NZQA

NEW ZEALAND QUALIFICATIONS AUTHORITY
MANA TOHU MĀTAURANGA O AOTEAROA

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

Pūtaiao, Kaupae 1, 2016

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

9.30 i te ata Rāhina 14 Whiringa-ā-rangi 2016
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 te 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.

ME HOATU RAWA KOE I TĒNEI PUKAPUKA KI TE KAIWHAKAHAERE Ā TE MUTUNGA O TE WHAKAMĀTAUTAU.

TAPEKE

MĀ TE KAIMĀKA ANAKE

TŪMAHI TUATAHI

(a) Whakaotihia te papatau o raro:

Pūmotu	Te Tau Iraoho	Whakanahatanga irahiko o te ngota	Whakanahatanga irahiko o te katote
F	9		
S	16		
Ca	20		

(b) Tuhia ngā tikanga tātai mō ēnei pūhui katote.

Tirohia te ripanga katote kei te pukapuka rauemi hei āwhina i a koe.

(i) Hiriwa pūkōwhai _____

(ii) Konurehu pākawa pungatara _____

(iii) Konupūmā pākawa ota _____

(c) Ka ngingiha te konutai i roto i te haurehu hāora, O_2, kia puta ai te konutai ōkai, Na_2O.

(i) Whakamāramahia mai he pēhea te mahi a ngā ngota Na me O e whakaputa ai i ngā katote Na^+ me te O^{2-}, e ai ki ō rāua rōpū i te taka pūmotu, te whakanaha irahiko, ME te maha o ngā iraoho.

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(ii) Parahautia te ōwehenga o ngā katote Na^+ me O^{2-} i roto i te tātai Na_2O, e ai ki ngā **irahiko** i ngaro, i riro mai rānei, me te **whana** kei ia katote.

Whakaurua mai he whakamāramatanga mō te **momo honohono** i waenga i ngā katote Na^+ me te O^{2-}.

(d) Tuhia tētahi whārite kupu ME tētahi whārite tohu taurite mō te tauhohenga i waenga i te **konutai waihā** me te **waikawa pungatara**.

Whārite kupu:

Whārite tohu taurite:

QUESTION ONE

(a)   Complete the table below.

Element	Atomic number	Electron arrangement of atom	Electron arrangement of ion
F	9		
S	16		
Ca	20		

(b)   Write the formulae for the following ionic compounds.

Use the table of ions in your resource booklet to help you.

(i)   Silver fluoride _____

(ii)   Potassium sulfate _____

(iii)   Calcium nitrate _____

(c)   Sodium burns in oxygen gas, O_2, to form sodium oxide, Na_2O.

(i)   Explain how the Na and O atoms form Na^+ and O^{2-} ions, in terms of their groups in the periodic table, electron arrangement, AND number of protons.

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(ii) Justify the ratio of Na^+ and O^{2-} ions in the formula Na_2O, in terms of the **electrons** lost or gained, and the **charge** on each ion.

Include an explanation of the **type of bonding** between the Na^+ and O^{2-} ions.

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

Word equation:

Balanced symbol equation:

TŪMAHI TUARUA

Ka raua atu he tīpako konupūmā pākawa waro ki te waikawa pūhaumāota waimeha i tētahi puoto koeko tuwhera. Ka inea haerehia te papatipu tapeke o te puoto me ngā mea i roto i roto i te wā.

E toru ngā whakamātautau ka whakahaerehia i te 25°C mā te whakamahi i te papatipu ōrite o te konupūmā pākawa waro, me te rōrahi waikawa ōrite:

	Ngā mokamoka konupūmā pākawa waro	pH o te waikawa
Whakamātau 1	Ngā kongakonga	1
Whakamātau 2	Puehu	1
Whakamātau 3	Puehu	5
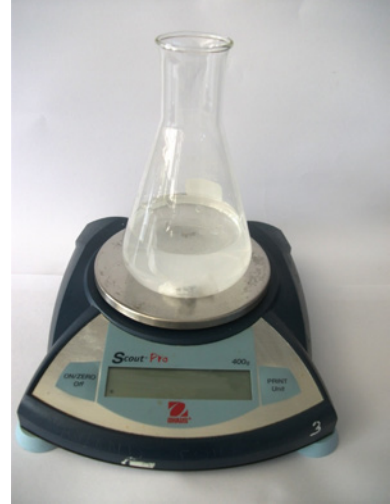
(a) Mō ia whakamātautau e tauhohe ana i te konupūmā pākawa waro ki te waikawa waimeha, ka heke haere te papatipu o te puoto me ngā mea i roto i roto i te wā.

Whakamāramahia mai he aha i pēnei ai.

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(b) (i) Tautohua te āhuatanga e whai pānga ana ki te pāpātanga tauhohe e tūhurahia ana i **Ngā Whakamātau 1 me 2**.

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(ii) Whakamāramahia he pēhea te pānga o tēnei āhuatanga ki te pāpātanga tauhohe i roto i ngā puoto e rua, me te kōrero anō mō ngā tukituki korakora.

Whakamāramahia mai ngā kitenga, tae atu ki ngā huringa ki te papatipu, i te roanga o **Ngā Whakamātau 1 me 2** kia mutu rā anō ngā tauhohe.

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(c) Whakatauritea te pāpātanga tauhohe o **Ngā Whakamātau 2 me 3**, me te kōrero anō mō ngā tukituki korakora me te kukūtanga o ngā katote hauwai i roto i te mehanga.

QUESTION TWO

A sample of calcium carbonate is added to dilute hydrochloric acid in an open conical flask. The total mass of the flask and contents is measured over time.

Three experiments are carried out at 25°C using the same mass of calcium carbonate, and the same volume of acid:

	Calcium carbonate pieces	pH of acid
Experiment 1	Chips	1
Experiment 2	Powdered	1
Experiment 3	Powdered	5
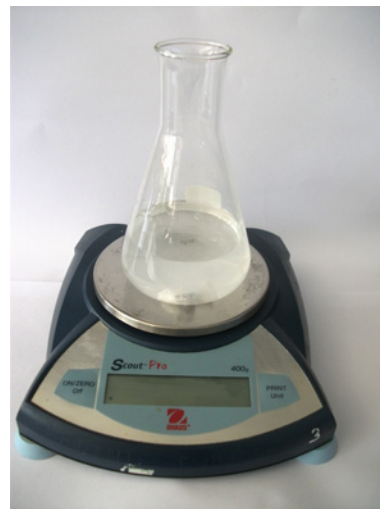
(a) For each of the experiments reacting calcium carbonate and dilute acid together, the mass of the flask and its contents decreases over time.

Describe why this happens.

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(b) (i) Identify the factor affecting the reaction rate being investigated in **Experiments 1 and 2**.

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(ii) Explain how this factor affects the rate of reaction in the two flasks, with reference to particle collisions.

Explain any observations, including changes in mass, over the course of **Experiments 1 and 2** until the reactions are finished.

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(c)   Compare and contrast the rate of reaction of **Experiments 2 and 3**, with reference to particle collisions and the concentration of hydrogen ions in the solution.

TŪMAHI TUATORU

I tāpirihia e tētahi ākonga he ranunga taetohu ki ngā mehanga i roto i ngā ipurau e rua e ai ki te pikitia i raro.

(kikorangi)   (waiporoporo)
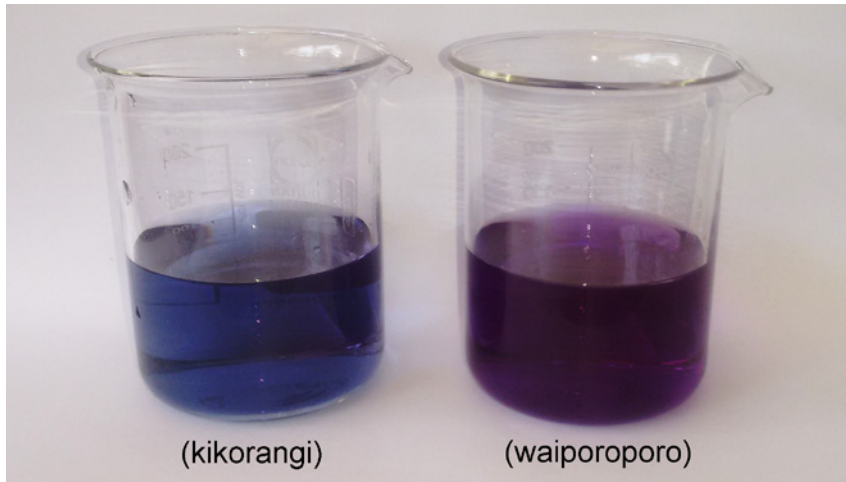
Ipurau 1   Ipurau 2
Konurehu pākawa waro   Konurehu waihā

(a) Whakamāramahia he aha i rerekē ai ngā tae o ngā mehanga.

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Kātahi ka tāpirihia atu e te ākonga he waikawa pūhaumāota ki ia ipurau kia mutu rā anō te huri o ngā tae.

(b) Tuhia tētahi whārite kupu ME tētahi whārite tohu taurite mō te tauhohenga i waenga i te **waikawa pūhaumāota** me te **konurehu pākawa waro** i roto i te Ipurau 1.

Whārite kupu:

Whārite tohu taurite:

QUESTION THREE

A student added universal indicator to the solutions in two beakers as shown below.

(blue)   (purple)

Beaker 1   Beaker 2
Potassium carbonate   Potassium hydroxide
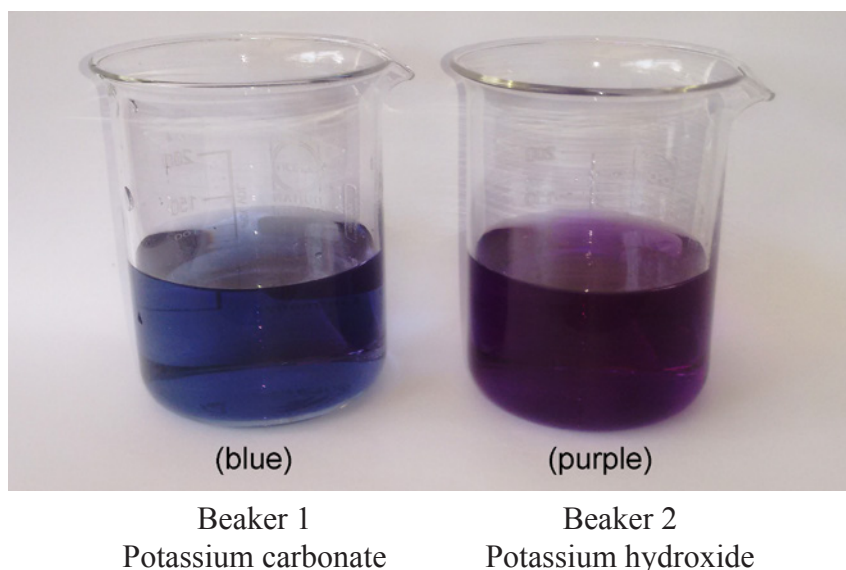
(a)   Explain why the solutions are different colours.

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The student then adds hydrochloric acid to each of the beakers until there are no more changes in colour.

(b)   Write a word equation AND a balanced symbol equation for the reaction between **hydrochloric acid** and **potassium carbonate** in Beaker 1.

Word equation:

Balanced symbol equation:

(c) Whakamāramahia mai ka aha te taetohu i te **Ipurau 2 (konurehu waihā)** i te wā e tāpirihia ana te waikawa pūhaumāota.

Me whakahāngai tēnei ki te huringa o te pH, ki ngā katote kei roto i te ipurau, me te momo tauhohenga kei te pā mai.

(c) Explain what will happen to the indicator colour in **Beaker 2 (potassium hydroxide)** as the hydrochloric acid is added.

Relate this to the changing pH, the ions present in the beaker, and the type of reaction occurring.

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

QUESTION
NUMBER

Level 1 Science, 2016

90944 Demonstrate understanding of aspects of acids and bases

9.30 a.m. Monday 14 November 2016
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.

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.