See back cover for an English translation of this cover

3

91391M

913915

SUPERVISOR'S USE ONLY

NEW ZEALAND QUALIFICATIONS AUTHORITY
MANA TOHU MĀTAURANGA O AOTEAROA

Te Mātauranga Matū, Kaupae 3, 2013

91391M Te whakaatu māramatanga ki ngā āhuatanga o ngā pūhui whaiwaro

2.00 i te ahiahi Rātū 19 Whiringa-ā-rangi 2013
Whiwhinga: Rima

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

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

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

He taka pūmotu kua whakaritea ki te Pukaiti Rauemi L3-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 mēnā 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

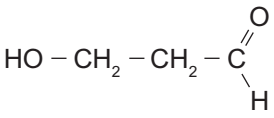
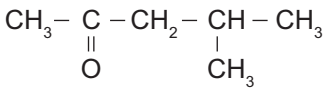
MĀ TE KAIMĀKA ANAKE

Kia 60 meneti hei whakautu i ngā pātai o tēnei pukapuka.

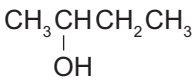
MĀ TE KAIMĀKA ANAKE

PĀTAI TUATAHI

(a) Whakaotihia te tūtohi i raro mā te tuku i te ingoa nahanaha IUPAC, te tātai hanganga rānei mō ia pūhui.

Tātai hanganga	Ingoa nahanaha IUPAC
	
	amiti pōwaro (propanamide)
	

(b) Ka taea te waiwaihā i raro te tīari hei poinanaha whakaata (enantiomer) e rua.



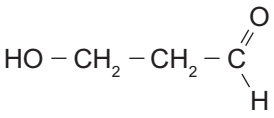
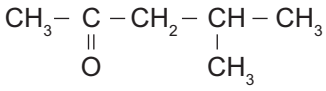
(i) Tuhia ngā hanganga ahu-toru mō ngā poinanaha whakaata e rua.

You are advised to spend 60 minutes answering the questions in this booklet.

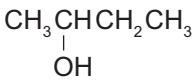
ASSESSOR'S USE ONLY

QUESTION ONE

(a) Complete the table below by giving the IUPAC systematic name or the structural formula for each compound.

Structural formula	IUPAC systematic name
	
	propanamide
	

(b) The alcohol below can exist as two enantiomers (optical isomers).



(i) Draw three-dimensional structures for the two enantiomers.

(ii) Honoa te hanganga o ngā poinanaha whakaata ki tētahi āhuatanga ōkiko e taea ai te waitohu ēnei i ngā rāpoi ngota whakaata-kore.

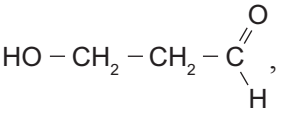
(c) Tuhia ngā tātai hanganga o ngā poinanaha rerekē e toru o $HO-CH_2-CH_2-\overset{\overset{O}{\parallel}}{C}-H$, e whakaatu ana i ngā āhuatanga e whai ake:

- Ka huri i te poinanaha 1 te tohu waikawa kikorangi mākū kia whero.
- He hākawa te poinanaha 2.
- He hāparo-rua te poinanaha 3.

Āhuatanga	**Tātai hanganga**
ka huri i te tohu waikawa kikorangi mākū kia whero	
he hākawa	
he hāparo-rua	

ASSESSOR'S USE ONLY

(ii) Link the structure of enantiomers to a physical property that can be used to distinguish them from non-optically active molecules.

(c) Draw the structural formulae of three different isomers of  , which show the following properties:

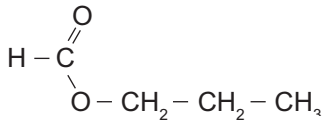
- Isomer 1 turns moist blue litmus paper red.
- Isomer 2 is an ester.
- Isomer 3 is a ketone.

Property	**Structural formula**
turns moist blue litmus paper red	
is an ester	
is a ketone	

(d) Homai ngā hanganga me ngā ingoa o ngā hua o ngā tauhohe i raro.

Ka whakahaerehia ngā tauhohe nei mā te whakawera ki te:

- mehanga[1] waikawa pūhaumāota meha,
- mehanga konutai waihā meha.



mehanga waikawa pūhaumāota meha

mehanga konutai waihā meha

Ingoa: _____	Ingoa: _____	Ingoa: _____	Ingoa: _____

Whakatauritea, whakatairitea hoki ngā tauhohe i runga.

I tō whakautu, me whakauru te (ngā) tūmomo tauhohe e mahi ana.

MĀ TE KAIMĀKA ANAKE

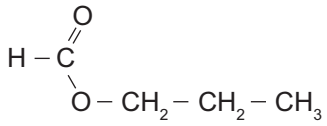
[1] wairewa

ASSESSOR'S USE ONLY

(d) Give the structures and names of the products of the reactions below.

These reactions are carried out by heating in either:

- dilute hydrochloric acid solution, or
- dilute sodium hydroxide solution.



dilute hydrochloric acid solution

dilute sodium hydroxide solution

Name: _____	Name: _____	Name: _____	Name: _____

Compare and contrast the reactions above.

In your answer, you should include the type of reaction(s) taking place.

PĀTAI TUARUA

MĀ TE KAIMĀKA ANAKE

(a) Mō ngā whakawhitinga e whai ake, tautuhia te matū whakahohe e hiahiatia, ka tuhi i te tūmomo tauhohe e mahi ana.

(i) Ka whakawhitihia te hāparo-rua-2-pēwaro ki te waihā-2-pēwaro.

Matū whakahohe e hiahiatia: _____

Tūmomo tauhohe: _____

(ii) Ka whakawhitihia te waihā-2-pūwaro ki tētahi ranunga o te waiwaro rua-1-pūwaro me te waiwaro rua-2-pūwaro

Matū whakahohe e hiahiatia: _____

Tūmomo tauhohe: _____

(iii) Matapakitia te tauhohe i (ii) i runga ake, me te kōrero anō mō ngā hanganga o te matū tauhohe whaiwaro me ngā hua.

QUESTION TWO

ASSESSOR'S USE ONLY

(a) For the following conversions, identify the reagent required, and state the type of reaction occurring.

(i) Pentan-2-one is converted to pentan-2-ol.

Reagent required: _____

Type of reaction: _____

(ii) Butan-2-ol is converted to a mixture of but-1-ene and but-2-ene.

Reagent required: _____

Type of reaction: _____

(iii) Discuss the reaction occurring in (ii) above, with reference to the structures of the organic reactant and products.

(b) Matapakitia ngā tukanga taiwhanga pūtaiao ka whakamahia hei whakawhiti i te waihā-1-pūwaro hei hāparo-tahi pūwaro, me te waihā-1-pūwaro hei waikawa pūwaro.

I ia matapakinga, me oti i a koe te:

- whakaahua i te tukanga mō ia whakawhitinga
- tuhi me te parahau i te tūmomo tauhohe
- tautuhi i ngā matū whakahohe ka whakamahia, me te whakamārama i ngā kitenga ka puta.

MĀ TE KAIMĀKA ANAKE

Waihā-1-pūwaro hei hāparo-tahi pūwaro:

Waihā-1-pūwaro hei waikawa pūwaro:

(b) Discuss the laboratory procedures used to convert butan-1-ol into butanal, and butan-1-ol into butanoic acid.

ASSESSOR'S USE ONLY

In each discussion, you should:

- outline the process for each conversion
- state and justify the type of reaction occurring
- identify the reagents used, and explain any observations made.

Butan-1-ol to butanal:

Butan-1-ol to butanoic acid:

(c) Waihangatia he tikanga mō te waitohu i waenga i ngā pūhui wē e toru, arā, te waihā-1-pūwaro, te waikawa pūwaro, me te pūhaumāota waikawa pūwaro, mā te whakamahi i te tohu waikaha kikorangi me te wai anake.

Whakamāramahia ngā kitenga katoa i tō tikanga, me te kōrero mō te hanganga o ngā pūhui whaiwaro.

MĀ TE KAIMĀKA ANAKE

(c) Devise a method for distinguishing between the three liquid compounds, butan-1-ol, butanoic acid, and butanoyl chloride, using only blue litmus paper and water.

Explain each of the observations in your method, with reference to the structure of the organic compounds.

ASSESSOR'S USE ONLY

PĀTAI TUATORU

MĀ TE KAIMĀKA ANAKE

(a) (i) E rārangi ana ngā pūhui waiwaihā e toru i raro:

mehākawa waihā-2-pōwaro waihā-1-pūwaro waihā-2-pūwaro

Whakatauritea, whakatairitea hoki ngā hanganga o ngā pūhui i runga.

(ii) Whakaahuahia mai ka pēhea tō waitohu i waenga i ngā waiwaihā i (i) i runga, mā te whakamahi whakamātautau matū ki ngā waiwaihā, ki ōna hua ōhikitanga hoki/rānei.

QUESTION THREE

ASSESSOR'S USE ONLY

(a) (i) Three alcohol compounds are listed below.

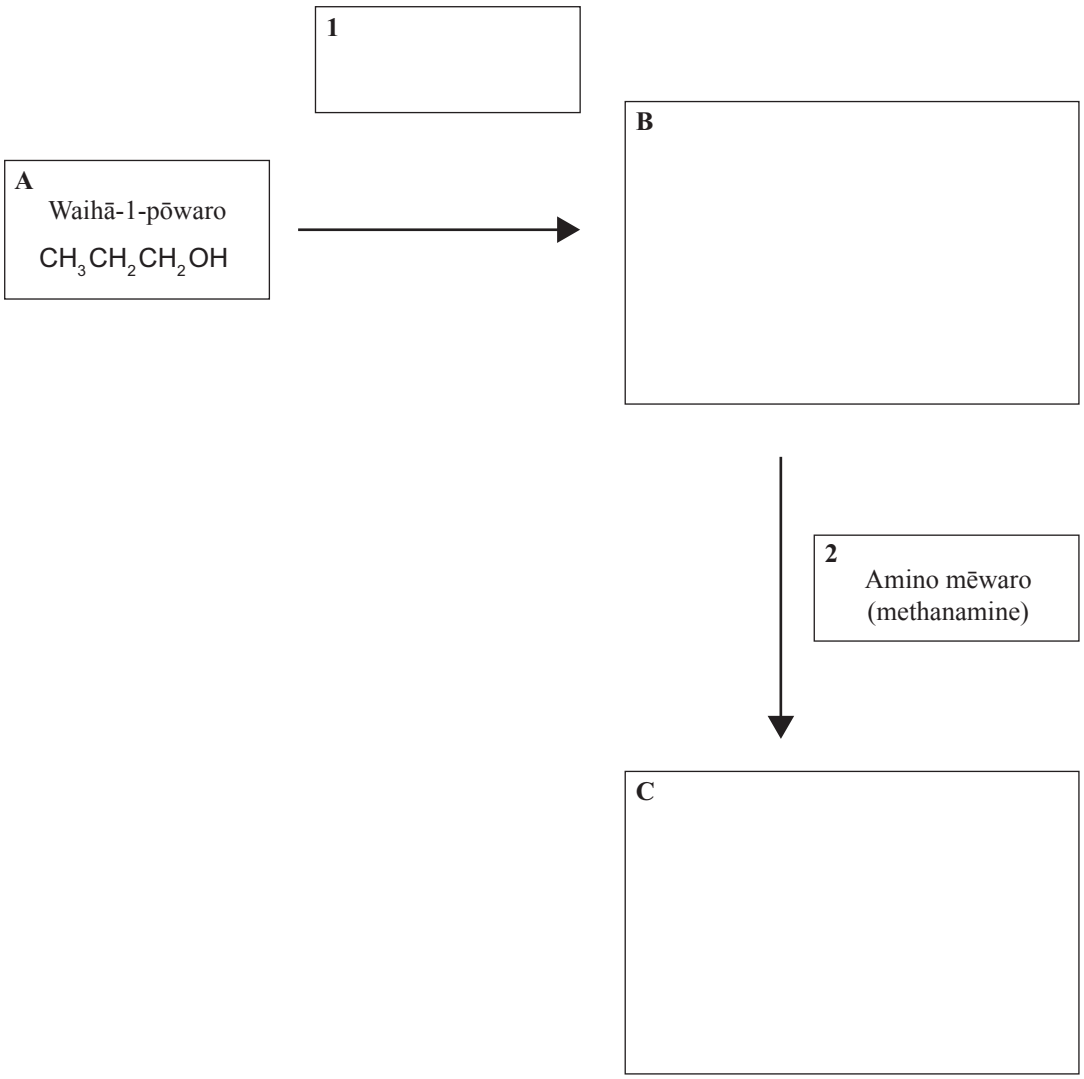
methylpropan-2-ol butan-1-ol butan-2-ol

Compare and contrast the structures of the compounds above.

(ii) Describe how you could distinguish between the alcohols in (i) above, using chemical tests on the alcohols and / or their oxidation products.

(b) Whakaotihia te mahere tauhohe e whai ake ana mā te tohu i ngā tātai hanganga o ngā pūhui whaiwaro **B** me **C**, me te tautuhi i te matū whakahohe **1**.

Whakaurua ngā āhuatanga e hiahiatia ana hei whakarite i te whakawhitinga o te matū tauhohe **A** ki te pūhui whaiwaro **C**, he **kawakore**.



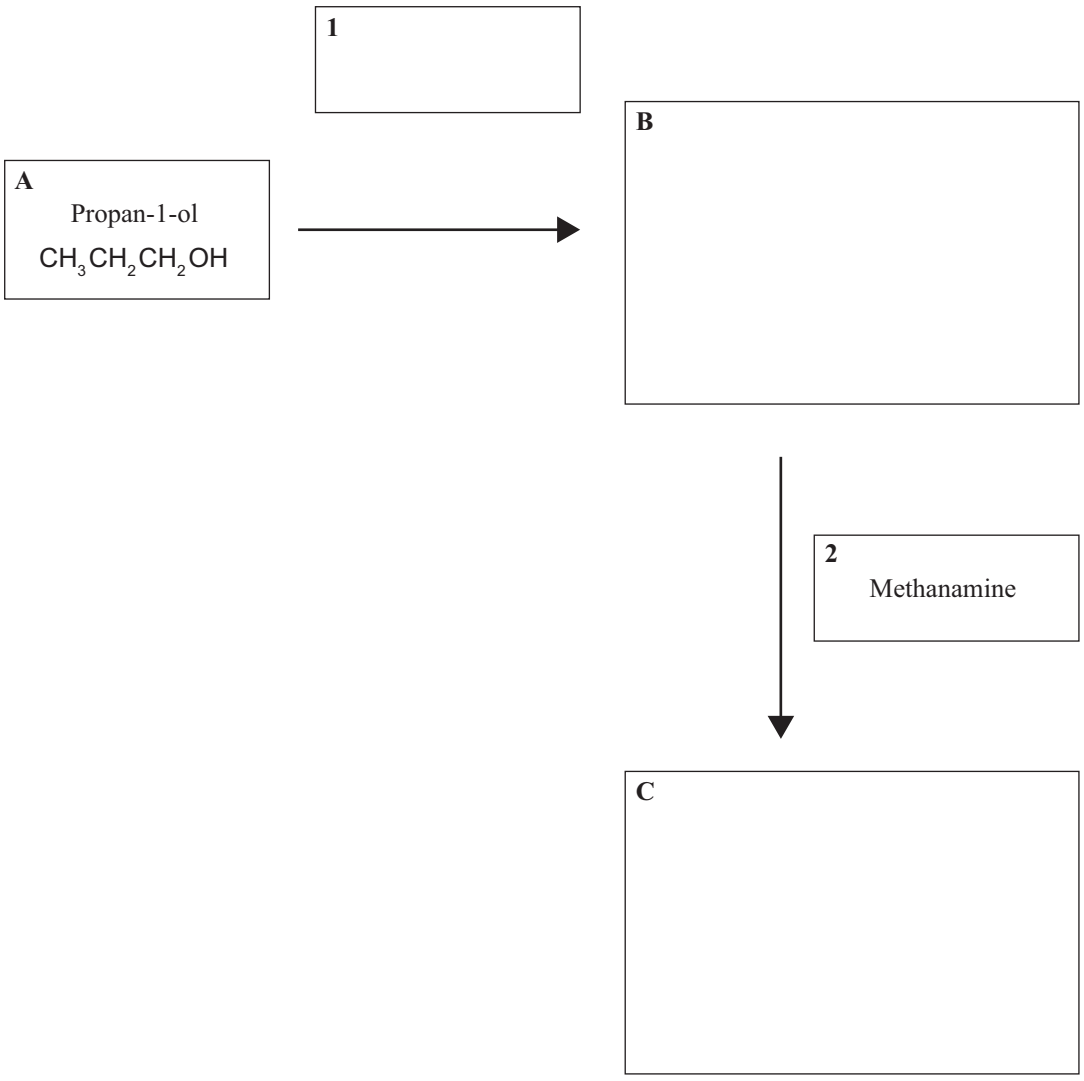
MĀ TE KAIMĀKA ANAKE

Ka whai tonu te Pātai Tuatoru i te whārangi 18.

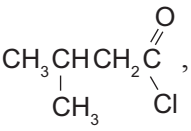
ASSESSOR'S USE ONLY

(b) Complete the following reaction scheme by drawing the structural formulae of the organic compounds **B** and **C**, and identifying reagent **1**.

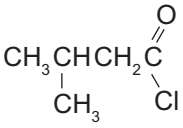
Include any necessary conditions, needed to bring about the transformation from reactant **A** to the organic compound **C**, which is a **base**.



Question Three continues on page 19.

(c) Ina tauhohe ana te haukini ki te  , e rua ngā hua ka puta.

Whakaotihia te whārite i raro mā te whakaingoa i ngā pūhui, te tuhi rānei i te hanganga.

Haukini +  →

Tātai hanganga o te hua whaiwaro:

Ingoa o te hua whaiwaro-kore

Ingoa:

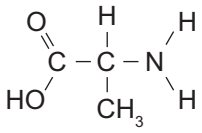
_____

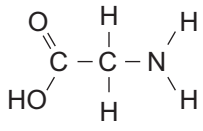
_____

_____

(d) Ka puta ngā pētini i te hononga o ngā waikawa amino.

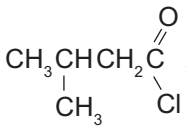
(i) Ki ngā pouaka i raro, whakaaturia kia rua ngā pētini-rua (dipeptide) ka taea mā te hononga o ngā waikawa amino:





(ii) Porohitatia te hono amiti (amide) i ia pētini-rua.

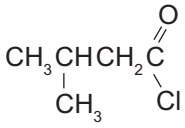
ASSESSOR'S USE ONLY

(c) When ammonia reacts with  , two products are formed.

Complete the equation below by naming compounds or drawing the structure.

Structural formula of organic product:

Name of inorganic product:

Ammonia +  → [ ] + _____

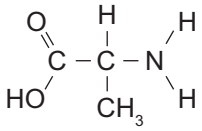
Name:

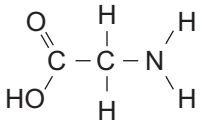
_____

_____

(d) Peptides are formed when amino acids combine.

(i) In the boxes below, show two possible dipeptides that can be formed by combining the amino acids:





[ ]

[ ]

(ii) Circle the amide link in each dipeptide.

He puka anō mēnā ka hiahiatia.
Tuhia te (ngā) tau pātai mēnā e hāngai ana.

TAU PĀTAI

MĀ TE KAIMĀKA ANAKE

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

QUESTION NUMBER

ASSESSOR'S USE ONLY

English translation of the wording on the front cover

Level 3 Chemistry, 2013

91391 Demonstrate understanding of the properties of organic compounds

2.00 pm Tuesday 19 November 2013
Credits: Five

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

91391M

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 L3–CHEMR.

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.