91165M

911655

2

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!

Te Mātauranga Matū, Kaupae 2, 2016

91165M Te whakaatu māramatanga ki ngā āhuatanga o ētahi pūhui whaiwaro

9.30 i te ata Rāhina 21 Whiringa-ā-rangi 2016
Whiwhinga: Whā

Paetae	Kaiaka	Kairangi
Te whakaatu māramatanga ki ngā āhuatanga o ētahi pūhui whaiwaro.	Te whakaatu māramatanga hōhonu ki ngā āhuatanga o ētahi pūhui whaiwaro.	Te whakaatu māramatanga matawhānui ki ngā āhuatanga o ētahi pūhui whaiwaro.

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.

He taka pūmotu kua whakaritea ki te Puka Rauemi L3-CHEMMR.

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 2–23 kei roto i tēnei pukapuka, ā, 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.

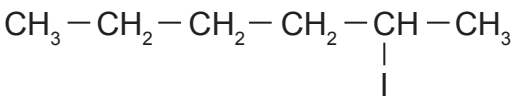
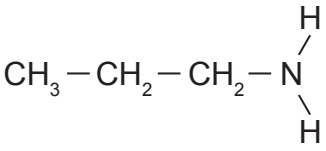
TAPEKE

MĀ TE KAIMĀKA ANAKE

TŪMAHI TUATAHI

MĀ TE KAIMĀKA ANAKE

(a) (i) Whakaotihia te tūtohi e whai ake nei.

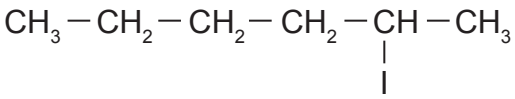
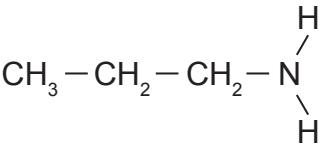
Ture tātai hanganga	Ingoa (nahanaha) IUPAC
	
	waikawa pēwaro 3-mewaro
	waiwaro toru-1-pōwaro
	

(ii) Tātuhia me te whakaingoa i ngā poinanaha hanganga e TORU o te pūhui whaiwaro C_5H_{12}.

QUESTION ONE

ASSESSOR'S USE ONLY

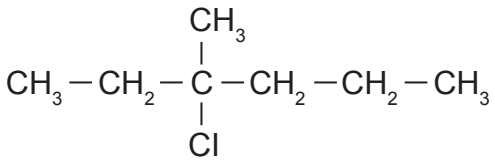
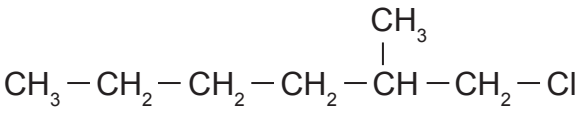
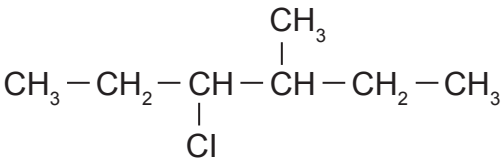
(a) (i) Complete the following table.

Structural formula	IUPAC (systematic) name
	
	3-methylpentanoic acid
	but-1-yne
	

(ii) Draw and name the THREE constitutional (structural) isomers of the organic compound C_5H_{12}.

(b) (i) Whakarōpūhia ngā waiwaro tahi whāpāhare (haloalkane) e whai nei hei mea tuatahi, tuarua, tuatoru rānei.

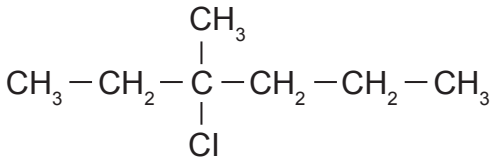
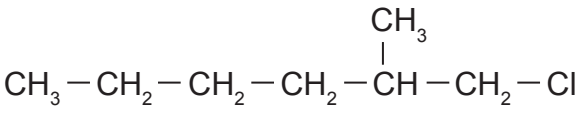
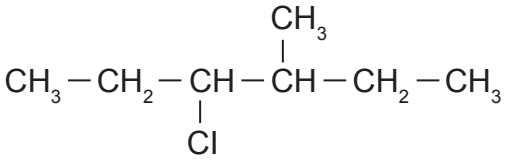
MĀ TE KAIMĀKA ANAKE

	Waiwaro tahi whāpāhare	Whakarōpūtanga
A		
B		
C		

(ii) Whakamāramahia tō kōwhiri mō te waiwaro tahi whāpāhare **A**.

(b) (i) Classify the following haloalkanes as primary, secondary or tertiary.

ASSESSOR'S USE ONLY

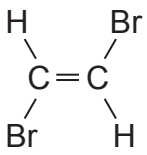
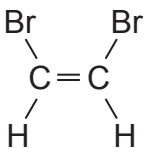
	Haloalkane	Classification
A		
B		
C		

(ii) Explain your choice for haloalkane **A**.

(c) Ka tāea e ētahi waiwaro rua te waihanga poinanaha (āhuahanga) *cis* me te *trans*.

MĀ TE KAIMĀKA ANAKE

(i) Whakaotia ngā ingoa o ngā hanganga **A** me te **B** i te tūtohi i raro.

A	**B**
	
_____ 1,2-pūkanerua waiwaro rua ewaro	_____ 1,2-pūkanerua waiwaro rua ewaro

(ii) Āta whakamāramahia te hanganga o te 1,2-pūkanerua waiwaro rua ewaro hei whakamārama he aha i tāea ai e ia te waihanga ngā poinanaha (āhuahanga) *cis* me te *trans*.

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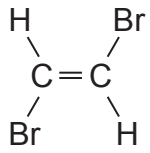
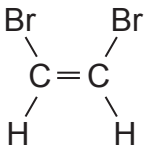
(c) Some alkenes are able to form *cis* and *trans* (geometric) isomers.

(i) Complete the names of structures **A** and **B** in the table below.

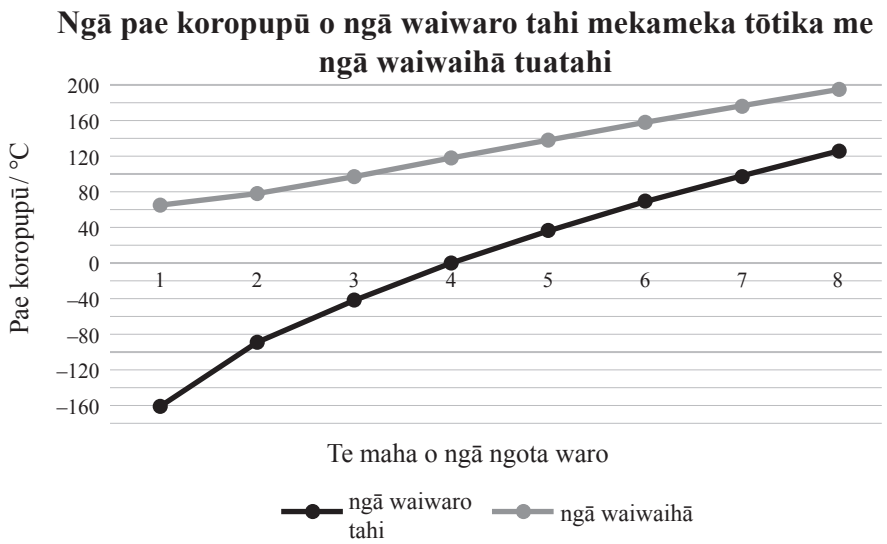
A	**B**
	
_____ 1,2-dibromoethene	_____ 1,2-dibromoethene

(ii) Elaborate on the structure of the organic compound 1,2-dibromoethene to explain why it is able to form *cis* and *trans* (geometric) isomers.

TŪMAHI TUARUA

MĀ TE KAIMĀKA ANAKE

(a)



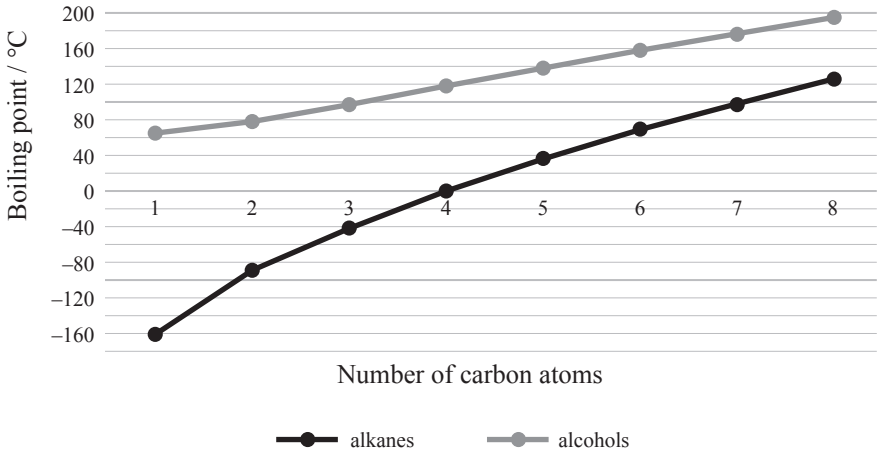
(i) Tautuhia ngā ia e whakaaturia ana i te kauwhata i runga.

(ii) Tautuhia ko ēhea ngā waiwaro tahi he haurehu i te pāmahana rūma (20°C) e ai ki te kauwhata i runga.

QUESTION TWO

ASSESSOR'S USE ONLY

(a) **Boiling points of straight chain alkanes and primary alcohols**



(i) Identify the trends shown on the graph above.

(ii) Identify which alkanes will be gases at room temperature (20°C) according to the graph above.

(b) E whakaahuahia ana ngā mehanga amine hei pāpāhua[1], ā, e whakaahuahia ana ngā mehanga waikawa waro-waihā hei waikawa.

MĀ TE KAIMĀKA ANAKE

(i) Whakaotia te whārite taurite mō te tauhohenga o ngā mehanga o te amine ewaro, $CH_3CH_2NH_2(aq)$ me te waikawa pūhaumāota, $HCl(aq)$.

$CH_3CH_2NH_2(aq) + HCl(aq) \rightarrow$ [ ]

(ii) Whakamāramahia te tauākī ‘he āhuatanga waikawa ō ngā waikawa waro-waihā’.

I tō tuhinga me kōrero koe mō te tauhohenga i waenga i te waikawa ewaro, $CH_3COOH(aq)$, me te wai, $H_2O(\ell)$.

[1] kawakore

ASSESSOR'S USE ONLY

(b) Solutions of amines are described as bases, and solutions of carboxylic acids are described as acids.

(i) Complete the balanced equation for the reaction between solutions of ethanamine, $CH_3CH_2NH_2(aq)$ and hydrochloric acid, $HCl(aq)$.

$$CH_3CH_2NH_2(aq) + HCl(aq) \rightarrow$$

(ii) Explain the statement 'carboxylic acids have acidic properties'.

Refer to the reaction between ethanoic acid, $CH_3COOH(aq)$, and water, $H_2O(\ell)$ in your answer.

(c) Ka tauhohe te haurehu ewaro, $C_2H_6(g)$, me te haurehu waiwaro rua ewaro, $C_2H_4(g)$, ki te wai pūkane, $Br_2(aq)$.

MĀ TE KAIMĀKA ANAKE

Whakatauritea ēnei tauhohenga e rua.

I tō tuhinga, me whakapuaki kōrero mō:

- ngā āhuatanga e hiahiatia ana
- ngā kitenga
- ngā momo tauhohenga ka puta
- ngā ture tātai hanganga o ngā hua waro kua puta.

(c) Ethane gas, $C_2H_6(g)$, and ethene gas, $C_2H_4(g)$, will both react with bromine water, $Br_2(aq)$.

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Compare and contrast these two reactions.

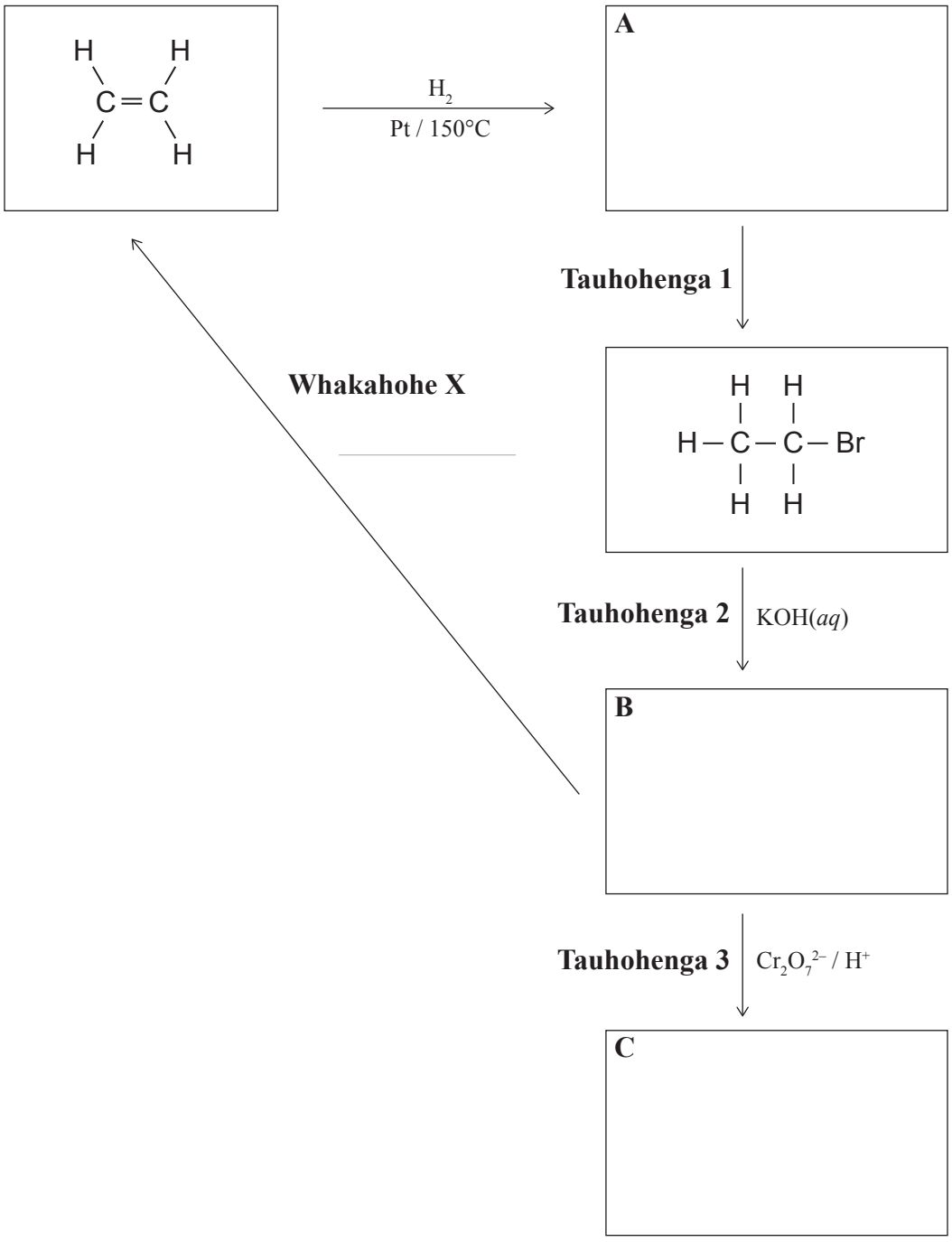
In your answer you should refer to:

- any conditions required
- the observations made
- the types of reactions occurring
- structural formulae of the organic products formed.

TŪMAHI TUATORU

MĀ TE KAIMĀKA ANAKE

(a) (i) Whakaotia te tūtohi e whai ake mā te tātuhi i ngā ture tātai hanganga o ngā pūhui whaiwaro **A**, **B** me te **C**, me te tautuhi i te whakahohe **X**.



(ii) Tautuhia te momo tauhohenga whaiwaro kei te puta i ngā Tauhohenga 1, 2 me te 3.

Tauhohenga 1 _____

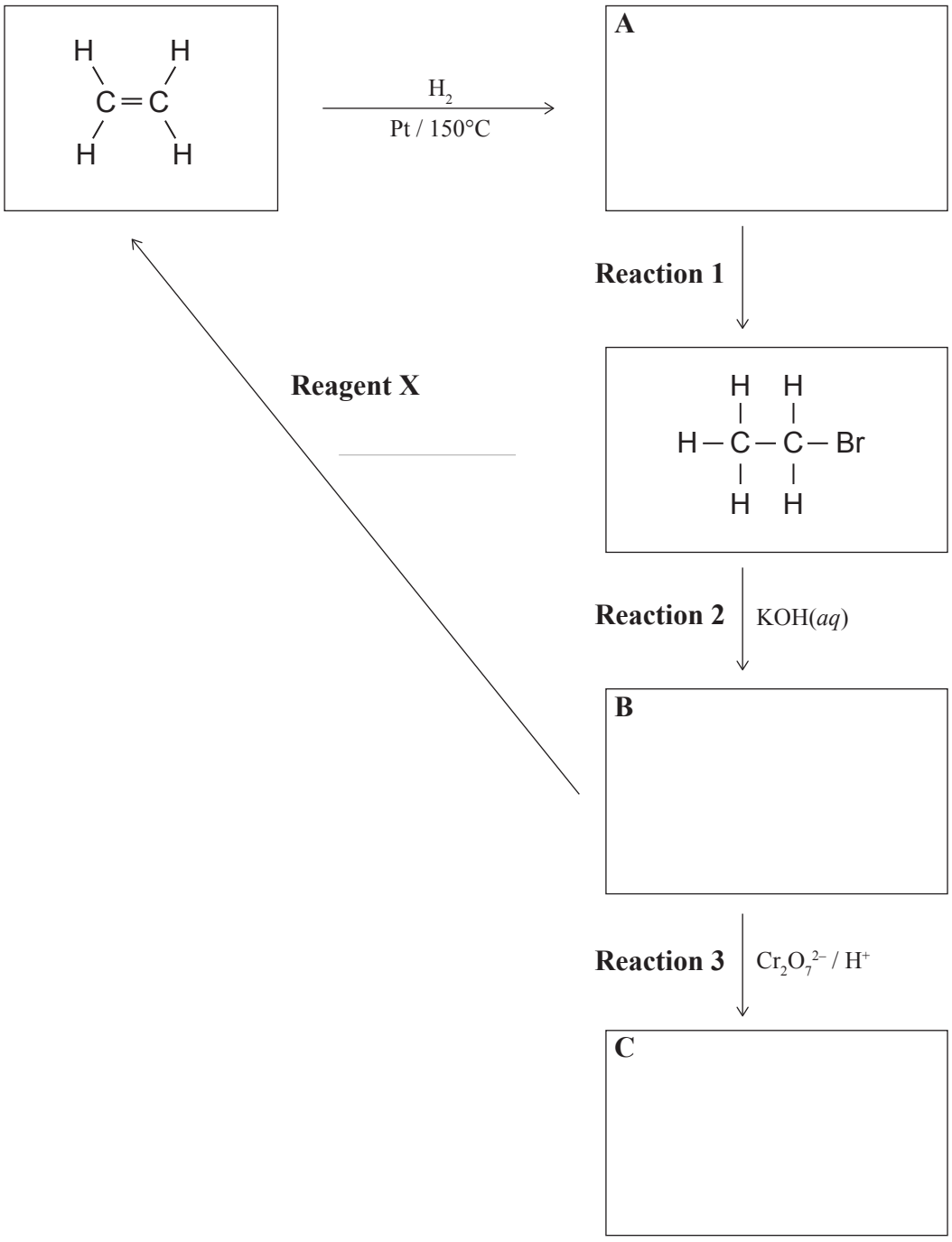
Tauhohenga 2 _____

Tauhohenga 3 _____

QUESTION THREE

ASSESSOR'S USE ONLY

(a) (i) Complete the following chart by drawing the structural formulae for the organic compounds **A**, **B**, and **C** and identifying reagent **X**.



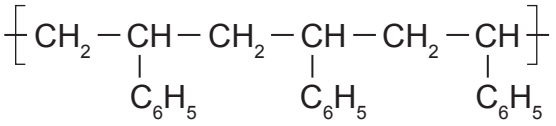
(ii) Identify the type of organic reaction occurring in each of Reactions 1, 2, and 3.

Reaction 1 _____

Reaction 2 _____

Reaction 3 _____

(b) He waerau te kirihou kōmāmā (polystyrene) me te hanganga:



(i) Tātuhia te waetahi ka whakamahia hei waihanga i te waerau kirihou kōmāmā.

(ii) Whakamāramahia te take e whakarōpūhia ana te hanganga o te kirihou kōmāmā mai i tana waetahi hei tauhohenga whakawaerautanga tāpiri.

MĀ TE KAIMĀKA ANAKE

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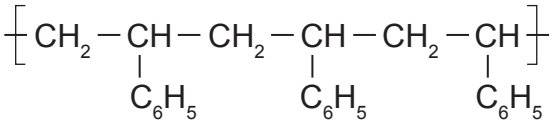
(b) Polystyrene is a polymer with the structure:



(i) Draw the monomer used to make the polymer polystyrene.

(ii) Explain why the formation of polystyrene from its monomer is classified as an addition polymerisation reaction.

(c) Ka puta i te tauhohenga i waenga i te waiwaro rua pōwaro, $C_3H_6(g)$, me te hauwai pūhaumāota, $HCl(g)$, he ranunga o ngā hua.

Ko tētahi o ēnei hua, te hua matua, he nui ake te ōwehenga ka waihangatia ki tētahi atu, arā, te hua iti.

$$CH_2=CH-CH_3 + HCl \rightarrow$$

(i) Tātuhia me te whakaingoa i ngā hua nui, hua iti hoki mō tēnei tauhohenga.

Hua Nui	**Hua Iti**
Ingoa:	**Ingoa:**

(ii) Āta whakamāramahia te tauhohenga ka puta i waenga i te waiwaro rua pōwaro me te hauwai pūhaumāota.

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(c) The reaction between propene, $C_3H_6(g)$, and hydrogen chloride, $HCl(g)$, produces a mixture of products.

One of these products, the major product, is made in higher proportions than the other, the minor product.

$$CH_2=CH-CH_3 + HCl \rightarrow$$

(i) Draw and name the major and minor products for this reaction.

Major Product	Minor Product
Name:	**Name:**

(ii) Elaborate on the reaction that occurs between propene and hydrogen chloride.

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.

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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 2 Chemistry, 2016

91165 Demonstrate understanding of the properties of selected organic compounds

9.30 a.m. Monday 21 November 2016
Credits: Four

91165M

Achievement	Achievement with Merit	Achievement with Excellence
Demonstrate understanding of the properties of selected organic compounds.	Demonstrate in-depth understanding of the properties of selected organic compounds.	Demonstrate comprehensive understanding of the properties of selected organic compounds.

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.

A periodic table is provided on the Resource Sheet L2–CHEMMR.

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 2–23 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.