See back cover for an English translation of this cover

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91165M

911655

SUPERVISOR'S USE ONLY

NEW ZEALAND QUALIFICATIONS AUTHORITY
MANA TOHU MĀTAURANGA O AOTEAROA

Te Mātauranga Matū, Kaupae 2, 2014

91165M Te whakaatu māramatanga ki ngā āhuatanga o ētahi matūwaro

2.00 i te ahiahi Rātū 11 Whiringa-ā-rangi 2014
Whiwhinga: Whā

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

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

Whakautua e koe ngā pātai KATOA kei roto i te pukapuka nei.

He taka pūmotu kua whakaritea ki te Pukaiti Rauemi L2-CHEMMR.

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 2–21 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

PĀTAI TUATAHI

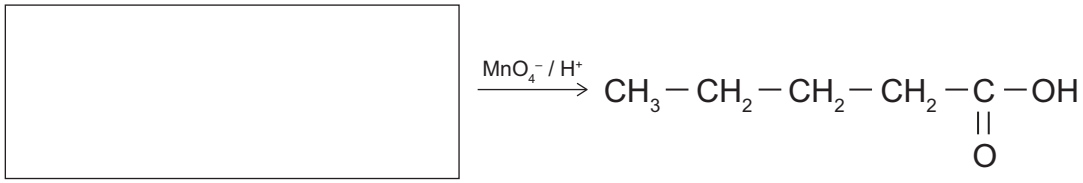
MĀ TE KAIMĀKA ANAKE

(a) Ki ngā pouaka i raro, tātuhia tētahi waiwaihā[1] tuatahi, tuarua, tuatoru hoki mō te rāpoi ngota $C_5H_{11}OH$.

Tuatahi | Tuarua | Tuatoru

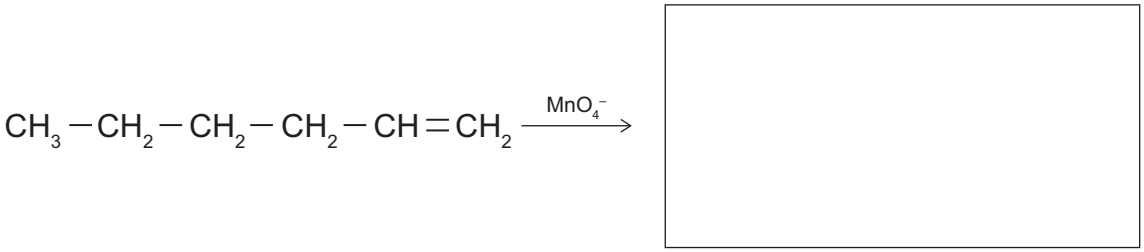
(b) (i) Ina ōhikitia ngā waiwaihā tuatahi e te pāhare konupango whakawaikawa, MnO_4^-/H^+, ka puta mai ko ngā waikawa waro-waihā (carboxylic).

Ki te pouaka i raro, tātuhia te waiwaihā tuatahi i ōhikitia kia puta ai te waikawa waro-waihā e whakaaturia ana.



(ii) Ka taea te whakamahi te katote pāhare konupango, MnO_4^-, hei ōhiki i ngā waiwaro rua.

Tātuhia te hua o te tauhohenga e whai ake ana:



[1] waipiro

QUESTION ONE

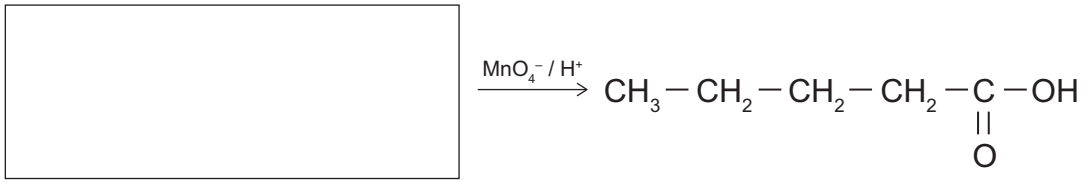
ASSESSOR'S USE ONLY

(a) In the boxes below, draw a primary, a secondary, and a tertiary alcohol for the molecule $C_5H_{11}OH$.

Primary	Secondary	Tertiary

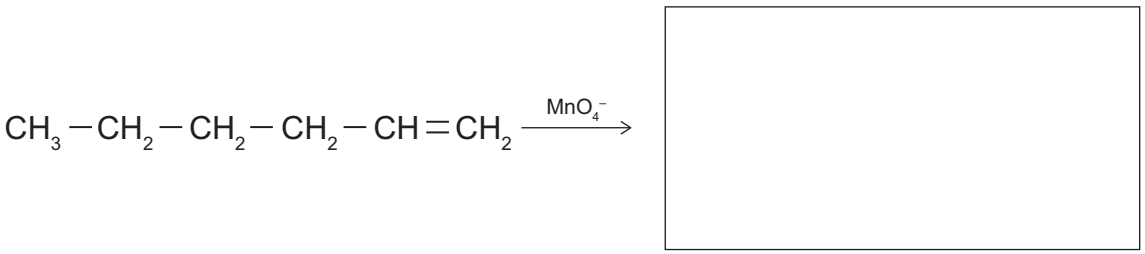
(b) (i) When primary alcohols are oxidised by acidified permanganate, MnO_4^-/H^+, they form carboxylic acids.

In the box below, draw the primary alcohol that was oxidised to form the carboxylic acid shown.



(ii) Permanganate ion, MnO_4^-, can be used to oxidise alkenes.

Draw the product of the following reaction:



(c) E whakarōpūhia katoatia ana ngā tauhohenga e whakaaturia ana i raro nō te momo tauhohenga kotahi.

MĀ TE KAIMĀKA ANAKE

Tauhohenga Tuatahi	Ka hohe te owaro, $CH_3CH_2CH_2CH_2CH_2CH_3$, ki te wai pūkane, Br_2(*waiwai*)
Tauhohenga Tuarua	Ka hohe te waihā-1-owaro, $CH_3CH_2CH_2CH_2CH_2CH_2OH$, ki te PCl_3
Tauhohenga Tuatoru	Ka hohe te 1-owaro pūhaumāota, $CH_3CH_2CH_2CH_2CH_2CH_2Cl$, ki te NH_3 kukū (waiwaihā)

Whakatauritea ēnei tauhohenga.

I tō whakautu, me:

- tuhi mēnā e hiahiatia ana ētahi āhuatanga
- whakaahua te momo tauhohenga ka puta me te whakamārama hoki i te take e whakarōpūhia katoatia ana ngā tauhohenga e toru ki tēnei momo tauhohenga
- whakamārama he aha i puta ai ngā papatūranga e rua i te **Tauhohenga Tuatahi**.

(c) The reactions shown below are all classified as being the same type of reaction.

ASSESSOR'S USE ONLY

Reaction One	hexane, $CH_3CH_2CH_2CH_2CH_2CH_3$, reacts with bromine water, $Br_2(aq)$
Reaction Two	hexan-1-ol, $CH_3CH_2CH_2CH_2CH_2CH_2OH$, reacts with PCl_3
Reaction Three	1-chlorohexane, $CH_3CH_2CH_2CH_2CH_2CH_2Cl$, reacts with conc NH_3 (alc)

Compare and contrast these reactions.

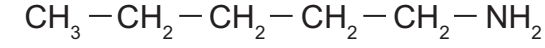
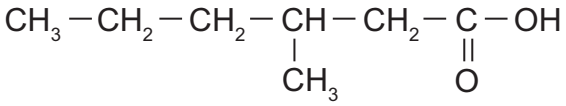
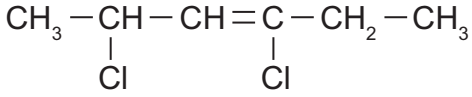
In your answer you should:

- state whether any conditions are required
- describe the type of reaction occurring and explain why all three reactions are classified as this type of reaction
- explain why two layers form in **Reaction One**.

PĀTAI TUARUA

MĀ TE KAIMĀKA ANAKE

(a) Whakaotia te tūtohi i raro nei hei whakaatu i te ture tātai hanganga me te ingoa (nahanaha) IUPAC mō ia pūhui.

Ture tātai hanganga	Ingoa (nahanaha) IUPAC
	Waiwaro toru-1-pōwaro
	2,2-waihā-1-pēwaro pūhaumāota-rua
	
	
	

QUESTION TWO

ASSESSOR'S USE ONLY

(a) Complete the following table to show the structural formula and IUPAC (systematic) name for each compound.

Structural formula	IUPAC (systematic) name
	But-1-yne
	2,2-dichloropentan-1-ol
$CH_3-CH_2-CH_2-CH_2-CH_2-NH_2$	
$CH_3-CH_2-CH_2-\underset{\displaystyle CH_3}{\underset{\vert}{CH}}-CH_2-\underset{\displaystyle O}{\underset{\Vert}{C}}-OH$	
$CH_3-\underset{\displaystyle Cl}{\underset{\vert}{CH}}-CH=\underset{\displaystyle Cl}{\underset{\vert}{C}}-CH_2-CH_3$	

(b) Kua whakaaturia i raro nei ngā hanganga o ngā pūhui whaiwaro e toru.

Pūhui **A**	$CH_3-CH_2-CH=CH-CH_3$
Pūhui **B**	$CH_3-CH_2-CH_2-CH=CH_2$
Pūhui **C**	$CH_3-CH_2-CH_2-CH_2-CH_3$

Whakamāramahia te take ka taea e te pūhui **A** te noho hei poinanaha āhuahanga (*cis* me *trans*), engari kāore e taea e **B** me **C**.

I tō whakautu, me:

- tātuhi ngā poinanaha (*cis* me *trans*) āhuahanga o te pūhui **A** i roto i ngā pouaka i raro
- whakamārama ngā whakaritenga mō ngā poinanaha (*cis* me *trans*) āhuahanga mā te kōrero mō ngā pūhui **A**, **B**, me **C**.

poinanaha *cis*

poinanaha *trans*

MĀ TE KAIMĀKA ANAKE

ASSESSOR'S USE ONLY

(b) The structures of three organic compounds are shown below.

Compound **A**	$CH_3-CH_2-CH=CH-CH_3$
Compound **B**	$CH_3-CH_2-CH_2-CH=CH_2$
Compound **C**	$CH_3-CH_2-CH_2-CH_2-CH_3$

Explain why compound **A** can exist as geometric (*cis* and *trans*) isomers, but compounds **B** and **C** cannot.

In your answer you should:

- draw the geometric (*cis* and *trans*) isomers of compound **A** in the boxes below
- explain the requirements for geometric (*cis* and *trans*) isomers by referring to compounds **A**, **B**, and **C**.

cis isomer

trans isomer

MĀ TE KAIMĀKA ANAKE

(c) Ka tāpirihia te konutai pākawa waro, te waikawa pūhaumāota, me te waikawa pungatara ki ngā tīpakonga rerekē o ngā pūhui whaiwaro e toru.

Kei te tūtohi o raro ngā hanganga o ngā pūhui me ngā hua o ngā tauhohenga.

Whakahohe	**Pūhui whaiwaro**		
	$CH_3-CH_2-\underset{\underset{O}{\|}}{C}-OH$	$CH_3-CH_2-CH_2-NH_2$	$CH_3-CH_2-CH_2-OH$
Na_2CO_3	**(i)**	kāore he tauhohenga	kāore he tauhohenga
HCl	kāore he tauhohenga	**(ii)**	$CH_3-CH_2-CH_2-Cl$
H_2SO_4	kāore he tauhohenga	$CH_3-CH_2-CH_2-NH_3^+$	$CH_3-CH=CH_2$

Whakatauritea ngā tauhohe **ka hua mai** i waenga i ēnei pūhui whaiwaro me ngā whakahohe ki te tūtohi i runga ake.

I tō whakautu, me:

- homai te hanganga o ngā hua whaiwaro **(i)** me **(ii)**
- whakaahua ngā momo tauhohenga rerekē ka hua mai, ka homai i ngā take e whakarōpūhia ana ki taua momo
- tautohu ngā momo āhuatanga e hiahiatia ana kia hua mai ai ngā tauhohenga.

He wāhi anō mō tō whakautu ki tēnei pātai kei te whārangi 12.

ASSESSOR'S USE ONLY

(c) Sodium carbonate, hydrochloric acid, and sulfuric acid are each added to separate samples of three organic compounds.

The structures of the compounds and the products of any reactions are given in the table below.

Reagent	**Organic compound**		
	$CH_3-CH_2-\underset{\underset{O}{\|}}{C}-OH$	$CH_3-CH_2-CH_2-NH_2$	$CH_3-CH_2-CH_2-OH$
Na_2CO_3	**(i)**	no reaction	no reaction
HCl	no reaction	**(ii)**	$CH_3-CH_2-CH_2-Cl$
H_2SO_4	no reaction	$CH_3-CH_2-CH_2-NH_3^+$	$CH_3-CH=CH_2$

Compare and contrast the reactions that **do** occur between these organic compounds, and the reagents in the table above.

In your answer you should:

- give the structure of the organic products **(i)** and **(ii)**
- describe the different types of reactions occurring, and give reasons why they are classified as that type
- identify any specific conditions that are required for the reactions to occur.

There is more space for your answer to this question on page 13.

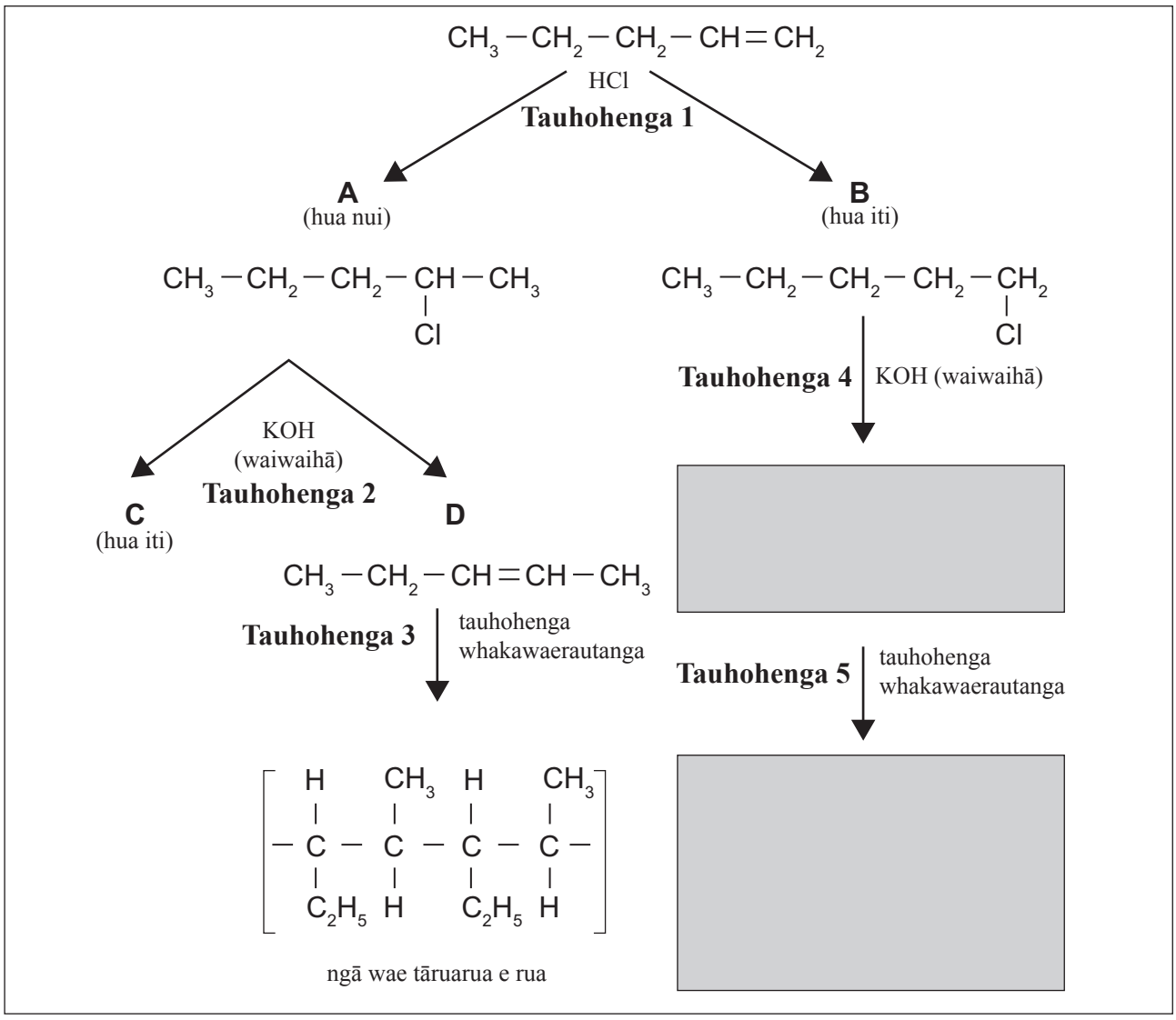
MĀ TE KAIMĀKA ANAKE

ASSESSOR'S USE ONLY

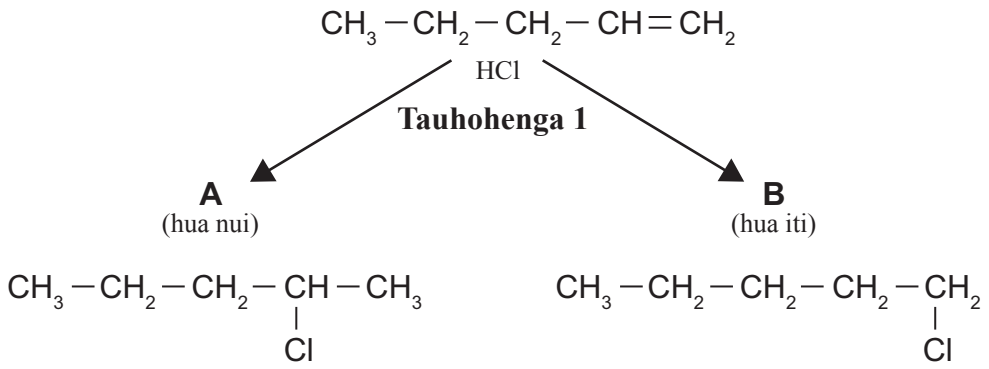
PĀTAI TUATORU

MĀ TE KAIMĀKA ANAKE

E whakaaturia ana tētahi mahere tauhohe i raro.



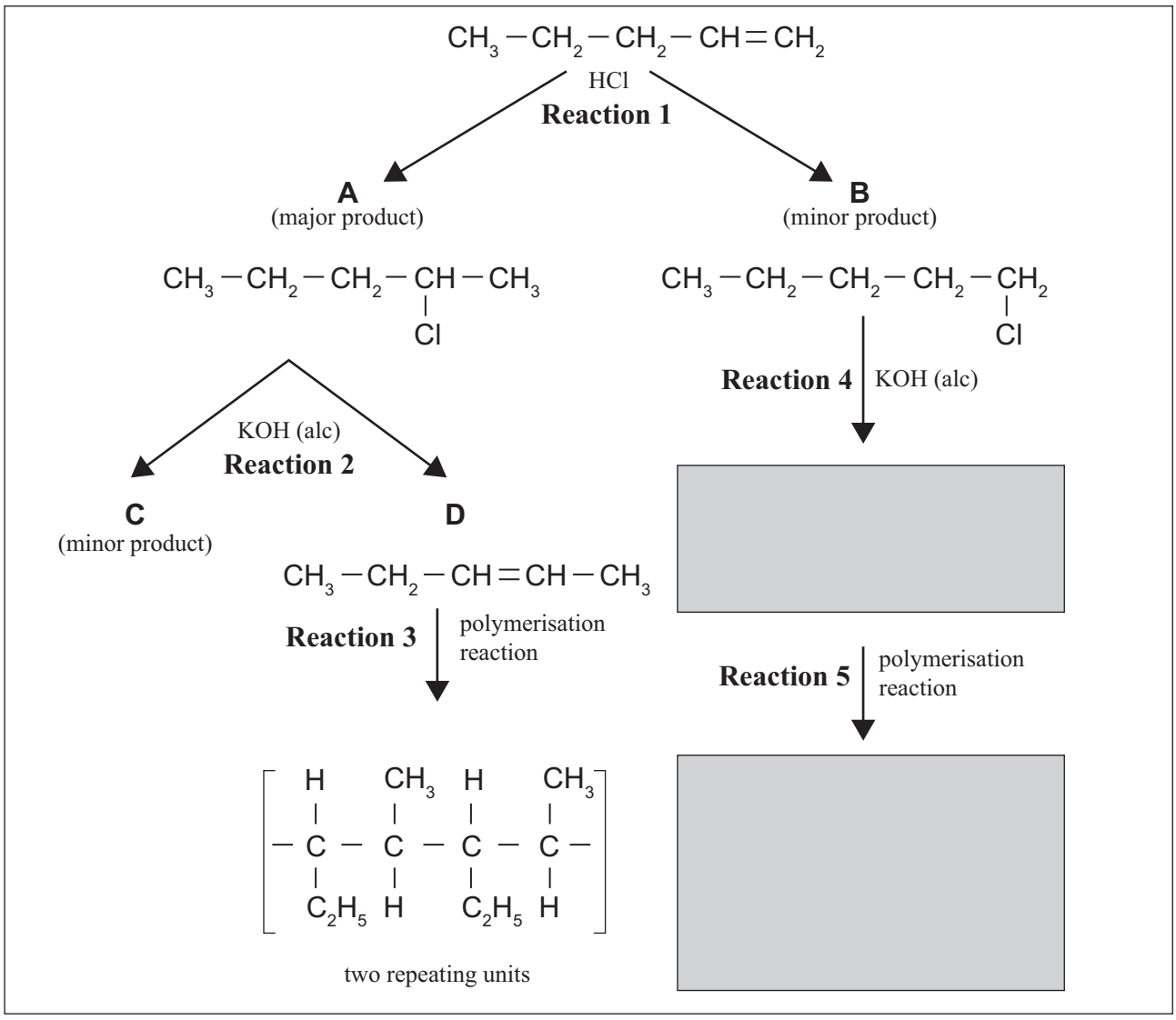
(a) (i) Whakamāramahia te take mai i te mahere tauhohe e whakaaturia ana anō i raro, e whakarōpūhia ana te **Tauhohenga 1** hei tauhohenga tāpiri.



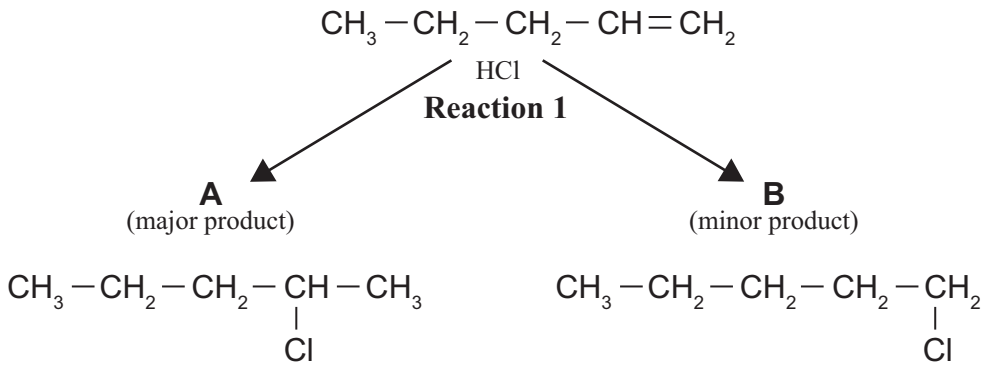
QUESTION THREE

ASSESSOR'S USE ONLY

A reaction scheme is shown below.



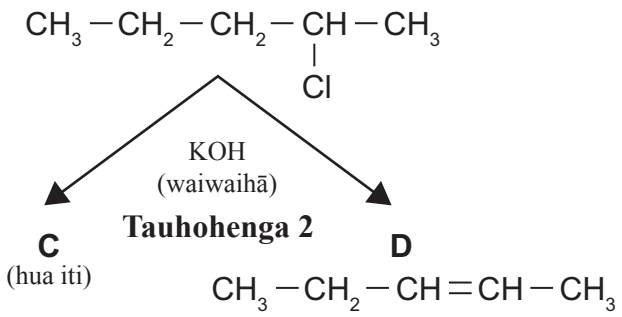
(a) (i) Explain why **Reaction 1** from the reaction scheme, shown again below, is classified as an addition reaction.



MĀ TE KAIMĀKA ANAKE

(ii) Whakamāramahia te take ko te pūhui **A** te hua **matua** mō te **Tauhohenga 1** e whakaaturia ana i te mahere tauhohe i te whārangi o mua ake.

(b) (i) Whakamāramahia te take mai i te mahere tauhohe e whakaaturia ana anō i raro, e whakarōpūhia ana te **Tauhohenga 2** hei tauhohenga tangohanga.



(ii) He tauhohenga tangohanga anō te **Tauhohenga 4**.

Tātuhia te tātai hanganga o te hua ka puta i te **Tauhohenga 4**.

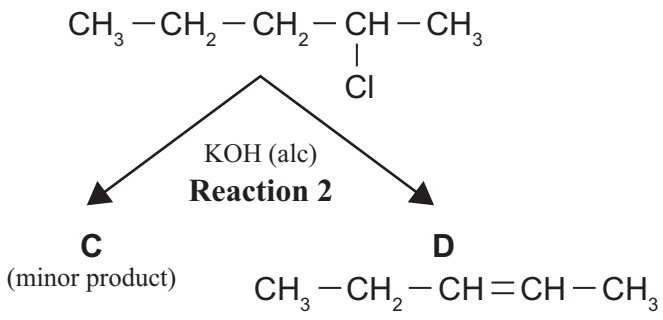
(c) (i) Tātuhia ngā wae tāruarua e RUA o te waerau ka puta i te **Tauhohenga 5**.

Ka haere tonu te Pātai Tuatoru i te whārangi 18.

ASSESSOR'S USE ONLY

(ii) Explain why compound **A** is the **major** product for **Reaction 1** shown in the reaction scheme on the previous page.

(b) (i) Explain why **Reaction 2** from the reaction scheme, shown again below, is classified as an elimination reaction.



(ii) **Reaction 4** is also an elimination reaction.

Draw the structural formula of the product formed in **Reaction 4**.

(c) (i) Draw TWO repeating units of the polymer formed in **Reaction 5**.

Question Three continues on page 19.

(ii) Whakatauritea te waerau ka puta i te **Tauhohenga 5** ki te waerau ka puta i te **Tauhohenga 3**.

I tō whakautu me whakamārama e koe he aha i rerekē ai ngā waerau ka puta i ēnei tauhohenga e rua.

MĀ TE KAIMĀKA ANAKE

(ii) Compare and contrast the polymer formed in **Reaction 5** to the polymer formed in **Reaction 3**.

In your answer you should explain why the polymers formed in these two reactions are different.

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He puka anō mēnā ka hiahiatia.
Tuhia te (ngā) tāu 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 2 Chemistry, 2014

91165 Demonstrate understanding of the properties of selected organic compounds

2.00 pm Tuesday 11 November 2014
Credits: Four

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.

91165M

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 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 2–21 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.