90932M

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1

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 1, 2015

90932M Te whakaatu māramatanga ki ētahi āhuatanga o te matū ā-waro

9.30 i te ata Rātū 24 Whiringa-ā-rangi 2015
Whiwhinga: Whā

Paetae	Kaiaka	Kairangi
Te whakaatu māramatanga ki ētahi āhuatanga o te matū ā-waro.	Te whakaatu māramatanga hōhonu ki ētahi āhuatanga o te matū ā-waro.	Te whakaatu māramatanga matawhānui ki ētahi āhuatanga o te matū ā-waro.

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.

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 2–17 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.

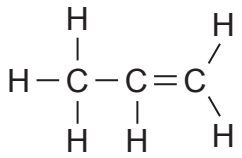
TAPEKE

MĀ TE KAIMĀKA ANAKE

TŪMAHI TUATAHI

MĀ TE KAIMĀKA ANAKE

(a) Whakaotia te tūtohi e whai nei mā te whakaingoa, te tātuhi rānei i te hanganga o ia pūhui whaiwaro.

Ingoa	Hanganga
Mewaro	
Owaro	
	

(b) Whakamahia ai te pūwaro me te powaro hei kora i roto i ngā muratahi puni.
He –42°C te pae koropupū o te powaro.

(i) He aha te āhua o te powaro i te paemahana rūma (18°C)?

(ii) Tuhia mai mēnā ka teitei ake, ka pāpaku ake rānei te pae koropupū o te pūwaro i tō te powaro.

Homai he pūtake mō tō whakautu mā te whakamahi i ō mōhiotanga ki te hanganga me ngā āhuatanga o ngā waiwaro tahi.

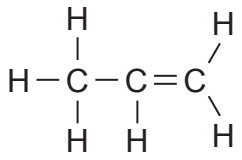
Ko te pae koropupū o te pūwaro he: **teitei ake** **pāpaku ake**
(porohitatia te whakautu tika)

Take:

QUESTION ONE

ASSESSOR'S USE ONLY

(a) Complete the table below by naming or drawing the structure of each organic compound.

Name	Structure
Methane	
Hexane	
	

(b) Butane and propane are both used as fuel in camping burners.
Propane has a boiling point of –42°C.

(i) What state would propane be at room temperature (18°C)?

(ii) State whether the boiling point of butane will be higher or lower than propane.

Give a reason for your answer using your knowledge of the structure and properties of alkanes.

Boiling point of butane would be: **higher** **lower**
(*circle correct answer*)

Reason:

(c) Ko te tikanga ka whai pānui whakatūpato ngā muratahi puni e tohutohu ana i ngā tāngata kia whakamahia ki tētahi wāhi hauhau i ngā wā katoa (kia nui te hāora), kei pā mai he whara kino, he mate rānei.

I runga i ngā here manatārua, kāore e whakaaetia te whakaaturanga o tēnei rauemi i konei.

http://www.huntingandfishing.co.nz/camping-tramping/cookware-coolers/msr-pocket-rocket-stove.html

Whakawhānuihia te take e tukuna ai tēnei whakatūpato ki ngā muratahi puni.

Whakamahia tētahi muratahi puni whai **powaro** hei tauira.

I tō tuhinga, me:

- tuhi te momo tauhohenga ngingiha ka puta ina iti te hāora
- whakaahua ngā kitenga ka kitea mēnā he iti te hāora, ā, ka tūhono i ēnei ki te tauhohenga e puta ana
- whakamārama ngā pānga e rua o ngā hua ngingiha ki te hauora tangata ina iti te hāora
- tuhi tētahi whārite kupu me tētahi whārite tohu taurite mō te tauhohenga e puta ana.

Whārite kupu:

Whārite tohu taurite:

MĀ TE KAIMĀKA ANAKE

(c) Camping burners usually have a warning notice instructing people to always use them in a well-ventilated place (plenty of oxygen) otherwise serious injury or death may occur.

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http://www.huntingandfishing.co.nz/camping-tramping/cookware-coolers/msr-pocket-rocket-stove.html

Elaborate on why this warning is given on camping burners.

Use a burner that contains **propane** as an example.

In your answer, you should:

- state the type of combustion reaction that occurs when there is a shortage of oxygen
- describe the observations that may be seen if there was a shortage of oxygen, and link these to the reaction occurring
- explain two effects that the combustion products can have on human health when there is a shortage of oxygen
- write a word equation and a balanced symbol equation for the reaction occurring.

Word equation:

Balanced symbol equation:

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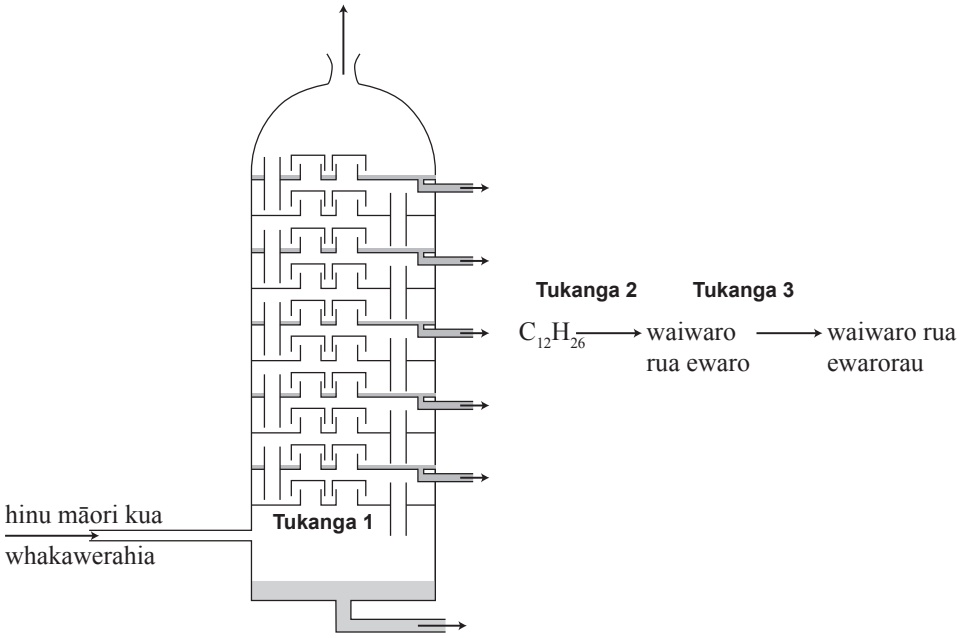
TŪMAHI TUARUA

MĀ TE KAIMĀKA ANAKE

He maha ngā tukanga ka whakahaerehia mō te hinu māori, he ranunga o ngā pūhui maha, hei hanga i ngā hua whaitake.
E whakaatu ana te hoahoa i raro nei i ētahi tukanga e toru ka whai wāhi pea.



(a) (i) Homai te ingoa o ia tukanga e tautohua ana i roto i te hoahoa i runga.

Tukanga	Ingoa o te tukanga
1	
2	
3	

(ii) Whakamāramahia te take nā te hanganga o te waiwaro rua ewaro e āhei ai te **Tukanga 3**, hei hanga i te waiwaro rua ewarorau (polyethene).

QUESTION TWO

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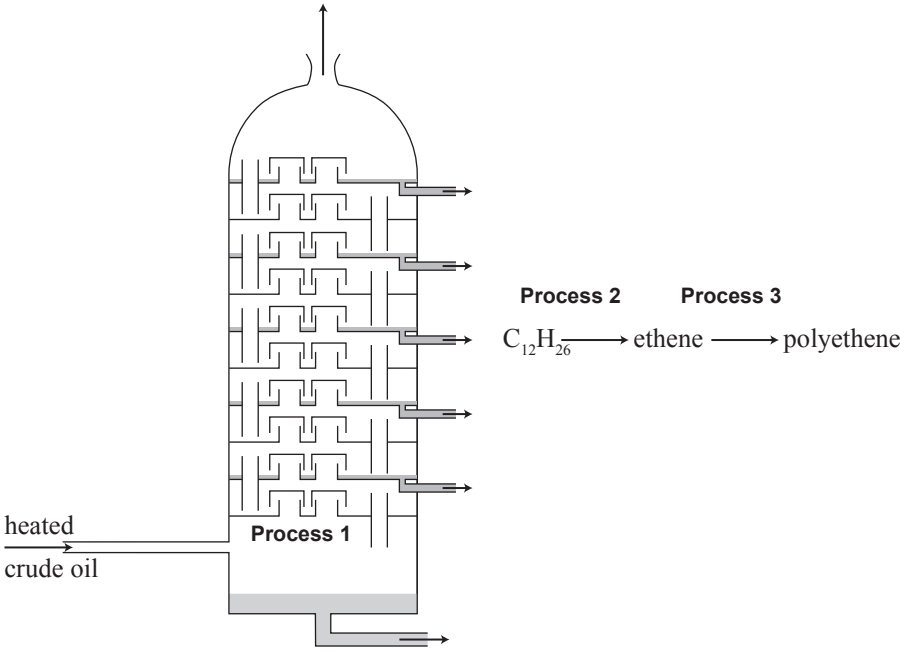
Crude oil, a mixture of many compounds, undergoes several processes to produce useful products. The diagram below shows three of the processes that may be involved.



(a) (i) Give the name of each of the processes identified in the diagram above.

Process	Name of process
1	
2	
3	

(ii) Explain how the structure of ethene allows it to undergo **Process 3**, to form polyethene.

MĀ TE KAIMĀKA ANAKE

(b) Ka tāea te ngaruawaro [dodecane], $C_{12}H_{26}$, te whakahohe i te **Tukanga 2**, hei hanga i te waiwaro rua ewaro me te wawaro.

(i) Tuhia tētahi āhuatanga kotahi e hiahiatia ana i te wā o te **Tukanga 2**.

(ii) Whakaotihia te whārite tohu e whai ake ana mō te tauhohenga o te ngaruawaro i te wā o te **Tukanga 2**.

Kia maumahara ki te whakataurite i te whārite.

$$C_{12}H_{26} \rightarrow$$

(c) Homai he whakaaturanga taipitopito o te **Tukanga 1**, e ai ki te hoahoa kei te whārangi 6.

I tō tuhinga, me:

- whakamārama he aha i hiahiatia ai te **Tukanga 1**
- whakawhānui he aha ka pā i te wā o te **Tukanga 1**, ā, ka tūhono atu i tēnei ki te hanganga me ngā āhuatanga o ngā waiwaro i roto i te hinu māori.
- whakaingoa kia rua ngā hua, i tua atu i te ngaruawaro, ka hangaia i te wā o te **Tukanga 1**.

ASSESSOR'S USE ONLY

(b) Dodecane, $C_{12}H_{26}$, can be reacted in **Process 2**, to form ethene and octane.

(i) State one condition that is needed during **Process 2**.

(ii) Complete the following symbol equation for the reaction of dodecane during **Process 2**.

Remember to balance the equation.

$$C_{12}H_{26} \rightarrow$$

(c) Give a detailed account of **Process 1**, as shown in the diagram on page 7.

In your answer, you should:

- explain why **Process 1** is necessary
- elaborate on what occurs during **Process 1**, and link this to the structure and properties of the hydrocarbons in crude oil.
- name two products, other than dodecane, that are formed during **Process 1**.

TŪMAHI TUATORU

MĀ TE KAIMĀKA ANAKE

He pūhui waro ngā waiwaihā, pēnei i te waihā ewaro, ēngari ēhara i te waiwaro pēnei i ngā waiwaro tahi me ngā waiwaro rua.

(a) (i) Tātuhia te tātai hanganga o te waihā ewaro ki te pouaka i raro.

(ii) Whakamāramahia te take ēhara ngā waiwaihā i te waiwaro, ēngari he waiwaro ngā waiwaro tahi me ngā waiwaro rua.

(iii) Whakaahuahia mai he aha e tāea ai te wehe i tētahi tautauira waihā ewaro mai i tētahi tautauira wawaro mā te whakamahi anake i te wai.

Whakamāramahia mai he aha i tāea ai ngā āhuatanga ōkiko o ngā pūhui te tautohu mā tēnei tikanga.

QUESTION THREE

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Alcohols, such as ethanol, are carbon compounds, but are not hydrocarbons like alkanes and alkenes.

(a) (i) Draw the structural formula of ethanol in the box below.

(ii) Explain why alcohols are not hydrocarbons, but alkanes and alkenes are.

(iii) Describe how a sample of ethanol could be distinguished from a sample of octane using only water.

Explain how the physical properties of the compounds allow them to be identified in this way.

(b) Ko tētahi tikanga o te whakanao waihā ewaro ko te whakamōi.

MĀ TE KAIMĀKA ANAKE

Whakamāramahia he pēhea te whakanao waihā ewaro mā te whakamōi.

I tō tuhinga, me:

- whakaoti i te whārite kupu e whai ake nei mē te whārite tohu taurite
- tautohu me te whakawhānui i ngā momo āhuatanga e hiahiatia ana kia puta ai te whakamōi.

Whārite kupu:

kūhuka →

Whārite tohu taurite:

$C_6H_{12}O_6$ →

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(b) One method of producing ethanol is by fermentation.

Explain how ethanol is produced by fermentation.

In your answer, you should:

- complete the following word equation and balanced symbol equation
- identify and elaborate on any conditions required for fermentation to occur.

Word equation:

glucose $\rightarrow$

Balanced symbol equation:

$C_6H_{12}O_6$ $\rightarrow$

(c) Ko te waihā ewaro i takea mai i te tipu huka ka tāea te whakaranu ki te penehīni hei whakanao korakoiora mō ngā waka.

I runga i ngā here manatārua, kāore e whakaaetia te whakaaturanga o tēnei rauemi i konei.

Ka tahu te waihā ewaro i roto i te hau me tētahi mura tata nei te kore kitea, ā, he painga ōna hei korakoiora tēnā i ētahi atu waiwaro ka kitea i roto i te penehīni, pēnei i te hewaro, C_7H_{16}.

Aromātaitia te whakamahinga o te waihā ewaro i roto i ngā korakoiora mō ngā waka.

www.renewablegreenenergypower.com/biofuel-101/

I tō tuhinga, me:

- tuhi te momo tauhohenga ngingiha ka pā ki te waihā ewaro i te nuinga o te wā, ā, ka whakaingoa i ngā hua ka puta
- whakamārama kia rua ngā pānga ka taea e ngā hua ngingiha o te waihā ewaro ki te taiao
- whakawhānui ngā painga o te whakamahi waihā ewaro hei korakoiora tēnā i ngā kora waiwaro, pēnei i ērā he whai hewaro
- whakauru tētahi whārite tohu taurite mō te ngingiha i te waihā ewaro.

Whārite tohu taurite:

MĀ TE KAIMĀKA ANAKE

(c) Ethanol made from sugar cane can be mixed with petrol to produce a biofuel for cars.

Ethanol burns in air with an almost invisible flame, and has some useful advantages as a biofuel compared to some hydrocarbons found in petrol, such as heptane, C_7H_{16}.

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www.renewablegreenenergypower.com/biofuel-101/

Evaluate the use of ethanol in biofuels for cars.

In your answer, you should:

- state the type of combustion reaction that ethanol usually undergoes, and name the products formed
- explain two effects that the combustion products of ethanol can have on the environment
- elaborate on the advantages of using ethanol as a biofuel compared to hydrocarbon fuels, such as those containing heptane
- include a balanced symbol equation for the combustion of ethanol.

Balanced symbol equation:

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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 1 Chemistry, 2015

90932 Demonstrate understanding of aspects of carbon chemistry

9.30 a.m. Tuesday 24 November 2015
Credits: Four

90932M

Achievement	Achievement with Merit	Achievement with Excellence
Demonstrate understanding of aspects of carbon chemistry.	Demonstrate in-depth understanding of aspects of carbon chemistry.	Demonstrate comprehensive understanding of aspects of carbon chemistry.

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.

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 2–17 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.