

See back cover for an English  
translation of this cover

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90944M



909445



NEW ZEALAND QUALIFICATIONS AUTHORITY  
MANA TOHU MĀTAURANGA O AOTEAROA

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

SUPERVISOR'S USE ONLY

Tohua tēnei pouaka mēnā  
KĀORE koe i tuhituhi i  
roto i tēnei pukapuka

## Pūtaiao, Kaupae 1, 2021

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

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

**Me whakamātau koe i ngā tūmahi KATOĀ kei roto i tēnei pukapuka.**

Tangohia te Pukapuka Rauemi 90944MMR mai i te puku o tēnei pukapuka.

Ki te hiahia koe ki ētahi atu wāhi hei tuhituhi whakautu, whakamahia te wāhi wātea kei muri i te pukapuka nei.

Tirohia mehemea kei roto nei ngā whārangi 2–17 e raupapa tika ana, ā, kāore hoki he whārangi wātea.

Kaua e tuhi ki roto i tētahi wāhi kauruku whakahāngai (✗/✗). Ka tapahia pea tēnei wāhi ina mākahia te pukapuka.

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

He konganuku te konukōhatu me te konumohe. He konu-kore<sup>1</sup> te hāora.

- Konukōhatu: \_\_\_\_\_

Konumohe: \_\_\_\_\_

Hāora: \_\_\_\_\_

- Tuhia te noho mai o ngā irahiko o ngā katote e rua.

Katote konumohe,  $\text{Al}^{3+}$ :

Katote ōkai, O<sup>2-</sup>:

- I tō tuhinga me:

- whakamārama he aha i puta ai ngā katote i ēnei pūmotu
- whakamārama ngā whana kei ngā katote e rua e ai ki te noho mai o ngā irahiko o ngā ngota me ngā katote, te maha o ngā iraho me te maha o ngā irahiko, me te whana.

Pūtaiao 90944M, 2021

Lithium and aluminium are metals. Oxygen is a non-metal.

- Lithium: \_\_\_\_\_

Aluminium: \_\_\_\_\_

Oxygen: \_\_\_\_\_

- Write the electron arrangement of the two ions.

Aluminium ion,  $\text{Al}^{3+}$ : \_\_\_\_\_

Oxide ion,  $O^{2-}$ : \_\_\_\_\_

- In your answer you should:

- explain why these elements form ions
- explain the charges on both ions in terms of electron arrangement of atoms and ions, number of protons and number of electrons, and charge.

- (c) Ka tangohia e te wheketere o Tiwai Point, e pātata ana ki Waihopai, te konumohe mai i tana tokahuke, arā, te toka konumohe.

Kei roto i te toka konumohe ko te konumohe ōkai,  $\text{Al}_2\text{O}_3$ .

Whakamāramahia mai te ōwehenga o ngā katote konumohe ki ngā katote ōkai i roto i te  $\text{Al}_2\text{O}_3$ .

I tō tuinga me whakamārama e koe:

- he pēhea te pānga o te ōwehenga ki te whana kei ngā katote
- te maha o ngā irahiko i riro mai, i ngaro rānei mai i ia ngota i te hanganga o te pūhui katote.

[www.nzherald.co.nz/the-country/news/covid-19-coronavirus-tiwai-point-reduces-production-in-response-to-virus/E3PCHSVWFOLHFMZW2TM6U4NRH4/](https://www.nzherald.co.nz/the-country/news/covid-19-coronavirus-tiwai-point-reduces-production-in-response-to-virus/E3PCHSVWFOLHFMZW2TM6U4NRH4/)

www.nzherald.co.nz/the-country/news/covid-19-coronavirus-tiwai-point-reduces-production-in-response-to-virus/  
E3PCHSVWFOLHFMZW2TM6U4NRH4/

In your answer you should explain:

- how the ratio is related to the charge on the ions
- the number of electrons gained or lost by each atom as it forms the ionic compound.

www.nzherald.co.nz/the-country/news/covid-19-coronavirus-tiwai-point-reduces-production-in-response-to-virus/  
E3PCHSVWFOLHFMZW2TM6U4NRH4/

## TŪMAHI TUARUA

Pā mai ai pea te kunāwhea<sup>2</sup> nā te waikawa pūhaumāota, HCl, i roto i te puku. Ka taea te whakamaimoa mā ngā pire kunāwhea i hangaia mai i te konupora pākawa waro, MgCO<sub>3</sub>.

- (a) Tuhia ngā whārite mō te tauhohenga o te konupora pākawa waro me te waikawa pūhaumāota.

Whārite kupu:

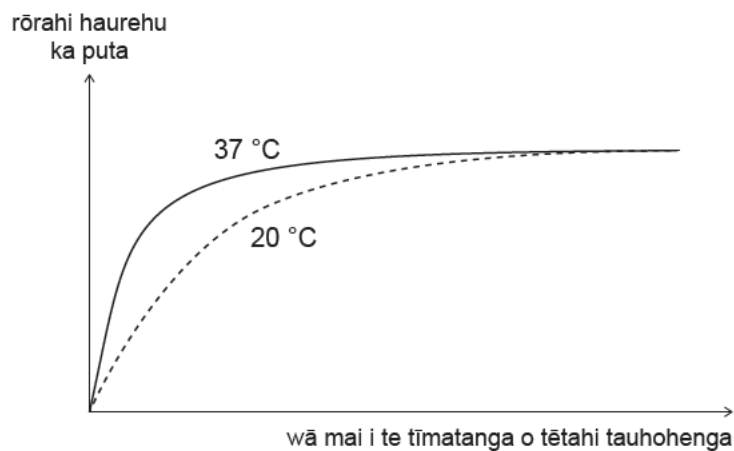
Whārite tohu:

- (b) I tūhuratia e te ākonga te tauhohenga i waenga i ngā pire konupora pākawa waro me te waikawa pūhaumāota.

I raua e ia tētahi pire kunāwhea kotahi ki tētahi puoto he 100 mL o te waikawa pūhaumāota i te 20 °C.

I tuarua e ia te whakamātautau, engari i tēnei wā i whakamahanatia te waikawa pūhaumāota ki te 37 °C.

I kohia e ia te haurehu i puta, me te tuhi i ana kitenga ki tētahi kauwhata.



- (i) Tuhia ko tēhea te pāmahana he tere ake te pāpātanga tauhohe.

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- (ii) Kōrerotia mō ngā tukinga korakora hei whakamārama i te pānga o te whakapiki i te pāmahana o te waikawa pūhaumāota mai i te 20 °C ki te 37 °C ki te pāpātanga tauhohe.

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<sup>2</sup> tokopaha

- (c) E ai ki ngā tohutohu mō te kai i ngā pire kunāwhea ka taea te horomi katoa, te ngaungau rānei kia maramara ai.

Whakamāramahia mai te take ka tere ake te mahi a ngā pire ina ngaungauhia, ka kōrero mō ngā huringa ki te pāpātanga tauhohe me te tukinga korakora.



<https://upload.wikimedia.org/wikipedia/commons/thumb/5/57/Antacid-L478.jpg/1200px-Antacid-L478.jpg>

**QUESTION TWO**

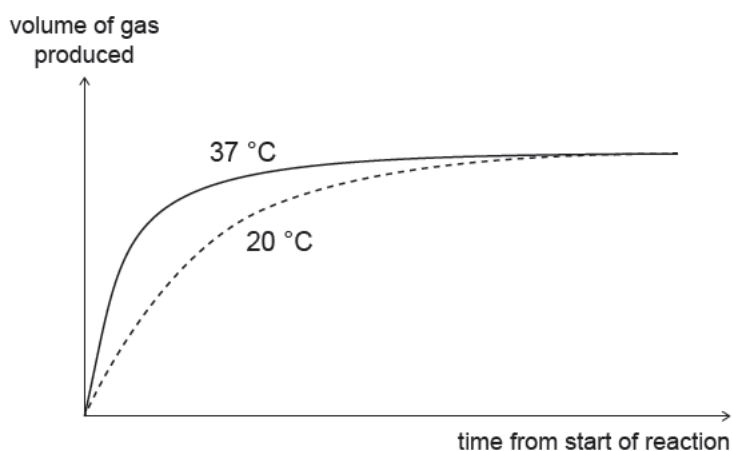
Indigestion can be caused by excess hydrochloric acid,  $\text{HCl}$ , in the stomach. It can be treated with indigestion tablets made of magnesium carbonate,  $\text{MgCO}_3$ .

- (a) Write the equations for the reaction of magnesium carbonate and hydrochloric acid.

Word equation:

Symbol equation:

- (b) A student investigated the reaction between magnesium carbonate tablets and hydrochloric acid. They placed one indigestion tablet into a flask containing 100 mL of hydrochloric acid at 20 °C. They repeated the experiment, but this time warmed the hydrochloric acid to 37 °C. They collected the gas produced, and recorded their findings on a graph.



- (i) State which temperature had the faster rate of reaction.
- \_\_\_\_\_
- (ii) Refer to particle collisions to explain the effect of increasing the temperature of the hydrochloric acid from 20 °C to 37 °C on the rate of reaction.
- \_\_\_\_\_
- \_\_\_\_\_
- \_\_\_\_\_
- \_\_\_\_\_



- Explain why the tablets work quicker when they are chewed, referring to the changes to the rate of reaction and particle collisions.

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<https://upload.wikimedia.org/wikipedia/commons/thumb/5/57/Antacid-L478.jpg/1200px-Antacid-L478.jpg>

## TŪMAHI TUATORU

Ka taea te hopi, pH 8, me te matū horoi umu, pH 12, te hanga mai i ngā pāpāhua<sup>3</sup>.

- (a) (i) Whakaotihia te tūtohi hei whakaatu i ngā kitenga ina whakaranua ēnei matū ki te tohu waikawa whero me te ranunga taetohu.

Te matū	pH	Kitenga me te tohu waikawa whero	Kitenga me te ranunga taetohu
Hopi	8		
Matū horoi umu	12		

Kua ngaro ngā tapanga mō tētahi pātara hopi me tētahi pātara matū horoi umu.

- (ii) Ko tēhea te taetohu ka whakamahia e koe kia haumarū ai te kimi he aha ngā matū kei roto i ngā pātara e rua?

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- (iii) Whakamāramahia mai te take i kōwhiri koe ki te whakamahi i tēnei taetohu, ā, kaua tētahi atu taetohu.

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<sup>3</sup> kawakore

### QUESTION THREE

Soap, pH 8, and oven cleaner, pH 12, can both be made from bases.

- (a) (i) Complete the table to show the observations when these substances are mixed with red litmus and universal indicator.

Substance	pH	Observation with red litmus	Observation with universal indicator
Soap	8		
Oven cleaner	12		

The labels for a bottle of soap and a bottle of oven cleaner have been lost.

- (ii) Which indicator would you use to safely find out the contents of the two bottles?

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- (iii) Explain why you have chosen to use this indicator and not the other indicator.

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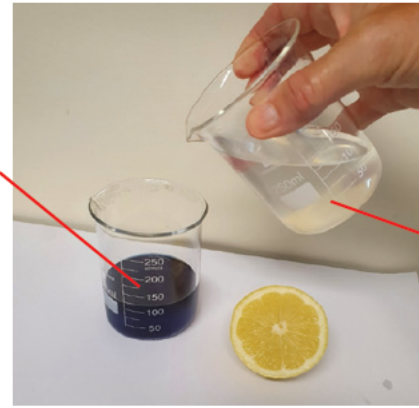
- (b) He waikawa te wai rēmana me te pH 4. I roto i tētahi taiwhanga pūtaiao, ka tāpiripirihia e tētahi ākonga he wai rēmana ki te ipurau he matū horoi umu me te ranunga taetohu kei roto, kia kore rā anō e kitea he huringa anō.

Me whakamārama mai ka ahatia te tae o te mehanga ina tāpirihia ana te wai rēmana ki te matū horoi umu.

I tō tuhinga me:

- hono 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 i te momo tauhohenga kei te puta.

Ka tāpirihia te matū horoi umu me te ranunga taetohu



Wai rēmana

Kei te whārangi 14  
ka haere tonu te  
Tūmahi Tuatoru.

- (b) Lemon juice is an acid with pH 4. In a science lab, a student adds lemon juice to a beaker containing oven cleaner and universal indicator until no further changes are seen.

Explain what will happen to the colour of the solution while the lemon juice is added to the oven cleaner.

In your answer you should:

- link the changes in colour of the universal indicator to the approximate pH of the solution
- link the pH to the concentration of hydrogen ions and the hydroxide ions in the solution
- explain the type of reaction occurring.

Oven cleaner and universal indicator are added



Lemon juice

Question Three  
continues on page 15.

- (c) Whakamārama mai he aha te take tē taea e te matū horoi umu me te hopi te whakangū tētahi i tētahi.

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- (c) Explain why oven cleaner and soap cannot neutralise each other.

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

TAU TŪMAHI



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

QUESTION  
NUMBER





*English translation of the wording on the front cover*

## Level 1 Science 2021

### 90944 Demonstrate understanding of aspects of acids and bases

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 90944R 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.

Check that this booklet has pages 2–17 in the correct order and that none of these pages is blank.

Do not write in any cross-hatched area (XXXX). This area may be cut off when the booklet is marked.

**YOU MUST HAND THIS BOOKLET TO THE SUPERVISOR AT THE END OF THE EXAMINATION.**

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