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90640

NEW ZEALAND QUALIFICATIONS AUTHORITY
MANA TOHU MĀTAURANGA O AOTEAROA

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

Level 1 Chemistry, 2004

90640 Describe properties and reactions of metals, acids and bases

Credits: Four
9.30 am Wednesday 10 November 2004

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.

If you need more space for any answer, use the page provided at the back of this booklet and clearly number the question.

A metal activity series, solubility rules, a table of ions and a periodic table are provided in the Resource Booklet in your Level 1 Chemistry package.

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.

Achievement Criteria *For Assessor's use only*		
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 35 minutes answering the questions in this booklet.

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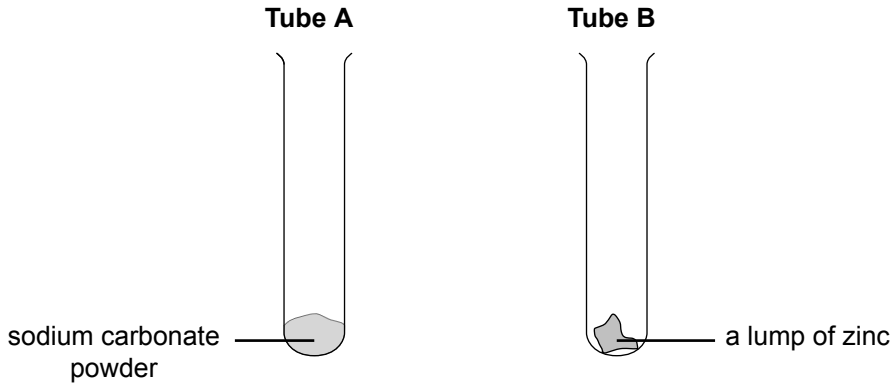
QUESTION ONE: REACTIONS OF ACIDS



Dilute sulfuric acid is added to each of the two tubes shown above. A stopper is then put in the top of each tube.

(a) Describe ONE **observation** of the reaction in **tube A**.

_____

_____

_____

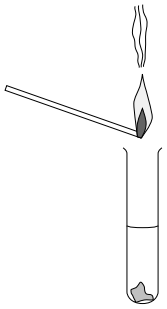
(b) Describe what will happen when the stopper is removed and a **burning splint** is held in the mouth of each tube:

(i) tube A

_____

_____

_____



(ii) tube B

_____

_____

_____

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(c) Complete the **word equations** for reactions that occur in each tube:

(i) tube A

sodium carbonate	+	sulfuric acid	→		+		+	

(ii) tube B

zinc	+	sulfuric acid	→		+	

QUESTION TWO: PROPERTIES OF METALS

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(a) Write a balanced chemical equation for the reaction of lithium with water.

(b) Write a balanced chemical equation for the reaction of magnesium with water.

(c) State the **physical or chemical properties** of aluminium that make the metal suitable for each of the uses given in the table below.

Write a DIFFERENT PROPERTY in each cell of the table. Each property must relate to the given use.

Use	Property 1	Property 2
Window frames for houses		
Overhead electrical power cables		

QUESTION THREE: TWO BLACK SOLIDS

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A student was given TWO black solids (powders) labelled **Compound X** and **Element Y**.

The table below describes the tests the student carried out and the observations made.

Test	Description of test	Observations	
		Compound X	**Element Y**
1	A sample of each black solid was placed in a test tube and water was added to a depth of 2 cm.	No reaction.	No reaction.
2	A fresh sample of each black solid was placed in a test tube, dilute sulfuric acid was added to a depth of 2 cm and the mixture was warmed.	The black solid disappeared and a blue solution remained. No gas bubbles were seen.	The black solid disappeared, bubbles of a colourless, odourless gas were seen and a pale green solution remained.
3	A fresh sample of each black solid was placed in a deflagrating spoon held in the blue flame of a Bunsen burner.	The solid did not burn. The black solid remained.	Sparks were formed in the flame. After strong heating the solid glowed red-hot and a different black solid was formed.

(a) Name **Compound X** and **Element Y**.

Compound X _____ **Element Y** _____

(b) Give reasons for your answers in (a) above. Identify the products of any reactions.

(i) Reasons for Compound X

_____

_____

_____

_____

_____

(ii) Reasons for Element Y

_____

_____

_____

_____

_____

QUESTION FOUR: RATE OF A REACTION

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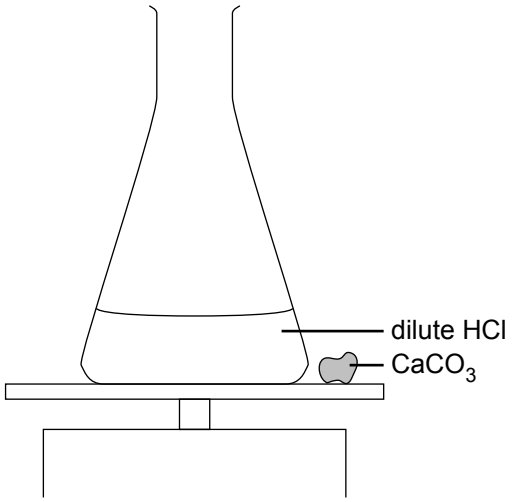
A student placed the following on a balance pan:

- 25 mL of dilute hydrochloric acid in a flask
- a lump of limestone (calcium carbonate).

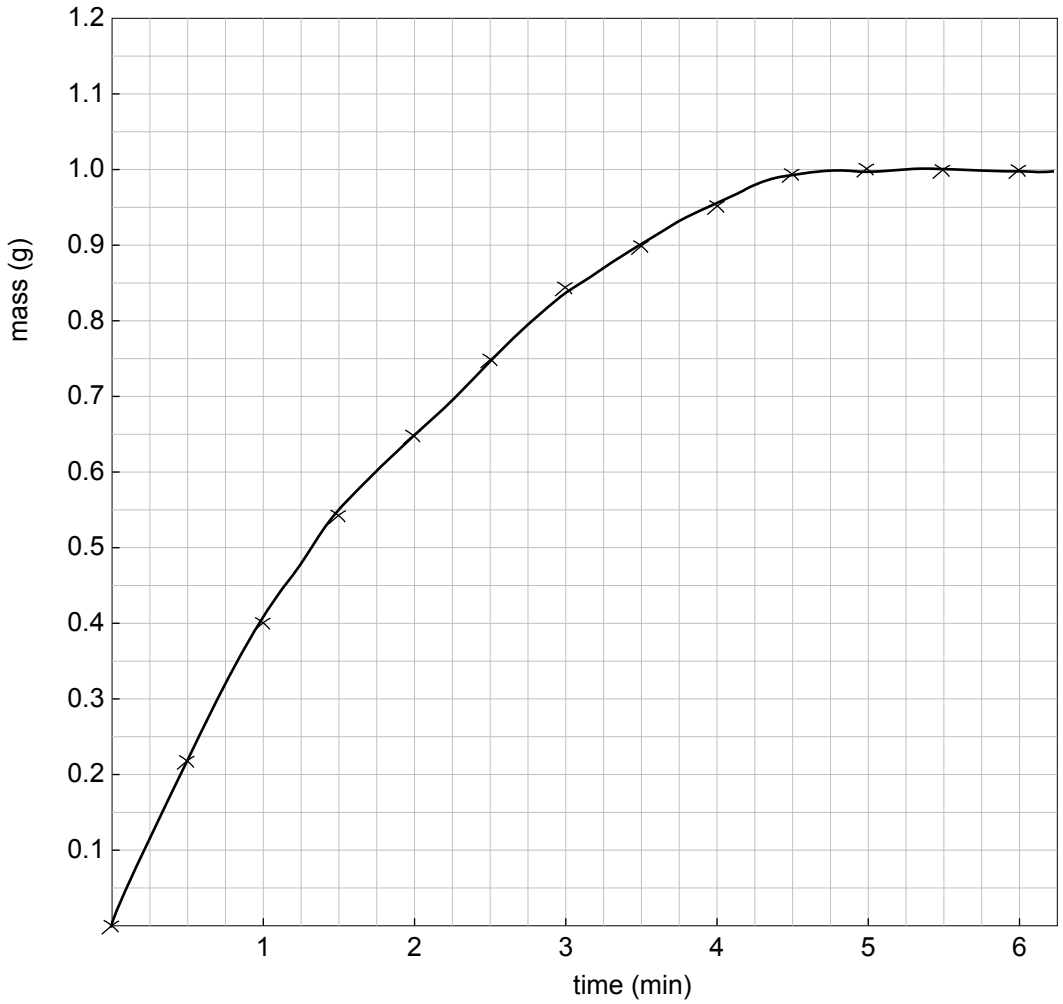


The mass was recorded and then the lump of limestone was added to the acid.

Carbon dioxide gas was given off.

Every 30 seconds the student recorded the mass of the flask. She then calculated the total mass of carbon dioxide given off from the beginning of the experiment and drew this graph:

Total mass of carbon dioxide given off from the start of the reaction.



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(a) Explain, in terms of the particles involved, why the graph is steepest at the start of the reaction.

(b) Explain why the graph levels off after 5 minutes.

(c) State ONE **factor**, other than temperature, that would **increase the rate** of this chemical reaction.

(d) The rate of this reaction can be increased when the temperature is increased. Explain, in terms of the particles involved, why the **reaction rate increases** when the **temperature** is **increased**.

QUESTION FIVE: ACIDS

Assessor's use only

A student is provided with two unlabelled, colourless solutions.
One is a solution of **sodium hydroxide** and the other a solution of **dilute hydrochloric acid**.
Both solutions have the same concentration.

(a) The student carries out TWO tests. Give expected observations for each test with **both** solutions.

TEST ONE: A piece of Universal Indicator paper is placed in each solution.

Observations

sodium hydroxide: _____

_____

hydrochloric acid: _____

_____

TEST TWO: A small piece of magnesium is added to each solution. Both pieces are the same size.

Observations

sodium hydroxide: _____

_____

hydrochloric acid: _____

_____

(b) Discuss reasons for the differences in these observations, with reference to the chemical properties of the two solutions.

Discussion: _____

_____

_____

_____

_____

_____

_____

_____

_____

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

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Question number