90944M

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SUPERVISOR'S USE ONLY

NEW ZEALAND QUALIFICATIONS AUTHORITY
MANA TOHU MĀTAURANGA O AOTEAROA

QUALIFY FOR THE FUTURE WORLD
KIA NOHO TAKATŪ KI TŌ ĀMUA AO!

Pūtaiao, Kaupae 1, 2017

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

9.30 i te ata Rāapa 15 Whiringa-ā-rangi 2017
Whiwhinga: Whā

Paetae	Kaiaka	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 mēnā e rite ana te Tau Ākonga ā-Motu (NSN) kei runga i tō puka whakauru ki te tau kei runga i tēnei whārangi.

Me whakamātau koe i ngā tūmahi KATOA kei roto i tēnei pukapuka.

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

Mēnā ka hiahia whārangi atu anō koe mō ō tuhinga, whakamahia ngā whārangi wātea kei muri o tēnei pukapuka, ka āta tohu ai i ngā tau tūmahi.

Tirohia mēnā e tika ana te raupapatanga o ngā whārangi 2–15 kei roto i tēnei pukapuka, ka mutu, kāore tētahi o aua whārangi i te takoto kau.

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

TAPEKE

MĀ TE KAIMĀKA ANAKE

TŪMAHI TUATAHI

MĀ TE KAIMĀKA ANAKE

I tāpirihia he tīpakonga o te paura konutai pākawa waro-rua ($NaHCO_3$) ki te waikawa pungatara (H_2SO_4) i roto i tētahi puoto, ā, ka kite e mirumiru ana.

E rua ngā whakamātautau i whakahaerehia me te waikawa i ngā paemahana rerekē, mā te whakamahi i te rahinga ōrite o te paura konutai pākawa waro-rua me te kukūtanga ōrite me te rahinga ōrite o te waikawa pungatara:

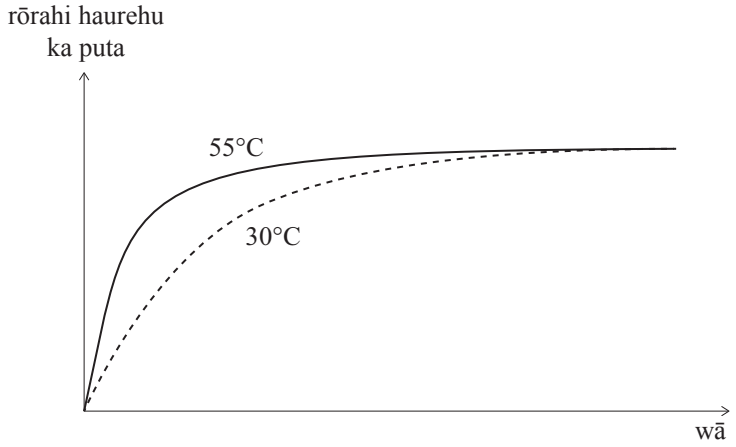
Whakamātautau	Paemahana o te waikawa, °C
1	30
2	55

(a) Nā te aha i puta ai te mirumiru?

(b) He aha i tino tere rawa ai te mirumiru i muri tonu i te tāpiritanga o te konutai pākawa waro-rua?

Me kōrero tō tuhinga mō ngā tukinga korakora.

(c) I kitea te tere o te tauhohenga mō ia whakamātautau mā te ine i te rōrahi haurehu i puta i roto i te wā, e ai ki te kauwhata i raro.



QUESTION ONE

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A sample of powdered sodium hydrogen carbonate ($NaHCO_3$) was added to sulfuric acid (H_2SO_4) in a flask, and fizzing was observed.

Two experiments were carried out with the acid at different temperatures, using the same amount of powdered sodium hydrogen carbonate and the same concentration and volume of sulfuric acid:

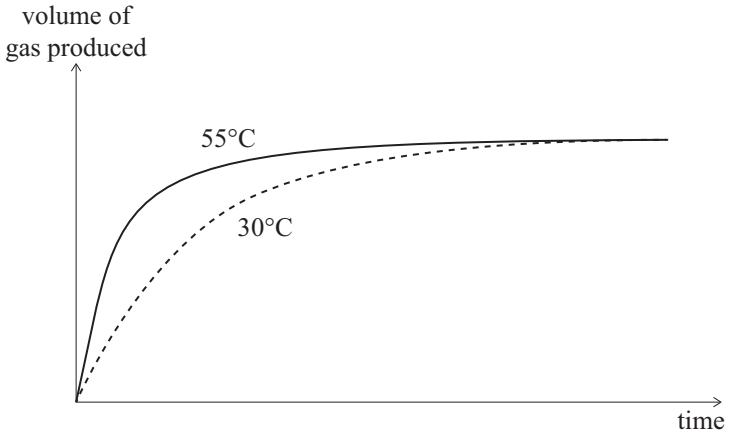
Experiment	Temperature of acid, °C
1	30
2	55

(a) What caused the fizzing?

(b) Why was the fizzing fastest immediately after the sodium hydrogen carbonate had been added?

Your answer should refer to particle collisions.

(c) The rate of reaction for each experiment was found by measuring the volume of gas produced over time, as shown in the graph below.



Tirohia te kauwhata i te whārangi tōmua hei whakautu i te pātai e whai ake:

He aha te pānga o te whakapiki i te paemahana ki te tere o te tauhohenga?

I tō whakautu me kōrero koe mō ngā tukinga korakora me te whakamārama he aha i mutu ai ngā rārangi e rua i te pūwāhi kotahi.

MĀ TE KAIMĀKA ANAKE

(d) Tuhia tētahi whārite ā-kupu ME tētahi whārite tohu taurite mō te tauhohenga i waenga i te konutai pākawa waro-rua ($NaHCO_3$) me te waikawa pungatara (H_2SO_4).

Whārite kupu:

Whārite tohu taurite:

ASSESSOR'S USE ONLY

Refer to the graph on the previous page to answer the following question:

What is the effect of increasing temperature on the rate of reaction?

Your answer should refer to particle collisions and explain why both lines finish at the same point.

(d) Write a word equation AND a balanced symbol equation for the reaction between sodium hydrogen carbonate ($NaHCO_3$) and sulfuric acid (H_2SO_4).

Word equation:

Balanced symbol equation:

TŪMAHI TUARUA

MĀ TE KAIMĀKA ANAKE

He konganuku tino tauhohe te konutai me te konurehu ka tauhohe ki te haurehu hāora. Engari, kāore te konutai me te konurehu i tauhohe tētahi ki tētahi.

(a) He aha i tauhohe ai te konutai me te konurehu ki te hāora, engari kaua tētahi ki tētahi.

I tō tuhinga me:

- kōrero mō ngā whakanahatanga irahiko o ngā ngota e toru me ngā katote e toru kei roto
- whakamārama mai te hāngaitanga o te whakanahatanga irahiko o tēnā, o tēnā o ngā ngota e toru ki te tūnga kei te taka pūmotu
- whakamārama mai he pēhea te puta o te hononga katote ina tauhohe te konutai, te konurehu rānei ki te hāora.

QUESTION TWO

ASSESSOR'S USE ONLY

Sodium and potassium are both highly reactive metals that react with oxygen gas. However, sodium and potassium do not react with each other.

(a) Why do sodium and potassium each react with oxygen, but not with each other?

In your answer you should:

- refer to the electron arrangements of each of the three atoms and three ions involved
- explain how the electron arrangement of each of the three atoms relates to its position in the periodic table
- explain how an ionic bond forms when sodium or potassium reacts with oxygen.

(b) Ko ngā mehanga kanokore tapakore e toru ko te:

- waikawa hauota (HNO_3)
- konutai pūhaumāota (NaCl)
- konutai pākawa waro-rua ($NaHCO_3$).

Me pēhea te tautohu i ēnei mehanga tapakore katoa mā te whakamahi anake i te mehanga **konurehu pākawa waro (K_2CO_3)** me te **pepa tohu waikawa whero**?

I tō tuhinga me:

- whakaoti te tūtohi
- whakamārama he pēhea tō tautohu i ia mehanga mā ngā kitenga
- whakauru te (ngā) whārite tohu taurite mō ngā tauhohenga.

Mehanga tapakore	**Kitenga (mēnā i puta) me te pepa tohu waikawa whero**	**Kitenga (mēnā i puta) me te konurehu pākawa waro (K_2CO_3)**
Waikawa hauota (HNO_3)		
Konutai pūhaumāota (NaCl)		
Konutai pākawa waro-rua ($NaHCO_3$)		

Whārite tohu taurite:

MĀ TE KAIMĀKA ANAKE

ASSESSOR'S USE ONLY

(b) Three unlabelled colourless solutions are known to be:

- nitric acid (HNO_3)
- sodium chloride (NaCl)
- sodium hydrogen carbonate ($NaHCO_3$).

How could each of these unlabelled solutions be identified using only **potassium carbonate (K_2CO_3)** solution, and **red litmus paper**?

In your answer you should:

- complete the table
- explain how the observations allow you to identify each solution
- include balanced symbol equation(s) for any reactions.

Unlabelled solution	**Observation (if any) with red litmus paper**	**Observation (if any) with potassium carbonate (K_2CO_3)**
Nitric acid (HNO_3)		
Sodium chloride (NaCl)		
Sodium hydrogen carbonate ($NaHCO_3$)		

Balanced symbol equation(s):

TŪMAHI TUATORU

MĀ TE KAIMĀKA ANAKE

(a) (i) Whakamārama mai he aha te take he 2:1 te ōwehenga o te hiriwa ōkai, Ag_2O.

I tō tuhinga me:

- whakahāngai te ōwehenga o ngā katote ki te maha o ngā irahiko ka ngaro, ka whiwhi rānei i ia ngota ina whakaputa katote ana
- whakamārama he pēhea te hāngai o te ōwehenga o ngā katote kei roto i te pūhui ki te whana o ngā katote.

(ii) He pāpāhua te hiriwa ōkai, ā, ka tauhohe ki te waikawa pūhaumāota.

Tuhia tētahi whārite kupu ME tētahi whārite tohu taurite mō te tauhohenga i waenga i te hiriwa ōkai me te waikawa pūhaumāota.

Whārite kupu:

Whārite tohu taurite:

QUESTION THREE

ASSESSOR'S USE ONLY

(a) (i) Explain why silver oxide, Ag_2O, has a 2:1 ratio of ions.

In your answer you should:

- relate the ratio of ions to the number of electrons lost or gained by each atom when forming ions
- explain how the ratio of the ions in the compound is related to the charge on the ions.

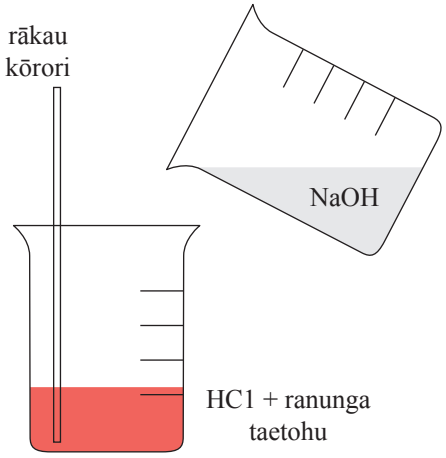
(ii) Silver oxide is a base and will react with hydrochloric acid.

Write a word equation AND a balanced symbol equation for the reaction between silver oxide and hydrochloric acid.

Word equation:

Balanced symbol equation:

(b) Ka āta kōrorihia he mehanga konutai waihā (NaOH) ki tētahi ipurau o te waikawa pūhaumāota (HCl) me te ranunga taetohu i tāpirihia. He **whero** te HCI me te mehanga ranunga taetohu **i te tīmatanga**.



Whakamāramahia mai ngā huringa o te tae o te ranunga taetohu ina āta tāpirihia te mehanga konutai waihā, ā, kia mutu rā anō te huri o te tae.

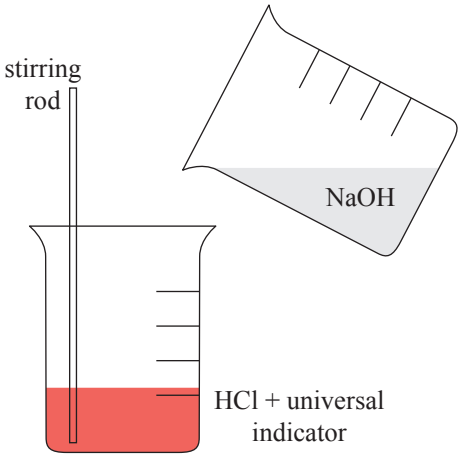
I tō tuhinga, me:

- whakahāngai i ngā huringa ki te tae o te ranunga taetohu ki te pH āwhiwhi o te mehanga
- hono i te pH ki ngā kukūtanga o ngā katote hauwai me ngā katote waihā i roto i te mehanga
- whakamārama mai te tauhohenga whakangū e puta ana.

MĀ TE KAIMĀKA ANAKE

(b) A solution of sodium hydroxide (NaOH) is slowly stirred into a beaker of hydrochloric acid (HCl) with universal indicator added. The HCl and universal indicator solution **starts out red**.

ASSESSOR'S USE ONLY



Explain the changes in the colour of the universal indicator as the sodium hydroxide solution is slowly added until no further colour changes occur.

In your answer, you should:

- relate the changes in the colour of the universal indicator to the approximate pH of the solution
- link the pH to the relative concentrations of hydrogen ions and hydroxide ions in solution
- explain the neutralisation reaction occurring.

He whārangi anō ki te hiahiatia.
Tuhia te (ngā) tau tūmahi mēnā e tika ana.

TAU TŪMAHI

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, 2017

90944 Demonstrate understanding of aspects of acids and bases

9.30 a.m. Wednesday 15 November 2017
Credits: Four

90944M

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.

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 90944MR from the centre of this booklet.

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

Check that this booklet has pages 2–15 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.