See back cover for an English translation of this cover

2

91165M

911655

SUPERVISOR'S USE ONLY

NEW ZEALAND QUALIFICATIONS AUTHORITY
MANA TOHU MĀTAURANGA O AOTEAROA

Te Mātauranga Matū, Kaupae 2, 2012

91165M Te whakaatu māramatanga ki ngā āhuatanga o ngā matūwaro kua tīpokahia

9.30 i te ata Rātū 20 Whiringa-ā-rangi 2012
Whiwhinga: Whā

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

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 L2-CHEMMR.

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 2–21 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

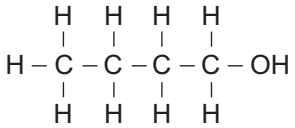
Kia 60 meneti hei whakautu i ngā pātai o tēnei pukapuka.

MĀ TE KAIMĀKA ANAKE

PĀTAI TUATAHI

(a) He waiwaihā ētahi poinanaha hanganga e whā o te $C_4H_{10}O$. Kua tātuhia tētahi o ēnei poinanaha me te whakaingoa ki te tūtohi i raro nei.

Whakaotihia te tūtohi hei whakaatu i te tātai hanganga me ngā ingoa IUPAC (nahanaha) o ētahi atu o ngā poinanaha hanganga.

	
waihā-1-pūwaro	

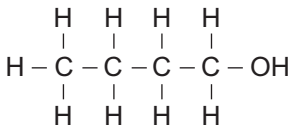
You are advised to spend 60 minutes answering the questions in this booklet.

ASSESSOR'S USE ONLY

QUESTION ONE

(a) Four of the structural isomers of $C_4H_{10}O$ are alcohols. One of these isomers has been drawn and named for you in the table below.

Complete the table to show the structural formulae and IUPAC (systematic) names of the other structural isomers.

	
butan-1-ol	

(b) Ka taea te ōhiki te waihā-1-pūwaro kia huri hei waikawa waro-waihā.

MĀ TE KAIMĀKA ANAKE

(i) Tuhia te ingoa, te tātai rānei o tētahi kaiwhakahohe tōtika ka taea te whakahaere i te tauhohenga.

Whakaurua ngā āhuatanga tauwhāiti.

(ii) Whakaahuahia te huringa tae ka kitea ake.

(iii) Ka taea anō tētahi atu o ngā poinanaha waiwaihā o te $C_4H_{10}O$ te ōhiki kia huri hei waikawa waro-waihā.

Tautohua tēnei poinanaha mā te ingoa, te tātai hanganga rānei:

Whakamāramahia tō kōwhiringa poinanaha.

ASSESSOR'S USE ONLY

(b) Butan-1-ol can be oxidised to form a carboxylic acid.

(i) Write the name or formula of a suitable reagent that could be used to carry out the reaction.

Include any specific conditions.

(ii) Describe the colour change that would be observed.

(iii) One of the other alcohol isomers of $C_4H_{10}O$ can also be oxidised to form a carboxylic acid.

Identify this isomer by name or structural formula:

Explain your choice of isomer.

(c) Me tautohu ngā pātara e rua whai waiwaro rua 1-pēwāro, $CH_3CH_2CH_2CH{=}CH_2$, me te owaro, $CH_3CH_2CH_2CH_2CH_2CH_3$.

E wātea ana ngā kaiwhakahohe e rua, arā, te wai pūkane, Br_2, me te konurehu pāporo whakawaikawa, MnO_4^- / H^+.

Arotakehia mēnā ka taea te whakamahi ngā kaiwhakahohe e RUA hei wehewehe i te waiwaro rua 1-pēwaro me te owaro.

I roto i tō whakautu me whakauru:

- tētahi whakaahuatanga o ngā momo tauhohenga ka pā mai
- ngā āhuatanga ka hiahiatia
- ngā mātakinga ka puta
- ngā whārite e whakaatu ana i te tātai hanganga o te (ngā) kaiwhakahohe whaiwaro me te (ngā) hua.

MĀ TE KAIMĀKA ANAKE

ASSESSOR'S USE ONLY

(c) Two bottles containing pent-1-ene, $CH_3CH_2CH_2CH{=}CH_2$, and hexane, $CH_3CH_2CH_2CH_2CH_2CH_3$, require identification.

Two reagents, bromine water, Br_2, and acidified potassium permanganate, MnO_4^- / H^+, are available.

Evaluate the possible use of BOTH reagents to distinguish between the pent-1-ene and hexane.

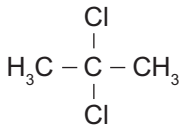
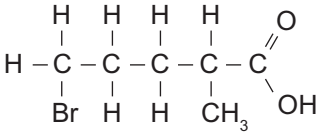
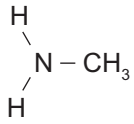
In your answer you should include:

- a description of the type of reactions that would occur
- any conditions that would be required
- any observations that would be made
- equations showing the structural formulae of the organic reactant(s) and product(s).

PĀTAI TUARUA

MĀ TE KAIMĀKA ANAKE

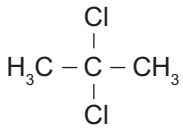
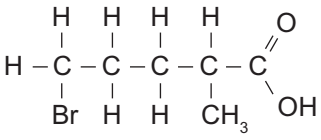
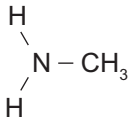
(a) Whakaotihia te tūtohi e whai ake nei hei whakaatu i te tātai hanganga me te ingoa IUPAC (nahanaha) mō ia pūhui.

Tātai hanganga	Ingoa
	
	waikawa ewaro
	
	
	2-aminopēwaro

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	Name
	
	ethanoic acid
	
	
	2-aminopentane

(b) Tuhia mai me pēhea te wehewehe i waenga i te aminopūwaro, $CH_3CH_2CH_2CH_2NH_2$, me te waikawa pūwaro, $CH_3CH_2CH_2COOH$, mā te whakamahi pepa tohu waikawa haukū.

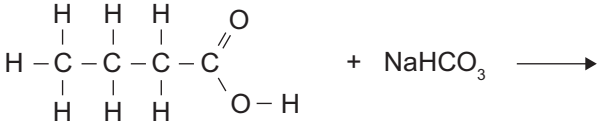
Homai tētahi pūtake mō tō whakautu.

(c) Ina tauhohea te waikawa pūwaro ki te konutai hauwai pākawa waro, $NaHCO_3$, ka kitea te koropupū i te wā o te tauhohenga.

(i) He aha te momo tauhohenga kei te puta?

(ii) Whakamāramahia he aha i kitea ai te koropupū i te wā o te tauhohenga.

(iii) Whakaotia te whārite i raro nei hei whakaatu i te tātai hanganga o te hua whaiwaro kua puta.



ASSESSOR'S USE ONLY

(b) State how you could distinguish between aminobutane, $CH_3CH_2CH_2CH_2NH_2$, and butanoic acid, $CH_3CH_2CH_2COOH$, using damp litmus paper.

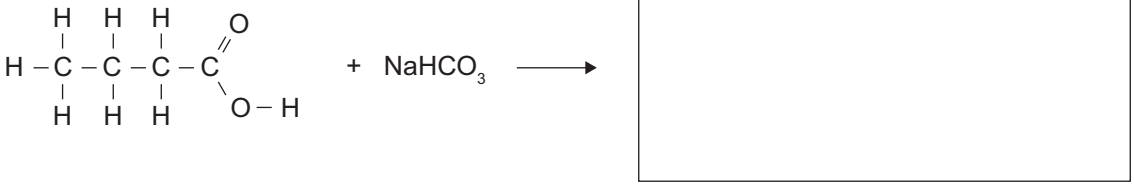
Give a reason for your answer.

(c) When butanoic acid reacts with sodium hydrogen carbonate, $NaHCO_3$, fizzing can be seen during the reaction.

(i) What type of reaction is occurring?

(ii) Explain why fizzing is observed during the reaction.

(iii) Complete the equation below to show the structural formula of the organic product formed.



(d) Ka tauhohe te ewaro haumāota, CH_3CH_2Cl, ki te KOH waiwai, te KOH waiwaihā, me te NH_3.

MĀ TE KAIMĀKA ANAKE

Whakatauritea ngā tauhohenga o te ewaro haumāota ki ngā kaiwhakahohe e toru.

I roto i tō whakautu me whakauru:

- te momo tauhohenga me te take i whakarōpūhia ai hei taua momo
- te momo rōpū mahinga i puta
- ngā whārite e whakaatu ana i ngā tātai hanganga mō ngā tauhohenga e tūpono ana.

(d) Chloroethane, CH_3CH_2Cl, reacts with aqueous KOH, alcoholic KOH, and with NH_3.

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Compare and contrast the reactions of chloroethane with the three reagents.

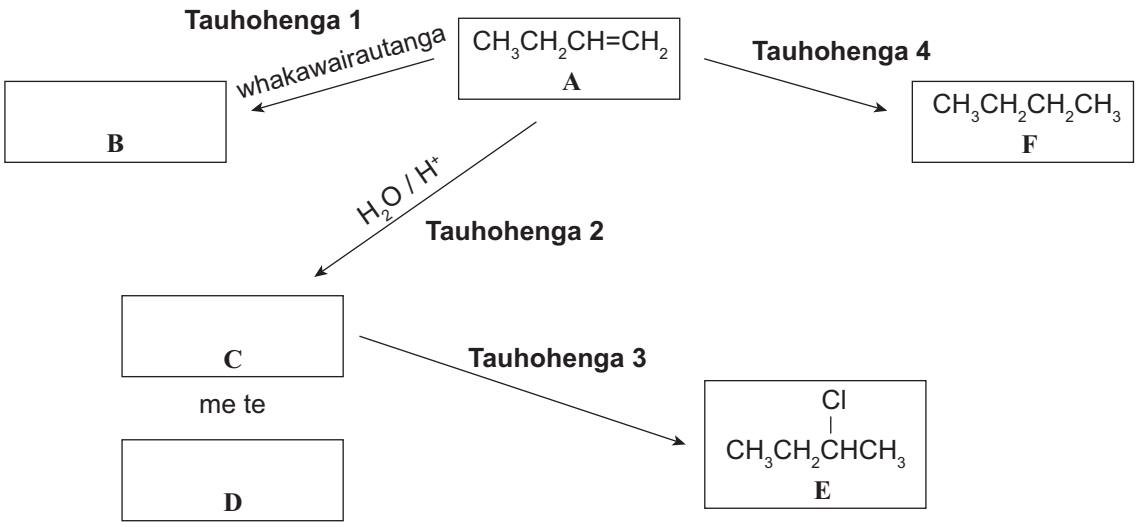
In your answer you should include:

- the type of reaction occurring and the reason why it is classified as that type
- the type of functional group formed
- equations showing structural formulae for reactions occurring.

PĀTAI TUATORU

MĀ TE KAIMĀKA ANAKE

E whakamahia ana te waiwaro rua-1-pūwaro i te raupapa tauhohenga i raro nei.



(a) (i) Tātuhia kia rua ngā wae tāruarua o te waerau, **B**, i hangaia i te **Tauhohenga 1**.

(ii) Homai te ingoa, te tātai rānei o tētahi kaiwhakahohe tōtika i te **Tauhohenga 4**; whakaurua ngā āhuatanga tauwhāiti e hiahiatia ana.

(iii) Homai te ingoa, te tātai rānei o tētahi kaiwhakahohe tōtika i te **Tauhohenga 3**; whakaurua ngā āhuatanga tauwhāiti e hiahiatia ana.

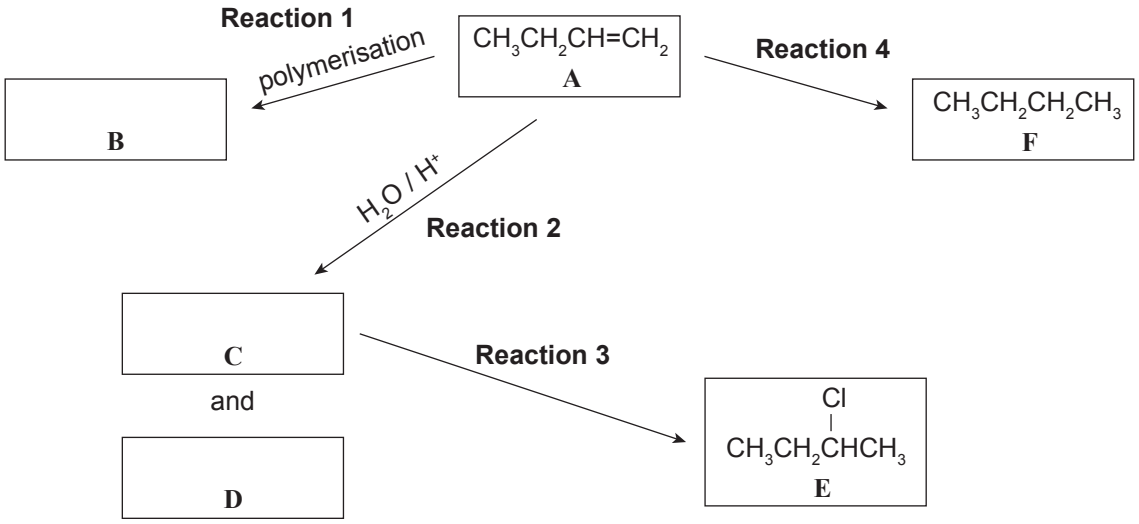
(b) Ka taea e te pūhui **A** te tīari hei poinanaha (*cis-trans*) āhuahanga?

Parahautia tō whakautu, me te kōrero mō ngā whakaritenga mō ngā poinanaha (*cis-trans*) āhuahanga.

QUESTION THREE

ASSESSOR'S USE ONLY

But-1-ene is used in the reaction sequence shown below.



(a) (i) Draw two repeating units of the polymer, **B**, formed in **Reaction 1**.

(ii) Give the name or formula of a suitable reagent in **Reaction 4**; include any specific conditions required.

(iii) Give the name or formula of a suitable reagent in **Reaction 3**; include any specific conditions required.

(b) Can compound **A** exist as geometric (*cis-trans*) isomers?

Justify your answer, including reference to the requirements for geometric (*cis-trans*) isomers.

(c) (i) Tātuhia ngā tātai hanganga o ngā rāpoi ngota whaiwaro **C** me **D**, i hangaia i te **Tauhohenga 2**, ki ngā pouaka i raro nei.

MĀ TE KAIMĀKA ANAKE

C

D

(ii) Āta whakamāramatia te tautohenga i te **Tauhohenga 2**.

I roto i tō whakautu me whakauru:

- te tautohunga o ngā hua mātāmua, mātāmuri hoki
- tētahi whakamārama mō te take e rua pea ngā hua ka puta
- he parahautanga o tō whakatau i ngā hanganga rerekē ki ngā pouaka **C** me **D** me te kōrero mō te raupapa tauhohenga.

MĀ TE KAIMĀKA ANAKE

ASSESSOR'S USE ONLY

(c) (i) Draw the structural formulae of the organic molecules **C** and **D**, formed in **Reaction 2**, in the boxes below.

C	**D**

(ii) Elaborate on the reaction occurring in **Reaction 2**.

In your answer you should include:

- identification of the major and minor products
- an explanation of why there are two possible products
- justification of your placement of the different structures in boxes **C** and **D** with reference to the reaction sequence.

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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

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English translation of the wording on the front cover

Level 2 Chemistry, 2012

91165 Demonstrate understanding of the properties of selected organic compounds

9.30 am Tuesday 20 November 2012
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–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.