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NEW ZEALAND QUALIFICATIONS AUTHORITY
MANA TOHU MĀTAURANGA O AOTEAROA

For Supervisor's use only

Level 1 Chemistry, 2008

90640 Describe characteristic properties and reactions of metals, acids and bases

Credits: Four
9.30 am 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 in the 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 2–9 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 characteristic properties and reactions of metals, acids and bases. ☐	Explain characteristic properties and reactions of metals, acids and bases. ☐	Apply an understanding of characteristic properties and reactions of metals, acids and bases. ☐
Overall Level of Performance ☐		

You are advised to spend 40 minutes answering the questions in this booklet.

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QUESTION ONE: KITCHEN CHEMISTRY

A group of students were investigating the chemical properties of acids and bases found in the kitchen.

(a) Complete the following table

Item	Chemical name	pH value	Colour when universal indicator added
Vinegar	Ethanoic acid	3	
Baking soda	Sodium hydrogen carbonate	8	
Caustic soda	Sodium hydroxide	13	

(b) The students created a chemical volcano using the baking soda and vinegar.

Discuss what is happening in this reaction. Use the information in the table in (a) to help you. Include in your answer

- the type of reaction that has occurred
- observations that would be made
- the products of the reaction
- an appropriate balanced equation.

QUESTION TWO: METAL REACTIONS

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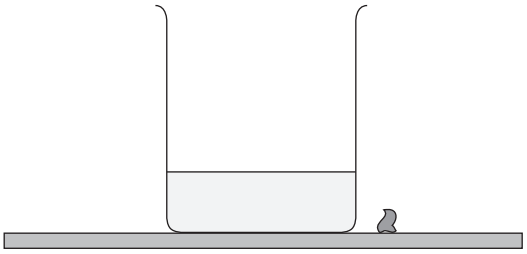

(a) A student put some water in a beaker, added a few drops of litmus solution, and then added a small piece of calcium metal. Calcium reacts vigorously in water.

(i) Describe TWO observations that would be made when calcium is added to the water in the beaker and **explain** why they occur.

(1) Observation: _____

_____

Explanation: _____

_____

_____

_____

_____

(2) Observation: _____

_____

Explanation: _____

_____

_____

_____

_____

(ii) Write a balanced equation for the reaction of calcium in water.

(b) THREE metals labelled X, Y and Z need to be identified based on some characteristic physical and chemical properties.

Test	**Description of Test**	**Observations**		
		Metal X	**Metal Y**	**Metal Z**
Colour of metal	The physical appearance of a cleaned piece of metal was examined.	shiny grey	pink-brown	shiny grey
Reaction with oxygen	A sample of each metal was exposed to air and if no reaction, it was placed in a Bunsen flame using tongs.	The shiny metal tarnished quickly when exposed to air.	No reaction in air.	No reaction in air, but burns with a bright white light in a Bunsen flame.
Reaction with cold water	A sample of each metal was placed in a test tube and cold water was added to a depth of 2 cm.	A vigorous reaction where the metal disappeared and a gas is produced.	No visible reaction.	A slow reaction where small bubbles of gas formed on the metal.
Reaction with sulfuric acid	A sample of each metal was placed in a test tube and dilute sulfuric acid was added to a depth of 2 cm.	A very vigorous reaction where the metal disappeared and a gas is produced.	No visible reaction.	A vigorous reaction where the metal disappeared and a gas is produced.

The possible metals are:

iron, magnesium, sodium, copper, zinc

Identify metals X, Y and Z and justify your answer using the reactions described in the table opposite. Include the products of any reactions in your answer.

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Metal X is: _____

Because: _____

_____

_____

_____

_____

Metal Y is: _____

Because: _____

_____

_____

_____

_____

Metal Z is: _____

Because: _____

_____

_____

_____

_____

QUESTION THREE: RATES OF REACTION

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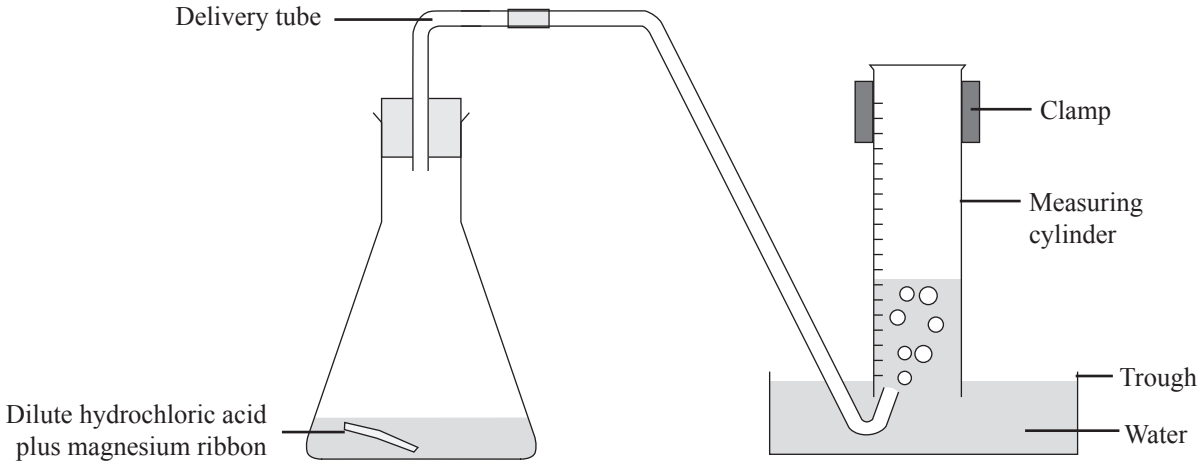
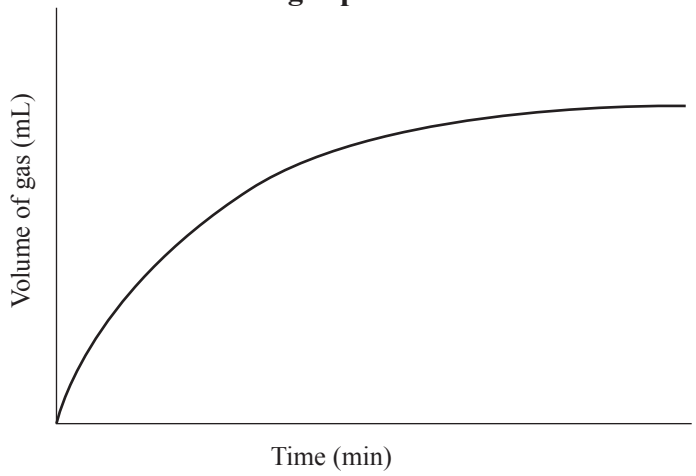
Magnesium ribbon reacts with **dilute hydrochloric acid** in a conical flask, which is connected to an inverted measuring cylinder in a trough of water. The volume of gas produced is measured over a few minutes, and the results are used to sketch a graph.



Volume of gas production with time



(a) Explain why, in terms of particles involved, the line on the graph levels off over time.

(b) Discuss the effect on the rate of reaction when repeating this experiment using the same mass of magnesium **powder** with the dilute hydrochloric acid.

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QUESTION FOUR: USEFUL METALS

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One of the most common uses of aluminium is packaging, including soft drink cans and aluminium foil.

Discuss why aluminium is used to package food and drinks despite the fact that aluminium is a reactive metal, found quite high up on the activity series (shown in your Resource Booklet).

Include in your answer:

- TWO or more properties that make aluminium suitable for making cans and foil
- why aluminium can be used in packaging food and drink when the metal is quite reactive.

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

Assessor's use only

Question number