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NZQA

NEW ZEALAND QUALIFICATIONS AUTHORITY
MANA TOHU MĀTAURANGA O AOTEAROA

For Supervisor's use only

Level 2 Chemistry, 2008

90308 Describe the nature of structure and bonding in different substances

Credits: Four
2.00 pm Friday 28 November 2008

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 periodic table is provided on the Resource Sheet L2–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 2–9 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

(a) Draw a Lewis structure (electron dot diagram) for each of the following molecules:

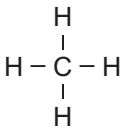
Molecule	Lewis structure
Cl_2O	
CS_2	
HCN	

Assessor's use only

(b) Lewis structures for TWO molecules are given below. For each molecule:

- name the shape
- justify your answer.

(i)



Shape _____

Justification _____

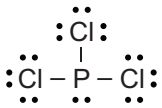
_____

_____

_____

_____

(ii)



Shape _____

Justification _____

_____

_____

_____

_____

QUESTION TWO

Assessor's use only

Complete the table below by stating the type of particle present in each of the solids, and identifying the bonding (attractive forces) between particles.

	Solid	Melting point (°C)	Type of particle	Bonding between particles
(a)	S_8	119		
(b)	$MgCl_2$	712		
(c)	Mg	650		
(d)	Diamond	3550		

QUESTION THREE

Assessor's use only

An element, X, has four valence electrons. Another element, Y, has six valence electrons. These elements both combine with oxygen. The molecules formed are XO_2 and YO_2.

(a) Draw the Lewis structures of these two molecules.

XO_2 YO_2

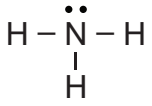
(b) Determine the bond angle in each of these molecules using the Lewis structures from (a). Justify your answer.

QUESTION FOUR

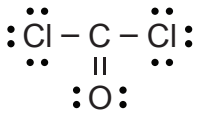
Assessor's use only

The Lewis structures of two molecules, NH_3 and $COCl_2$, are shown below.

NH_3



$COCl_2$



Circle the answer which describes the polarity of each of these molecules.

Discuss the reasons for your choice.

NH_3 **polar** **non-polar**

$COCl_2$ **polar** **non-polar**

QUESTION FIVE

Assessor's use only

Two of the following substances can conduct electricity.

copper chloride diamond graphite iodine silicon dioxide

(a) Write the names of these two substances.

Substance One _____ **Substance Two** _____

(b) Discuss, with reference to structure and bonding, why the substances chosen in (a) are able to conduct electricity. Include any conditions that are required.

Substance One _____

Substance Two _____

QUESTION SIX

Assessor's use only

Discuss the following physical properties of Zn and $ZnCl_2$ using your knowledge of structure and bonding:

- malleability (easily hammered into shape)
- solubility in water (a polar solvent).

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

Assessor's use only

Question number