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90308

NEW ZEALAND QUALIFICATIONS AUTHORITY
MANA TOHU MĀTAURANGA O AOTEAROA

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

Level 2 Chemistry, 2005

90308 Describe the nature of structure and bonding in different substances

Credits: Four
2.00 pm 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.

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.

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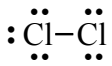
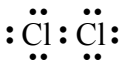
QUESTION ONE

The Lewis structure for chlorine, Cl_2, is  or 

Complete the table below by:

(a) drawing a Lewis structure for each molecule,

(b) naming the shape of each molecule.

Molecule	**(a) Lewis structure**	**(b) Name of shape**
H_2S		
PCl_3		
CH_3Br		
$COCl_2$ (Note: C is the central atom)		

QUESTION TWO

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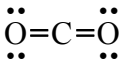
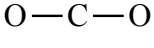
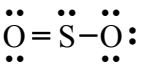
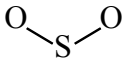
The table below shows the Lewis structures and shapes of two molecules.

Molecule	Lewis structure	Diagram to show shape
CO_2		
SO_2		

Using the information in this table, **describe** CO_2 and SO_2 molecules as either **polar** or **non-polar**, and **discuss** the reasons for your choice.

(a) **CO_2**

(b) **SO_2**

QUESTION THREE

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Complete the following table by:

(a) stating the type of particle found in each solid substance as atoms, ions or molecules,

(b) specifying the attractive force existing between the particles of each solid substance,

(c) describing the relative melting point of each substance as either high or low.

Solid substance	**(a) Type of particle in solid – atoms, ions or molecules**	**(b) Attractive force between particles**	**(c) Relative melting point of substance – high or low.**
calcium chloride ($CaCl_2$)			
diamond (C)			
ice (H_2O)			

QUESTION FOUR

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(a) Complete the table by classifying substances B to F as:

ionic, **metallic**, **molecular** or **covalent network**.

As an example, the classification for substance A has been done for you.

Substance	Melting point (°C)	Conductivity	Hardness of solid	Classification
A	770	conducts when molten but not when solid	brittle	ionic
B	1083	high	malleable	
C	–190	none	brittle	
D	1700	none	hard	
E	–57	none	brittle	
F	801	conducts when molten but not when solid	brittle	

(b) Explain why substance A will conduct electricity when molten, but not when solid.

QUESTION FIVE

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For each of the THREE uses of different crystalline solids below, discuss the property identified by relating the property to the **structure** and **bonding** within the solid.

(a) Silver (Ag) is **easily shaped** and may be used to make jewellery.

(b) Copper (Cu) is a **good conductor of electricity** and is used for electrical wires.

(c) Silicon dioxide (SiO_2) has a **very high melting point** and is used to make glass.

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Turn over for Question Six

QUESTION SIX

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Some properties of two solids are shown in the table below.

Solid	Melting point (°C)	Solubility
iodine (I_2)	Sublimes when gently heated	Soluble in cyclohexane
potassium iodide (KI)	681	Soluble in water

Discuss the properties of iodine and potassium iodide, in terms of the **structure** and **bonding** within each solid.

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

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Question number	