See back cover for an English translation of this cover

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90944M

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NZQA

NEW ZEALAND QUALIFICATIONS AUTHORITY
MANA TOHU MĀTAURANGA O AOTEAROA

SUPERVISOR'S USE ONLY

Pūtaiao, Kaupae 1, 2013

90944M Te whakaatu māramatanga ki ngā āhuatanga o te waikawa me te pāpāhua

9.30 i te ata Rāhina 18 Whiringa-ā-rangi 2013
Whiwhinga: Whā

Paetae	Paetae Kaiaka	Paetae Kairangi
Te whakaatu māramatanga ki ngā āhuatanga o te waikawa me te pāpāhua.	Te whakaatu māramatanga hōhonu ki ngā āhuatanga o te waikawa me te pāpāhua.	Te whakaatu māramatanga matawhānui ki ngā āhuatanga o te waikawa me te pāpāhua.

Tirohia mehemea e ōrite ana te Tau Ākonga ā-Motu (NSN) kei tō pepa whakauru ki te tau kei runga ake nei.

Me whakautu e koe te KATOA o ngā pātai kei roto i te pukapuka nei.

Tangohia te Pukaiti Rauemi 90944MR i waenga o tēnei pukapuka.

Ki te hiahia koe ki ētahi atu wāhi hei tuhituhi whakautu, whakamahia te (ngā) whārangi kei muri i te pukapuka nei, ka āta tohu ai i ngā tau pātai.

Tirohia mehemea kei roto nei ngā whārangi 2–23 e raupapa tika ana, ā, kāore hoki he whārangi wātea.

HOATU TE PUKAPUKA NEI KI TE KAIWHAKAHAERE HEI TE MUTUNGA O TE WHAKAMĀTAUTAU.

TAPEKE

MĀ TE KAIMĀKA ANAKE

Kia 60 meneti hei whakautu i ngā pātai o tēnei pukapuka.

MĀ TE KAIMĀKA ANAKE

PĀTAI TUATAHI: HANGANGA NGOTA

He **ōrite** te whakanaha irahiko o F^-, Ne, me Mg^{2+}.

(a) Whakaotihia te papatau i raro nei.

Whakamahia te taka pūmotu i roto i tō Pukaiti Rauemi.

	Tau ngota	**Te maha o ngā iraoho**	**Te maha o ngā irahiko**	**Whakanaha irahiko**
F^-				
Ne				
Mg^{2+}				

(b) Whakatauritehia te hanganga ngota o F^-, Ne, me Mg^{2+}.

I tō whakautu me:

- whakaahua i te rerekētanga i waenga i tētahi ngota me tētahi katote
- whakamārama i ngā hihiko kei F^-, Ne, me Mg^{2+} e pā ana ki te whakanaha irahiko me te maha o ngā iraoho
- whakahāngai i te tūnga o F^-, Ne, me Mg^{2+} i te taka pūmotu ki ngā hihiko me te whakanaha irahiko
- whakamārama he aha i ōrite katoa ai te whakanaha irahiko o ngā mea e toru.

MĀ TE KAIMĀKA ANAKE

You are advised to spend 60 minutes answering the questions in this booklet.

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QUESTION ONE: ATOMIC STRUCTURE

F^-, Ne, and Mg^{2+} have the **same** electron arrangement.

(a) Complete the table below.

Use the periodic table in your Resource Booklet.

	Atomic number	Number of protons	Number of electrons	Electron arrangement
F^-				
Ne				
Mg^{2+}				

(b) Compare the atomic structure of F^-, Ne, and Mg^{2+}.

In your answer you should:

- describe the difference between an atom and an ion
- explain the charges on F^-, Ne, and Mg^{2+} in terms of electron arrangement and number of protons
- relate the position of F^-, Ne, and Mg^{2+} on the periodic table to the charges and electron arrangement
- explain why all three have the same electron arrangement.

ASSESSOR'S USE ONLY

PĀTAI TUARUA: NGĀ WAIKAWA ME NGĀ PĀPĀHUA

MĀ TE KAIMĀKA ANAKE

I tāpirihia atu he konurehu waihā (KOH) ki tētahi mehanga waikawa pungatara me te ranunga taetohu i roto kia kore rā anō e kitea he panonitanga.

I tuaruatia te whakamātauranga, engari i tautauhia he pepa tohu waikawa whero me tētahi pepa tohu waikawa kikorangi ki te mehanga i muri i te tāpiritanga o ia 5 ml o te konurehu waihā.

E whakaaturia ana ngā hua o ngā whakamātauranga ki te papatau i raro.

Rōrahi KOH i tāpirihia (ml)	Tae o te mehanga me te ranunga taetohu	Tae o te pepa tohu waikawa whero	Tae o te pepa tohu waikawa kikorangi
0	whero	noho whero	huri ki te whero
5	karaka-kōwhai	noho whero	huri ki te whero
10	kākāriki	noho whero	noho kikorangi
15	kikorangi	huri ki te kikorangi	noho kikorangi
20	waiporoporo	huri ki te kikorangi	noho kikorangi

(a) Tuhia tētahi whārite kupu ME tētahi whārite tohu taurite mō te tauhohenga i waenga i te waikawa pungatara me te konurehu waihā.

Whārite kupu:

Whārite tohu taurite:

(b) Matapakitia ngā pupūtanga i roto i tēnei tauhohenga i te tāpiritanga o te konurehu waihā ki te waikawa pungatara.

MĀ TE KAIMĀKA ANAKE

I tō whakautu me:

- whakahāngai i ngā tae o te mehanga i kitea ki te waikawatanga me te pH o taua mehanga
- whakamārama he aha i puta ai ngā tae rerekē o te mehanga, Ā, ka hono i ēnei tae ki ngā katote i reira i te wā o te tauhohenga
- whakamārama i ngā painga o te whakamahi i te ranunga taetohu ina whakatauritea ki te pepa tohu waikawa.

QUESTION TWO: ACIDS AND BASES

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Potassium hydroxide (KOH) was added to a solution of sulfuric acid containing universal indicator until no further change was observed.

The experiment was repeated, but a piece of red litmus paper and a piece of blue litmus paper were each dipped into the solution after each 5 mL of potassium hydroxide was added.

The results of the experiments are shown in the table below.

Volume of KOH added (mL)	Colour of solution with universal indicator	Colour of red litmus paper	Colour of blue litmus paper
0	red	stays red	turns red
5	orange-yellow	stays red	turns red
10	green	stays red	stays blue
15	blue	turns blue	stays blue
20	purple	turns blue	stays blue

(a) Write a word equation AND a balanced symbol equation for the reaction between sulfuric acid and potassium hydroxide.

Word equation:

Balanced symbol equation:

(b) Discuss what happened in this reaction as the potassium hydroxide was added to the sulfuric acid.

In your answer you should:

- relate the colours of the solution observed to the acidity and pH of the solution
- explain why the different colours of the solution were produced AND link these colours to the ions present during the reaction.
- explain the advantages of using universal indicator compared to litmus paper.

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PĀTAI TUATORU: NGĀ TERE TAUTOHENGA

E whakaatu ana te papatau i raro i te rahinga o ngā kongakonga māpere (konupūmā pākawa waro) ka whakamahia i roto i tētahi tūhuratanga matū ki ngā āhuatanga e whai pānga ki te tere o te tauhohenga.

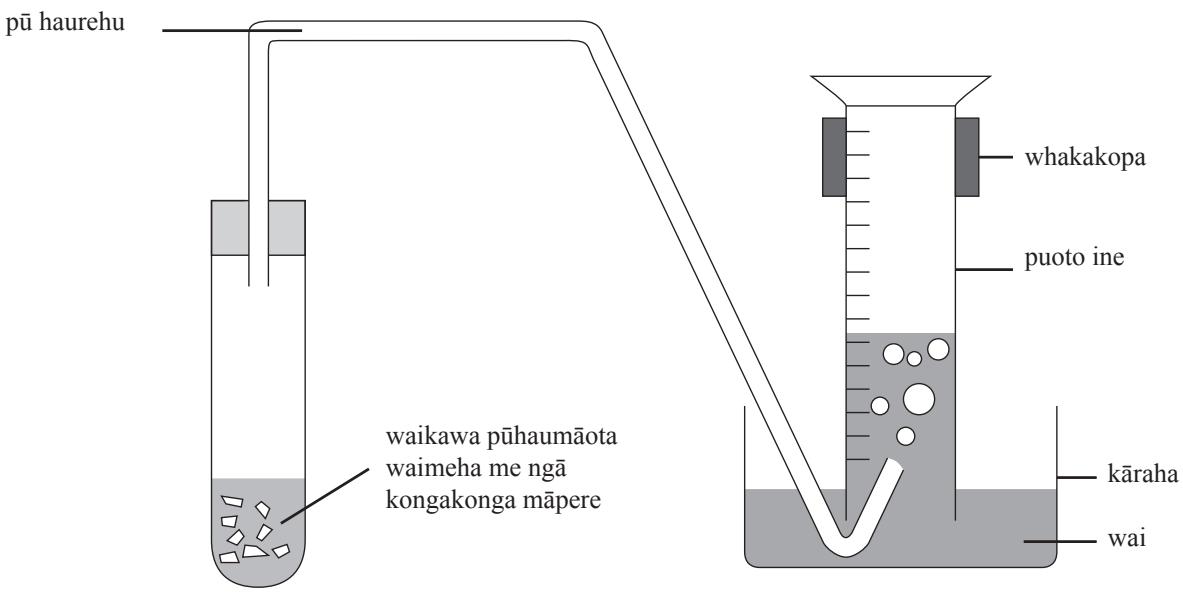
Whakamātauranga	Rahinga o ngā kongakonga māpere (konupūmā pākawa waro)
Whakamātauranga 1	kongakonga māpere iti
Whakamātauranga 2	kongakonga māpere nui

Whakamātauranga 1: I tāpirihia he 10 ml o te waikawa pūhaumāota ki tētahi ipuipu nui he kongakonga māpere iti i roto.

Whakamātauranga 2: I tāpirihia he 10 ml o te waikawa pūhaumāota o taua kukūtanga anō mai i te Whakamātauranga 1 ki tētahi atu ipuipu nui he kongakonga māpere nui i roto.

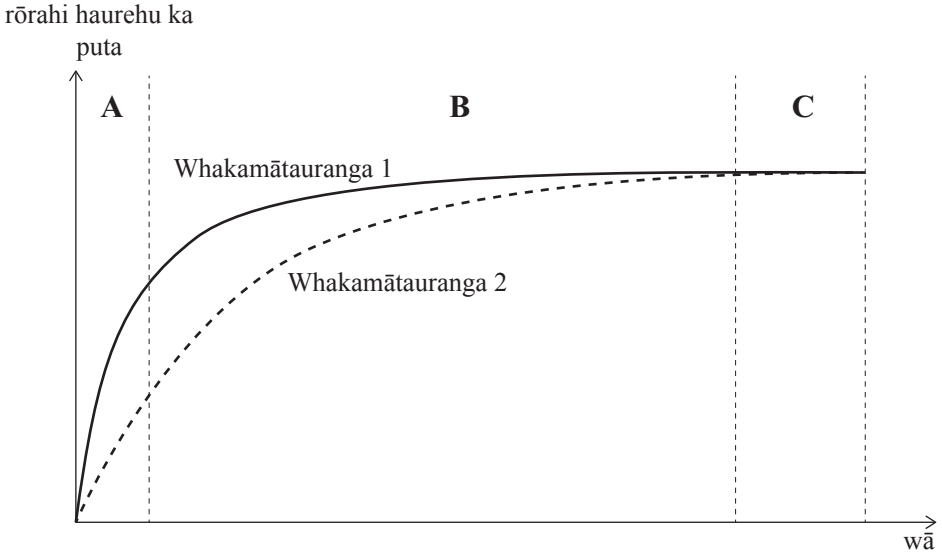
I te ōrite te papatipu tapeke o ngā kongakonga māpere i ngā whakamātauranga e rua.

I tūhonotia ngā ipuipu ki tētahi puoto ine kōaro i tētahi kāraha wai, pērā i te hoahoa i raro nei.



E whakaatu ana te kauwhata i raro i ngā kitenga mō te rōrahi haurehu ka puta i roto i tētahi wā.

MĀ TE KAIMĀKA ANAKE



(a) Tuhia he aha te āhuatanga e whai pānga ki te tere o te tauhohenga e tūhuratia ana i tēnei whakamātauranga.

(b) Whakamāramahia he aha ngā pupūtanga i te **Whakamātauranga 1** i ngā wāhanga A, B, me C o te kauwhata e pā ana ki te tere o te tauhohenga.

I tō whakautu me kōrero koe mō ngā tukinga korakora.

QUESTION THREE: REACTION RATES

The table below shows the size of marble chips (calcium carbonate) used in a chemical investigation into factors affecting rate of reaction.

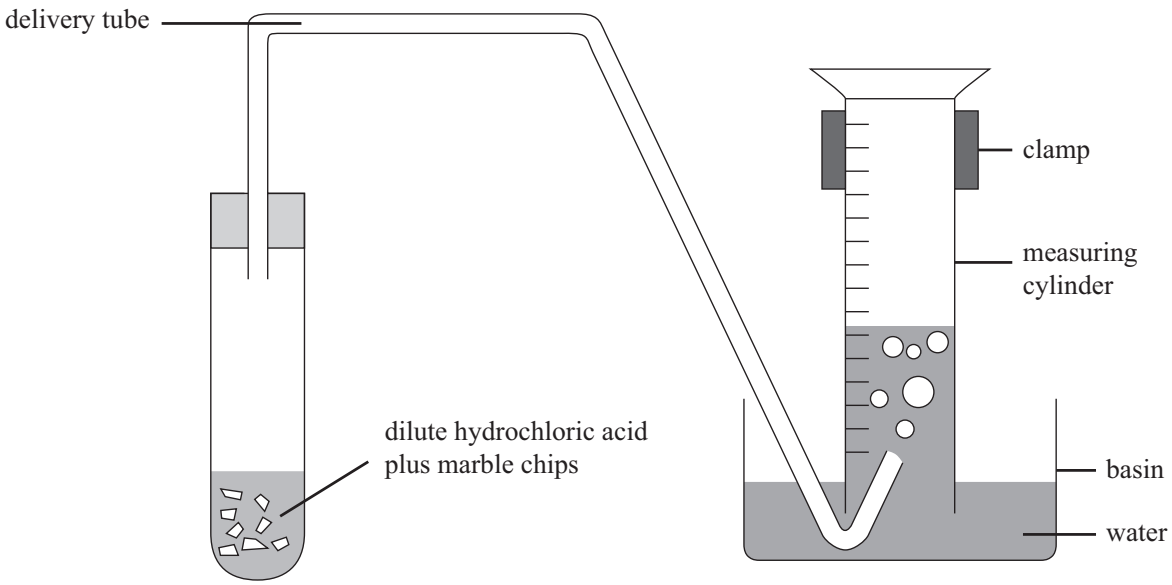
Experiment	Size of marble chips (calcium carbonate)
Experiment 1	small marble chips
Experiment 2	large marble chips

Experiment 1: 10 mL of hydrochloric acid was added to a boiling tube containing small marble chips.

Experiment 2: 10 mL of hydrochloric acid of the same concentration as in Experiment 1 was added to another boiling tube containing large marble chips.

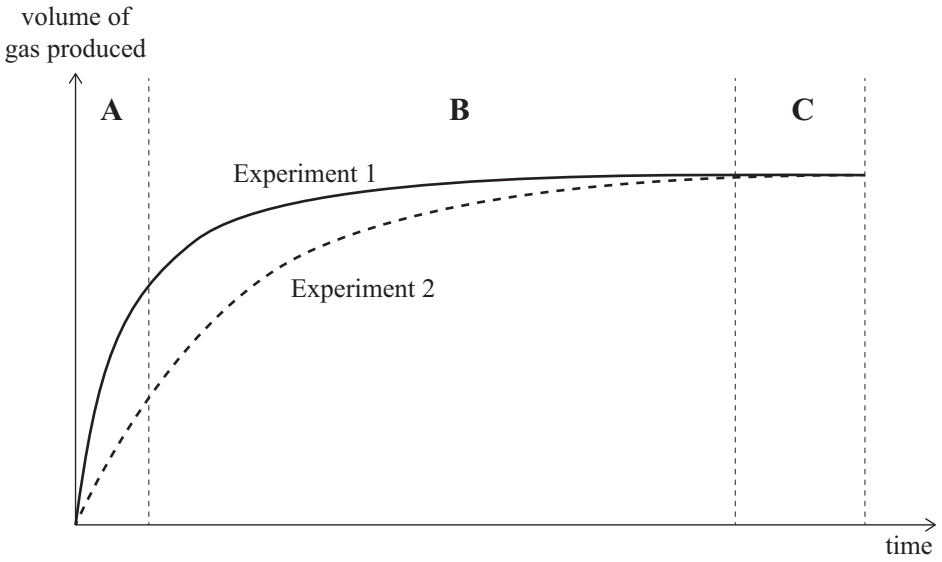
In both experiments the total mass of the marble chips was the same.

The boiling tubes were connected to an inverted measuring cylinder in a basin of water, as shown in the diagram below.



The graph below shows the results for the volume of gas produced over a period of time.

ASSESSOR'S USE ONLY



(a) State what factor affecting the rate of reaction is being investigated in this experiment.

(b) Explain what is happening in **Experiment 1** in sections A, B, and C of the graph in terms of reaction rate.

In your answer you should refer to particle collisions.

(c) Whakamāramahia te take i tere ake te **Whakamātauranga 1** i te **Whakamātauranga 2**.

I tō whakautu me:

- whakamārama he pēhea te whakaatu o te kauwhata he tere ake te Whakamātauranga 1
- whakamārama he pēhea te pānga o te rahinga o ngā kongakonga māpere ki te maha o ngā tukinga korakora.

MĀ TE KAIMĀKA ANAKE

(c) Explain why **Experiment 1** was faster than **Experiment 2**.

In your answer you should:

- explain how the graph shows that Experiment 1 is faster
- explain how the size of the marble chips affects the number of particle collisions.

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PĀTAI TUAWHĀ: TE TŪHURA TAUHOHENGA

MĀ TE KAIMĀKA ANAKE

Whakamātauranga Tuatahi

I whakahaerehia e tētahi ākonga tētahi whakamātauranga i roto i te taiwhanga pūtaiao mā te whakamahi i te tūmahi e whai ake:

Upane tuatahi: I tāpirihia te ranunga taetohu ki tētahi mehanga waikawa pūhaumāota i roto i tētahi ipurau.

Upane tuarua: I āta tāpiri haerehia te konupūmā waihā kia huri kākāriki te mehanga.

Upane tuatoru: Kātahi ka ringihia ngā mea i roto i te ipurau ki tētahi oko whakaeto ka waiho ki tētahi wāhi ka whitikia e te Rā mō ētahi rā.

(a) Tuhia tētahi whāinga pūtaiao mō tēnei whakamātauranga.

(b) Whakamāramahia te pūtake o ia upane i roto i te tūmahi me te āhua o te whakamahi i ngā utauta me ngā matū kia tutuki ai taua pūtake.

Upane tuatahi
Pūtake:

Whakamāramatanga:

Upane tuarua
Pūtake:

Whakamāramatanga:

Upane tuatoru
Pūtake:

Whakamāramatanga:

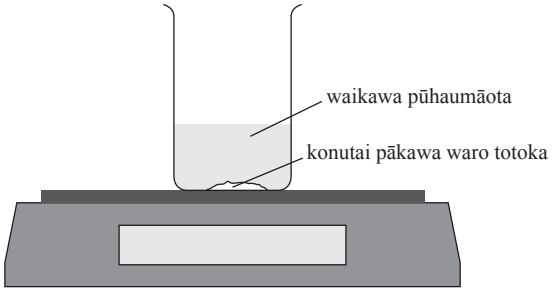
Whakamātauranga Tuarua

I roto i tētahi atu whakamātauranga i whakamahia te tūmahi e whai ake:

Upane tuatahi: I utaina he ipurau ki tētahi taurite e ai ki te hoahoa i raro nei.

Upane tuarua: I tāpirihia te waikawa pūhaumāota ki te konutai pākawa waro totoka i roto i te ipurau.

Upane tuatoru: I tuhia te papatipu i roto i te wā.



(c) Tuhia tētahi whārite kupu ME tētahi whārite tohu taurite mō te tauhohenga i waenga i te waikawa pūhaumāota me te konutai pākawa waro.

Whārite kupu:

Whārite tohu taurite:

QUESTION FOUR: INVESTIGATING REACTIONS

ASSESSOR'S USE ONLY

Experiment One

A student carried out an experiment in the lab using the following method:

Step one: Universal indicator was added to a solution of hydrochloric acid in a beaker.

Step two: Calcium hydroxide was added slowly until the solution turned green.

Step three: The contents of the beaker were then poured into an evaporating dish and left in a sunny place for several days.

(a) Write a scientific aim for this experiment.

(b) Explain the purpose of each step in the method and how the equipment and chemicals used achieve that purpose.

Step one
Purpose:

Explanation:

Step two
Purpose:

Explanation:

ASSESSOR'S USE ONLY

Step three
Purpose:

Explanation:

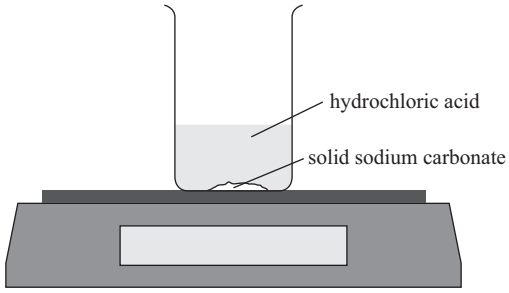
Experiment Two

In another experiment the following method was used:

Step one: A beaker was placed on a balance as shown in the diagram below.

Step two: Hydrochloric acid was added to solid sodium carbonate in the beaker.

Step three: The mass was recorded over time.



(c) Write a word equation AND a balanced symbol equation for the reaction between hydrochloric acid and sodium carbonate.

Word equation:

Balanced symbol equation:

(d) Whakamāramahia mai he aha e heke haere ai te papatipu o te ipurau me ngā mea i roto i te wā.

I tō whakautu me:

- tuhi i ētahi atu kitenga i te tauhohenga o te waikawa pūhaumāota ki te konutai pākawa waro
- whakamārama he pēhea te heke haere o te papatipu o te ipurau me ngā mea i roto nā te waihanga o ngā hua o te tauhohenga.

MĀ TE KAIMĀKA ANAKE

(d) Explain why the mass of the beaker and contents would decrease over time.

In your answer you should:

- state any other observations that would be made as hydrochloric acid reacts with the sodium carbonate
- explain how the products formed by the reaction lead to the decrease in mass of the beaker and contents.

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He puka anō mēnā ka hiahiatia.
Tuhia te (ngā) tau pātai mēnā e hāngai ana.

TAU PĀTAI

MĀ TE KAIMĀKA ANAKE

Extra paper if required.
Write the question number(s) if applicable.

QUESTION NUMBER

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English translation of the wording on the front cover

Level 1 Science, 2013

90944 Demonstrate understanding of aspects of acids and bases

9.30 am Monday 18 November 2013
Credits: Four

Achievement	Achievement with Merit	Achievement with Excellence
Demonstrate understanding of aspects of acids and bases.	Demonstrate in-depth understanding of aspects of acids and bases.	Demonstrate comprehensive understanding of aspects of acids and bases.

90944M

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 attempt ALL the questions in this booklet.

Pull out Resource Booklet 90944R from the centre of 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 2–23 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.