		

QUESTION THREE

Assessor's use only

All of the following elements, except one, have similar chemical properties.

(a) Circle the ONE element that is the exception.

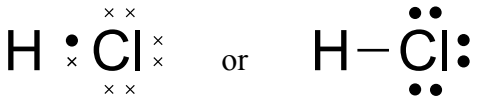
Mg Ca O Sr

(b) Use the positions of the atoms on the periodic table and electron arrangements of the atoms to justify your choice in (a).

QUESTION FOUR

Assessor's use only

The Lewis diagram for a hydrogen chloride molecule can be drawn as:



Draw the Lewis diagrams for the atoms or molecules given in each of the boxes below:

(a) Nitrogen atom, N	(b) Chlorine molecule, Cl_2
(c) Water, H_2O	(d) Phosphorus trichloride, PCl_3
(e) Nitrogen molecule, N_2	(f) Carbon disulfide molecule, CS_2

QUESTION FIVE

Assessor's use only

The following table shows the electrical conductivity of two substances in their solid and liquid states.

Name of substance	**Electrical conductivity of the substance**	
	Solid state	**Liquid state**
sodium chloride (NaCl)	Non-conductor	Conductor
sulfur dichloride (SCl_2)	Non-conductor	Non-conductor

Discuss the differences in electrical conductivity of these two substances in both states of matter.

Your discussion should include the **types** of particles that make up these substances, and the **forces** between them in the solid and liquid states.

QUESTION SIX

Assessor's use only

Of the two substances chlorine (Cl_2) and potassium chloride (KCl), one is a gas and the other is solid at room temperature.

Discuss the state of each substance at room temperature, in terms of the types of particles that make up these substances, and the **attractive forces** between these particles.

You should include in your answer information on particle separation, energy, and particle motion.

(a) **Chlorine**

(b) **Potassium Chloride**

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

Assessor's use only

Question number