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# NZQA

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SUPERVISOR'S USE ONLY

## Level 1 Chemistry, 2016

### 90932 Demonstrate understanding of aspects of carbon chemistry

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

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 2–10 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.**

**TOTAL**

ASSESSOR'S USE ONLY

**QUESTION ONE**

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

Propane	Propene

- (b) (i) What is the type of bonding present in a molecule of propane?

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Give a reason for your answer.

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- (ii) How does the structure of propene differ to propane?

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- (c) Alkanes can be used as fuels. Compare and contrast: the complete combustion of alkanes, which produces carbon dioxide; and the incomplete combustion, which produces carbon monoxide and carbon in addition to carbon dioxide.

In your answer, you should:

- use butane as an example to illustrate your answer
- give an explanation of an effect on the environment for TWO combustion products
- include balanced symbol equations for the reactions occurring, in the labelled boxes below.

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Balanced symbol equation for the **complete** combustion of butane:

Balanced symbol equation for the **incomplete** combustion of butane:

**QUESTION TWO**

- (a) Draw the structural formulae of methanol and ethanol in the boxes below.

Methanol	Ethanol

- (b) (i) The boiling point for methanol is 65°C and ethanol is 78°C.

Why does ethanol have a higher boiling point than methanol?

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- (ii) Why are both methanol and ethanol soluble in water?

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- (c) How does the industrial preparation of methanol from natural gas differ from the process of fermentation to form ethanol?

In your answer, you should include:

- a description of the two processes
- explanations of any conditions required
- balanced symbol equations for any reactions occurring, in the labelled boxes below.

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Balanced symbol equation(s) for the industrial preparation of methanol:

Balanced symbol equation for preparation of ethanol using fermentation:

**QUESTION THREE**

Crude oil undergoes fractional distillation in tall towers, like the ones shown in the photograph below. The different fractions produced have many uses.



[http://photoartforums.com/forums/uploads/1277616145/gallery\\_85\\_17\\_924301.jpg](http://photoartforums.com/forums/uploads/1277616145/gallery_85_17_924301.jpg)

- (a) Name TWO of the fractions obtained from a fractional distillation tower, and describe ONE use for each.

<b>Fraction</b>	<b>Name</b>	<b>Use</b>
1		
2		

- (b) (i) Why does crude oil need to undergo fractional distillation before it can be used?

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- (ii) Explain why fractional distillation is carried out in tall towers.

In your answer you should link the process of fractional distillation to the physical properties and chemical structure of the hydrocarbons in crude oil.

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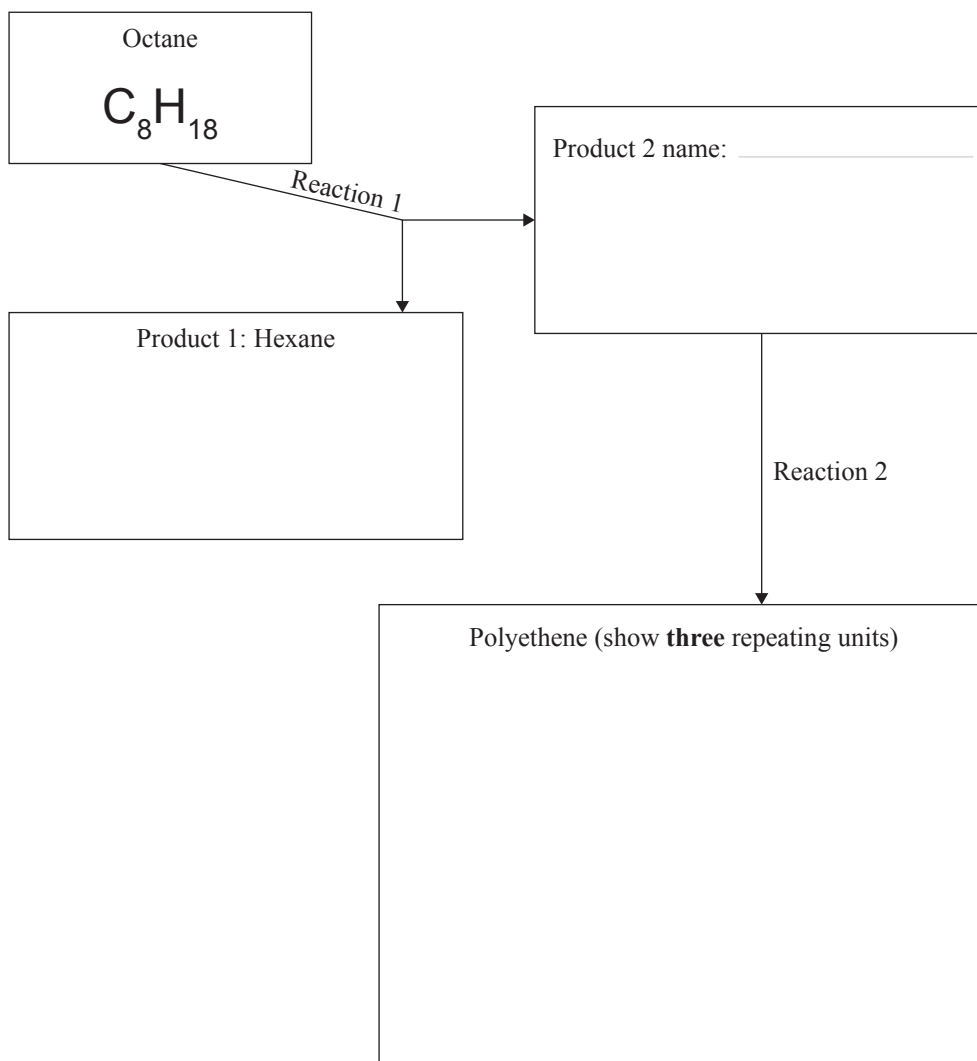
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**Question Three continues  
on the following page.**

- (c) Octane can be used to produce the polymer, polyethene. Octane undergoes Reaction 1 to form hexane and Product 2. Product 2 can be used to produce polyethene.
- (i) Complete the reaction scheme by filling in the boxes to show all structural formulae, as well as the name for Product 2.





(ii) Elaborate on Reaction 1 and Reaction 2.

In your answer, you should:

- name the types of reactions occurring
- give the conditions required for each reaction
- explain how polyethene can be made from Product 2.

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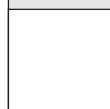
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