90932M

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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, 2017

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

9.30 i te ata Rātū 14 Whiringa-ā-rangi 2017
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 mō ō tuhinga, whakamahia ngā whārangi wātea kei muri o tēnei pukapuka, ka āta tohu ai i ngā tau tūmahi.

Tirohia mēnā e tika ana te raupapatanga o ngā whārangi 2–19 kei roto i tēnei pukapuka, ka mutu, kāore tētahi o aua whārangi i te takoto kau.

HOATU TE PUKAPUKA NEI KI TE KAIWHAKAHAERE HEI TE MUTUNGA O TE WHAKAMĀTAUTAU.

TAPEKE

MĀ TE KAIMĀKA ANAKE

TŪMAHI TUATAHI

MĀ TE KAIMĀKA ANAKE

(a) Tātuhia ngā tātai hanganga o te pōwaro me te waiwaro rua pōwaro ki ngā tapawhā i raro.

Pōwaro	Waiwaro rua pōwaro

(b) Ka whakamahia te waiwaro rua pōwaro hei mahi i te waerau waiwaro rua pōwaro rau.

Ki te tapawhā i raro, tātuhia he wāhanga o te waerau waiwaro rua pōwaro rau me ngā wae tāruarua e TORU.

(c) Ko te pae koropupū mō te waiwaro rua ewaro he –104ºC me te –48ºC mō te waiwaro rua pōwaro.

He aha i teitei ake ai te pae koropupū o te waiwaro rua pōwaro i te waiwaro rua ewaro?

Whakamāramatia tō tuhinga.

QUESTION ONE

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(a) Draw the structural formulae of propane and propene in the boxes below.

Propane	Propene

(b) Propene is used to make the polymer polypropene.

In the box below, draw a section of the polymer polypropene with THREE repeating units.

(c) The boiling point for ethene is –104°C and propene is –48°C.

Why does propene have a higher boiling point than ethene?
Explain your answer.

(d) Whakamāramatia mai te take ka taea te whakamahi te **waiwaro rua pōwaro** hei mahi waerau, engari kāore e taea e te **pōwaro**.

I tō tuhinga, me whakamārama koe i te tauhohenga matū i waenga i ngā rāpoi ngota o te waiwaro rua pōwaro hei hanga i te waerau waiwaro rua pōwaro rau.

MĀ TE KAIMĀKA ANAKE

(d) Explain why **propene** can be used to make polymers, but **propane** cannot.

In your answer, you should explain the chemical reaction that occurs between propene molecules to form the polymer, polypropene.

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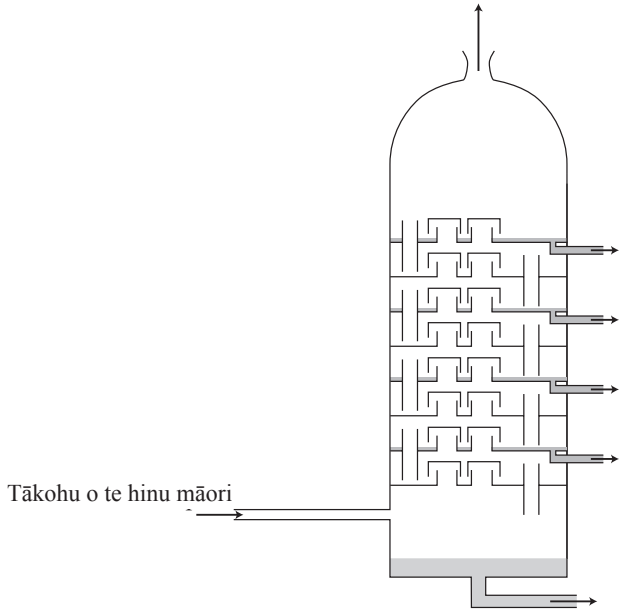
TŪMAHI TUARUA

MĀ TE KAIMĀKA ANAKE

Ka iheu tauwehetia te hinu māori i roto i ngā pourewa teitei, pēnei i ēnei e whakaaturia ana ki te hoahoa i raro.



(a) (i) He aha te take me iheu tauwehe te hinu māori i mua i te whakamahinga?
Whakamāramatia tō tuhinga.

(ii) Whakamāramatia mai he aha i huihui ai ngā waiwaro iti ake ki runga ake o te pourewa.

QUESTION TWO

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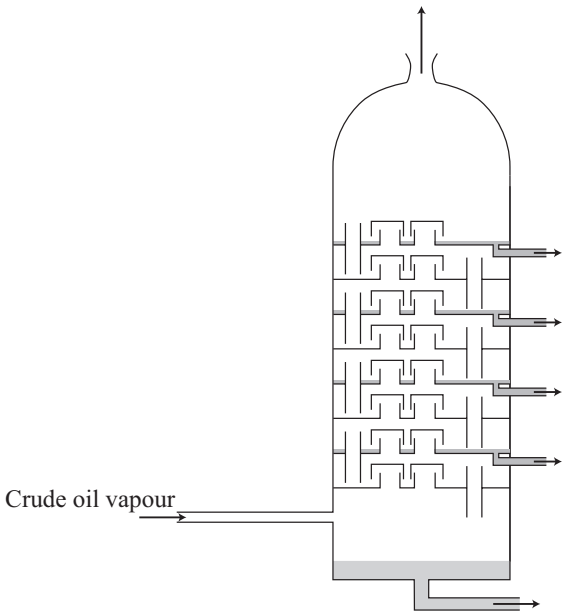
Crude oil is fractionally distilled in tall towers, like the one shown in the diagram below.



(a) (i) Why must crude oil be fractionally distilled before it can be used?
Explain your answer.

(ii) Explain why smaller hydrocarbons are collected at the top of the tower.

(b) Whakaotihia te whārite mō te wāwāhi i te ngawaro, $C_{10}H_{22}$, hei hanga pēwaro me ētahi atu hua e rua.

MĀ TE KAIMĀKA ANAKE

$$C_{10}H_{22} \rightarrow \quad + \quad +$$

(c) Whakatauritea ngā tukanga o te ihu tauwehenga me te wāwāhitanga.

I tō tuhinga, me kōrero mō ngā āhuatanga ōkiko, āhuatanga matū hoki/rānei e hāngai ana ki ngā waiwaro.

He wāhi anō mō tō tuhinga mō tēnei tūmahi kei te whārangi 10.

ASSESSOR'S USE ONLY

(b) Complete the equation for the cracking of decane, $C_{10}H_{22}$, to produce pentane and two other products.

$C_{10}H_{22} \rightarrow$ + +

(c) Contrast the processes of fractional distillation and cracking.

In your answer, you should refer to relevant physical and/or chemical properties of hydrocarbons.

There is more space for your answer to this question on page 11.

MĀ TE KAIMĀKA ANAKE

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TŪMAHI TUATORU

MĀ TE KAIMĀKA ANAKE

(a) (i) Tātuhia ngā tātai hanganga o te hewaro me te waihā mewaro ki ngā tapawhā i raro nei.

Hewaro

Waihā mewaro

(ii) Whakamāramatia he aha i whakarōpūtia ai te hewaro hei waiwaro, engari kaua te waihā mewaro.

(b) He wē kanokore te hewaro me te waihā mewaro i te paemahana o te rūma (25°C).

Ka pēhea te whakamahi i te wai hei whakarerekē i ngā tīpakonga motuhake o te hewaro me te waihā mewaro?

I tō tuhinga, me whakauru koe ō kitenga, me te whakamārama i ngā āhuatanga ōkiko o ngā pūhui e RUA e taea ai tēnei tautohutanga.

Ka haere tonu te Tūmahi Tuatoru i te whārangi 14.

QUESTION THREE

ASSESSOR'S USE ONLY

(a) (i) Draw the structural formulae of heptane and methanol in the boxes below.

Heptane

Methanol

(ii) Explain why heptane is classified as a hydrocarbon, while methanol is not.

(b) Heptane and methanol are both colourless liquids at room temperature (25°C).

How could water be used to distinguish between separate samples of heptane and methanol?

In your answer, you should include any observations that would be made, and explain the physical properties of BOTH compounds that allow this identification.

Question Three continues on page 15.

(c) Ka taea te hewaro me te waihā mewaro te whakamahi hei kora, ā, ka taea hoki te ngingiha oti me te ngingiha otikore.

MĀ TE KAIMĀKA ANAKE

Tātarihia ngā tauhohe ngingiha o ngā kora e rua - te hewaro me te waihā mewaro.

I tō tuhinga me whakauru koe:

- he whakaahuatanga o ngā kitenga ka oti mō te ngingiha oti me te ngingiha otikore o te hewaro, o te waihā mewaro RĀNEI
- he whakamāramatanga o te pānga ki te hauora tangata o ngā hua ngingiha E RUA mai i te ngingiha **otikore** o te hewaro, o te waihā mewaro RĀNEI
- he whakamāramatanga o ngā hua pai o te whakamahi waihā mewaro kē hei kora kaua te hewaro
- he whārite tohu taurite mō te ngingiha **otinga** o ia kora.

Whārite tohu taurite mō te ngingiha **otinga** o te hewaro:
Whārite tohu taurite mō te ngingiha **otinga** o te waihā mewaro:

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(c) Both heptane and methanol can be used as fuels and can undergo both complete and incomplete combustion.

Analyse the combustion reactions of the two fuels – heptane and methanol.

In your answer, you should include:

- a description of the observations that would be made for both complete and incomplete combustion of EITHER heptane OR methanol
- an explanation of the effect on human health for TWO combustion products from the **incomplete** combustion of EITHER heptane OR methanol
- an explanation of the advantages of using methanol as a fuel compared to heptane
- a balanced symbol equation for the **complete** combustion of each fuel.

Balanced symbol equation for the **complete** combustion of heptane:
Balanced symbol equation for the **complete** combustion of methanol:

MĀ TE KAIMĀKA ANAKE

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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, 2017

90932 Demonstrate understanding of aspects of carbon chemistry

9.30 a.m. Tuesday 14 November 2017
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 2–19 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.