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91391M



913915



NEW ZEALAND QUALIFICATIONS AUTHORITY  
MANA TOHU MĀTAURANGA O AOTEAROA

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KIA NOHO TAKATŪ KI TŌ ĀMUA AO!

SUPERVISOR'S USE ONLY

## Te Mātauranga Matū, Kaupae 3, 2016

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

2.00 i te ahiahi Rāhina 21 Whiringa-ā-rangi 2016  
Whiwhinga: Rima

Paetae	Kaiaka	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 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 KATOĀ 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 2–21 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

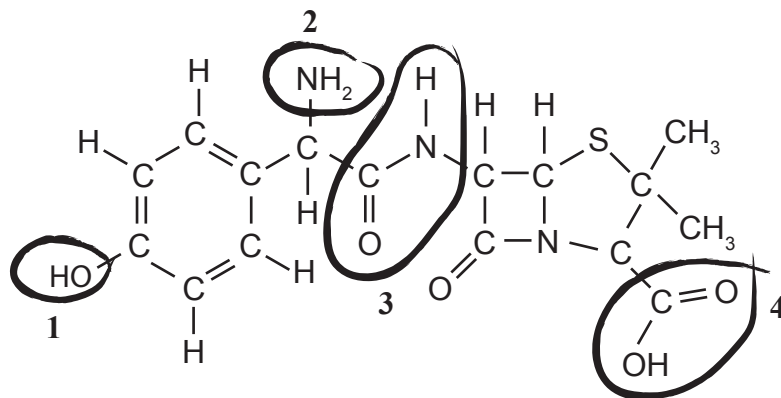
MĀ TE KAIMĀKA ANAKE

## TŪMAHI TUATAHI

- (a) Whakaotihia te tūtohi i raro mā te tātuhi i te ture tātai hanganga mō ngā pūhui kua whakaingoatia.

Ingoa nahanaha IUPAC	Ture Tātai Hanganga
ehākawa pūwaro	
2-waihā hāparo-tahi pūwaro	
amiti ewaro (ethanamide)	

- (b) E whakaaturia ana te hanganga o te amoxycillin i raro. He rongoā paturopi ka whakamahia mō ngā whakapokenga huakita.



Whakaingoatia ngā rōpū mahinga rerekē e whā kua porohitatia i roto i te rāpoi ngota amoxycillin i runga.

1	
3	

2	
4	

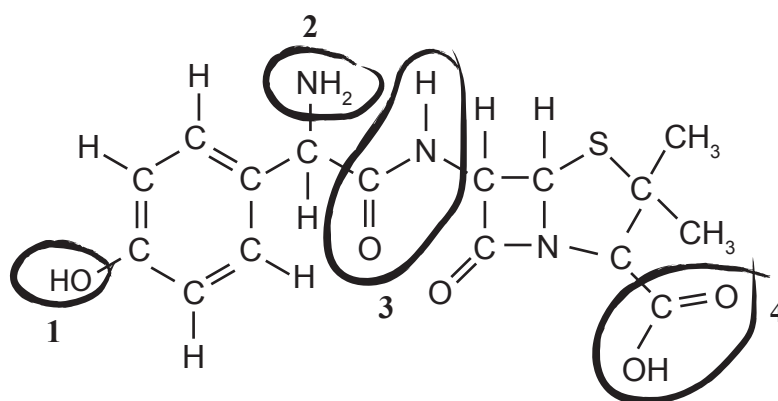
# QUESTION ONE

 ASSESSOR'S  
USE ONLY

- (a) Complete the table below by drawing the structural formula for the named compounds.

IUPAC systematic name	Structural Formula
butylethanoate	
2-hydroxybutanal	
ethanamide	

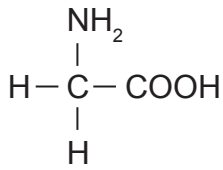
- (b) The structure of amoxycillin is given below. It is an antibiotic used in the treatment of bacterial infections.



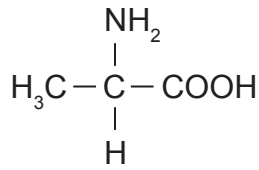
Name the four different functional groups circled within the amoxycillin molecule above.

1		2	
3		4	

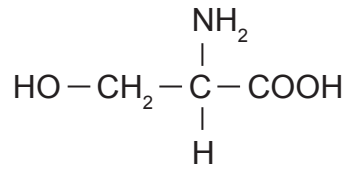
- (c) Ko te kairīni (glycine), aranina (alanine) me te herina (serine) ngā waikawa amino e toru e whakaaturia ana i raro.



kairīni



aranina



herina

- (i) Tātuhia ngā hanganga ahū-3 o ngā poinanaha whakaata (poinanaha ōmata) o te **herina** ki ngā pouaka i raro.

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- (ii) Porohitia te waikawa amino i raro KĀORE nei e whakaatu i te poinanahatanga whakaata:

**kairīni****aranina****herina**

Whakamāramatia tō tuhinga.

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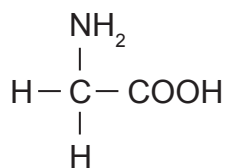
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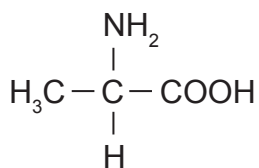
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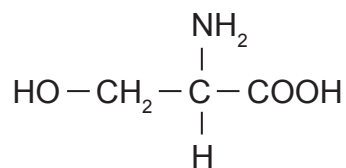
- (c) Glycine, alanine, and serine are three amino acids shown below.



glycine



alanine



serine

- (i) Draw the 3-D structures of the enantiomers (optical isomers) of **serine** in the boxes below.

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- (ii) Circle the amino acid below which does NOT display optical isomerism:

**glycine****alanine****serine**

Explain your answer.

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- (iii) Tātuhia ngā pepetairua (dipeptides) e rua ka tāea mai i ngā waikawa amino **kairīni** me te **aranina**.


- (iv) Whakaingoahia te momo tauhohenga i pā i te putanga o ngā pepetairua i (iii) i runga.

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Whakamāramahia tāu i kōwhiri ai.

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- (v) Tātuhia ngā hua o tētahi whakapāheko ā-wai (hydrolysis) mā te waikawa mō TĒTAHI o ngā pepetairua mai i (iii) i runga.

Whakamāramahia te take i puta ai ēnei hua.

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- (iii) Draw the two possible dipeptides formed from the amino acids **glycine** and **alanine**.


- (iv) Name the type of reaction that occurred when the dipeptides formed in (iii) above.

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Explain your choice.


- (v) Draw the products of an acidic hydrolysis for ONE of the dipeptides from (iii) above.  
Explain why these products are formed.

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(a) (i) He aha te whakahohe ka tāea te whakamahi hei whakaiti i te hāparo-tahi me te hāparo-rua?

- Tātuhia te rōpū mahinga o ia hua kua puta.

<p><b>hāparo-tahi</b></p> <p><b>pēwaro</b></p>	<p>Hanganga o te hua:</p>   <p>Rōpū mahinga: _____</p>
<p><b>hāparo-rua</b></p> <p><b>2-pēwaro</b></p>	<p>Hanganga o te hua:</p>   <p>Rōpū mahinga: _____</p>



**QUESTION TWO**ASSESSOR'S  
USE ONLY

- (a) (i) What reagent can be used to reduce aldehydes and ketones?
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- (ii) For the **reduction** of pentanal and pentan-2-one, draw the structure of the organic product formed in each case.

Identify the functional group of each product formed.

<b>pentanal</b>	Structure of the product:          Functional group: _____
<b>pentan-2-one</b>	Structure of the product:          Functional group: _____

(b) Kua whakaaturia i te tūtohi i raro nei ngā hanganga o ngā matū whaiwaro e whā.

(i) Whakaingoahia ngā matū whaiwaro **A** ki **D**.

Pūāhua	Hanganga	Ingoa
<b>A</b>	$\text{CH}_3\text{CH}_2\text{CH}_2-\text{NH}_2$	
<b>B</b>	$\text{CH}_3\text{CH}_2-\text{C} \begin{array}{l} \text{O} \\ \text{=} \\ \text{H} \end{array}$	
<b>C</b>	$\text{CH}_3\text{CH}_2-\text{C} \begin{array}{l} \text{O} \\ \text{=} \\ \text{Cl} \end{array}$	
<b>D</b>	$\text{CH}_3-\overset{\text{O}}{\underset{\text{  }}{\text{C}}}-\text{CH}_3$	

(b) The structures of four different organic substances are shown in the table below.

(i) Name the organic substances **A** to **D**.

Letter	Structure	Name
<b>A</b>	$\text{CH}_3\text{CH}_2\text{CH}_2-\text{NH}_2$	
<b>B</b>	$\text{CH}_3\text{CH}_2-\text{C} \begin{array}{l} \nearrow \text{O} \\ \searrow \text{H} \end{array}$	
<b>C</b>	$\text{CH}_3\text{CH}_2-\text{C} \begin{array}{l} \nearrow \text{O} \\ \searrow \text{Cl} \end{array}$	
<b>D</b>	$\text{CH}_3-\overset{\text{O}}{\parallel}{\text{C}}-\text{CH}_3$	

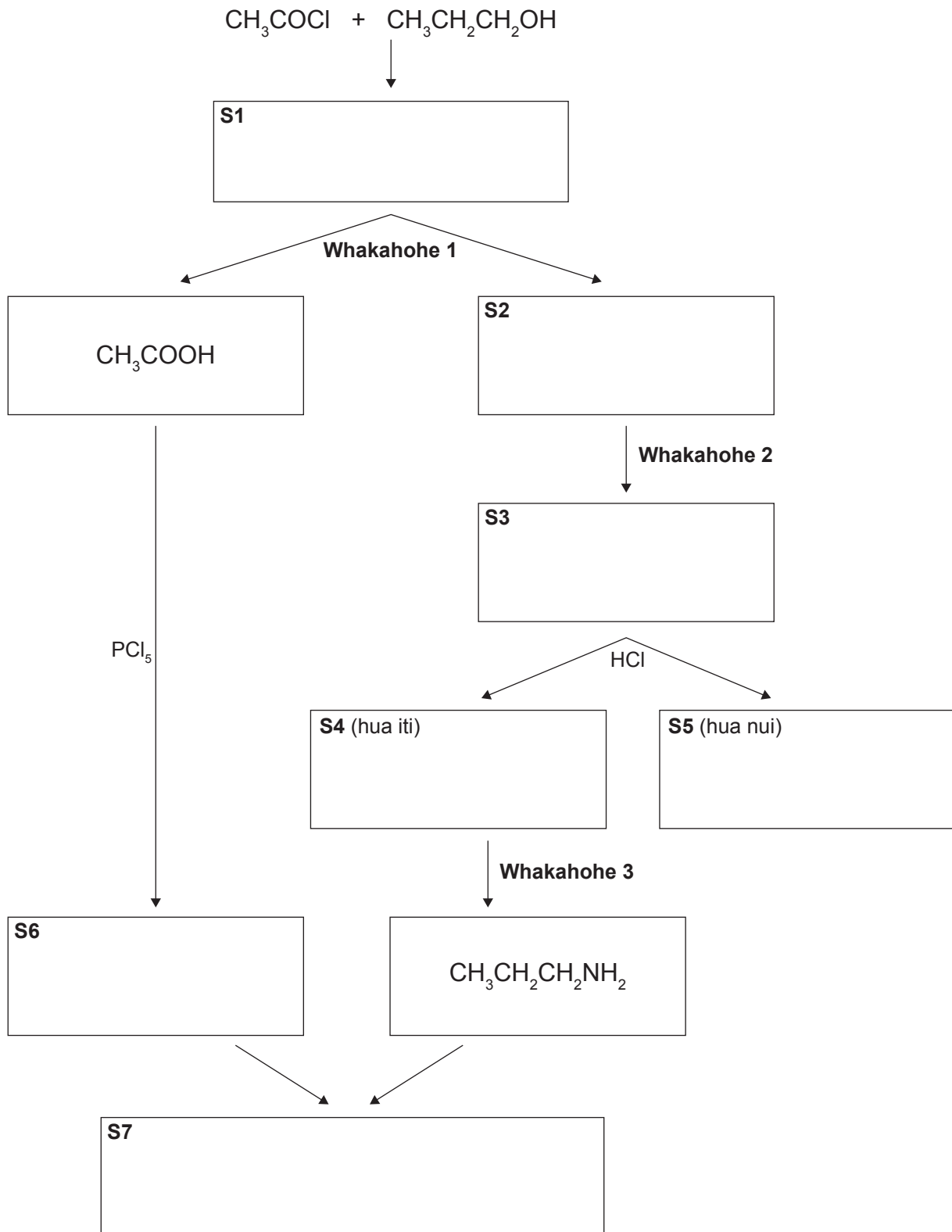
- he whakaahuatanga o ngā whakamātautau i whakahaerehia me ngā mea i kite koe
- ngā whārite hei whakaatu i ngā hua whaiwaro i puta, mēnā e tika ana.

- In your answer, you should include:

- a description of any tests carried out and any observations you would make
- equations to show the organic products formed, if applicable.

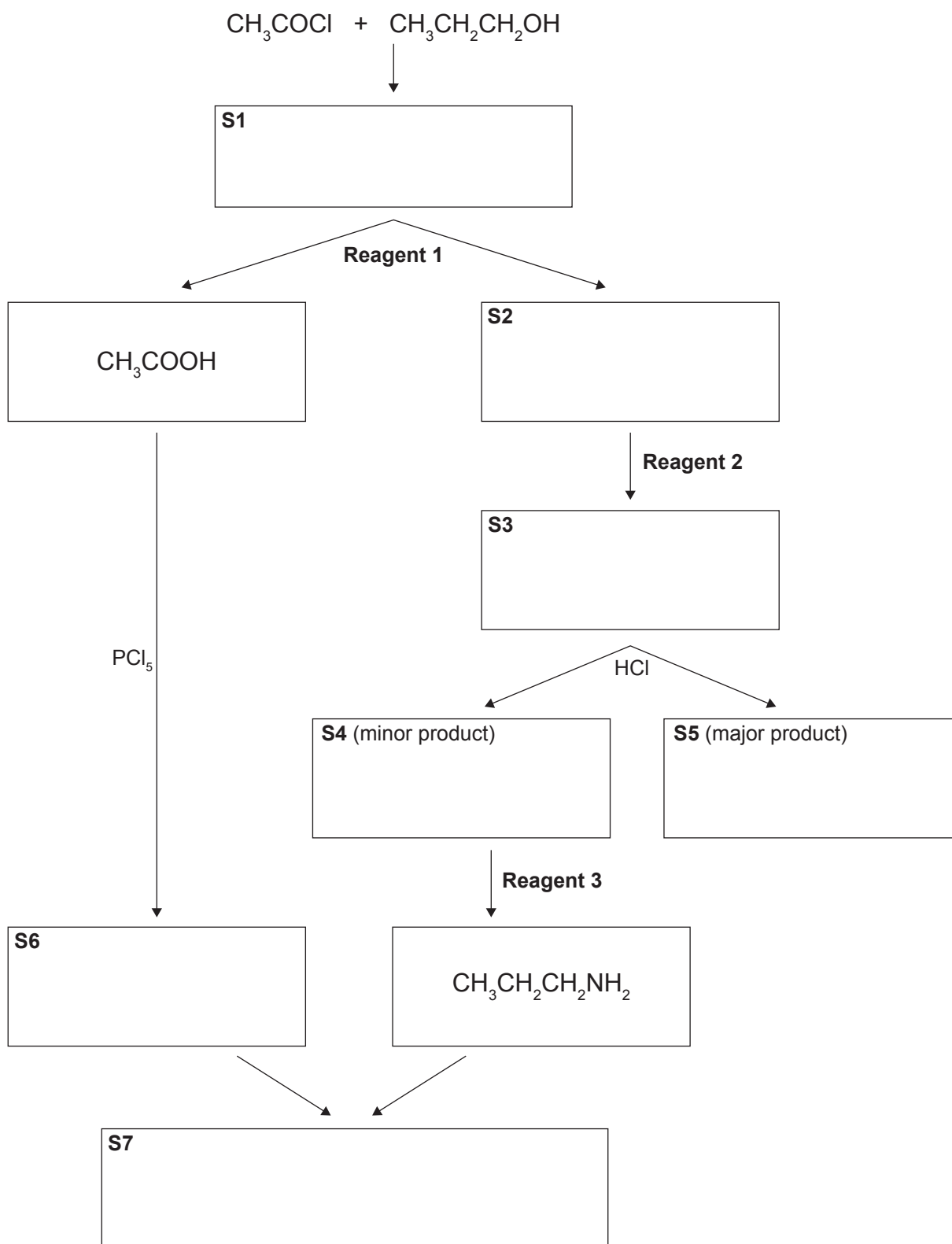
## TŪMAHI TUATORU

- (a) Whakaotihia te mahere tauhohe e whai ake mā te tātuhī i ngā hanganga whaiwaro mō te **S1** ki te **S7**, me te tautuhī i ngā whakahohe **1** ki te **3**.



## QUESTION THREE

- (a) Complete the following reaction scheme by drawing organic structures for **S1** to **S7**, and identifying reagents **1** to **3**.



Reagent 1 is: \_\_\_\_\_

Reagent 2 is: \_\_\_\_\_

Reagent 3 is: \_\_\_\_\_

- (b) Tātuhia he mahere tauhohe hei whakaatu he pēhea te whakawhiti i te **waihā 1-pūwaro** ki te **hāparo-rua 2-pūwaro**.

Me whakauru e koe ngā whakahohe hāngai, ngā āhuatanga e hiahiatia ana, me ngā hanganga o ngā matū whaiwaro katoa kei roto.

**Ka haere tonu te Tūmahi  
Tuatoru i te whārangi 18.**



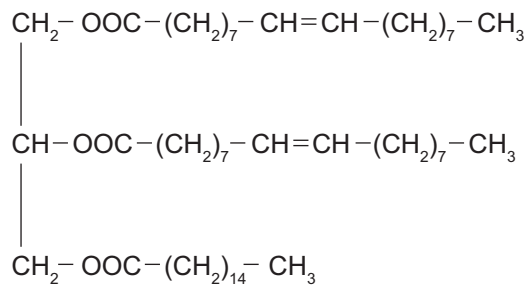
- (b) Draw a reaction scheme to show the conversion of **butan-1-ol** to **butan-2-one**.

You should include any relevant reagents, conditions required, and the structures of all organic substances involved.

ASSESSOR'S  
USE ONLY

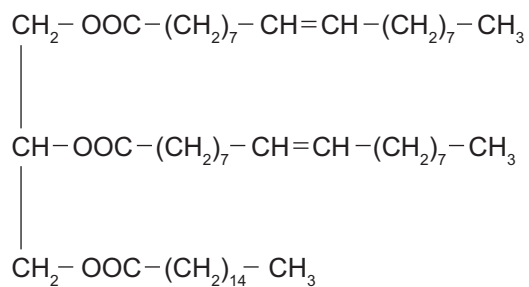
**Question Three continues  
on page 19.**

- (c) E whai ake ko te hanganga o te hākawa-toru nonireka (triglyceride) e kitea ana i te hinu ōriwa:



- (i) **Porohitatia** tētahi o ngā rōpū hākawa i roto i te rāpoi ngota hākawa-toru nonireka i runga.
- (ii) Tātuhia ngā ture hanganga o ngā hua ka puta i te whakapāheko ā-wai o tēnei hākawa-toru nonireka i ngā āhuatanga taketake, mā te whakamahi i te konutai waihā waiwai, NaOH.

- (c) A triglyceride found in olive oil has the following structure:



- (i) Put a **circle** around one of the ester groups in the triglyceride molecule shown above.
- (ii) Draw the structural formulae of the products produced by the hydrolysis of this triglyceride in basic conditions, using aqueous sodium hydroxide, NaOH.

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

ASSESSOR'S  
USE ONLY





*English translation of the wording on the front cover*

**Level 3 Chemistry, 2016**

**91391 Demonstrate understanding  
of the properties of organic compounds**

2.00 p.m. Monday 21 November 2016  
Credits: Five

91391M

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.

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 in the Resource Sheet L3–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 2–21 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.**