For Supervisor's use only

2

90308

NEW ZEALAND QUALIFICATIONS AUTHORITY
MANA TOHU MĀTAURANGA O AOTEAROA

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

Level 2 Chemistry, 2006

90308 Describe the nature of structure and bonding in different substances

Credits: Four
2.00 pm 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.

A Periodic Table is provided on the RESOURCE SHEET in your Level 2 Chemistry package.

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.

Check that this booklet has pages 2–9 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 the bonding in simple molecules and the nature of types of solids.	Link selected properties of simple molecules and different types of solids to their structure.	Discuss properties of substances in terms of structure and bonding.
Overall Level of Performance		

You are advised to spend 45 minutes answering the questions in this booklet.

Assessor's use only

QUESTION ONE

Complete the table below by:

(a) drawing a Lewis structure (electron dot diagram) for each molecule

(b) drawing a diagram to show the shape of the molecule

(c) naming the shape of the molecule.

Formula of molecule	(a) Lewis structure	(b) Diagram of shape	(c) Name of shape
SF_2			
CO_2			
PBr_3			

QUESTION TWO

Assessor's use only

The following table contains oxides of elements from the third row of the Periodic Table. Complete the table below by:

(a) stating the type of particle found in each substance as an **atom**, **ion** or **molecule**

(b) specifying the attractive force that exists between the particles in the solid state of the substance.

Solid	**(a)** **Type of particle**	**(b)** **Attractive force between particles**
sodium oxide		
sulfur trioxide		
silicon dioxide		
aluminium oxide		

QUESTION THREE

Assessor's use only

Two ozone depleting substances are CCl_4 and CH_2Cl_2.

State whether the molecules are **polar** or **non-polar** and discuss the reasons for your choice. Include a Lewis structure of the molecules with your answer.

(a) CCl_4

(b) CH_2Cl_2

QUESTION FOUR

Assessor's use only

Molecules of water (H_2O) and ozone (O_3) each contain 3 atoms and both the molecules are bent. However, the bond angle in H_2O is significantly smaller than the bond angle in O_3.

Using Lewis structures, discuss the reasons for the difference in **bond angles** of these two molecules.

QUESTION FIVE

Assessor's use only

The **physical properties** of some crystalline solids are stated below. For each example, explain why the substance has the property stated by relating the **property** to the **structure and bonding** within the solid.

(a) Solid sodium chloride does not conduct electricity. However, if it is melted, sodium chloride will conduct electricity.

(b) Potassium chloride will not dissolve in non-polar solvents, but will dissolve in water.

(c) Copper is easily shaped to form wires.

Assessor's use only

QUESTION SIX

Assessor's use only

The following table shows the melting and boiling points of chlorides of some elements of the third row of the Periodic Table.

	sodium chloride NaCl	**magnesium chloride $MgCl_2$**	**phosphorus trichloride PCl_3**	**sulfur dichloride SCl_2**
melting point / °C	801	712	–91	–80
boiling point / °C	1465	1418	74	59

(a) Describe the **trend** in melting and boiling points of chlorides across the third row of the periodic table by referring to the data in the table above.

(b) Discuss reasons for the differences in melting and boiling points of all FOUR chlorides, shown in the table above, by referring to the **particles** and **forces between the particles** in the solids.

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

Assessor's use only

Question number	