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MANA TOHU MĀTAURANGA O AOTEAROA

For Supervisor's use only

Level 3 Science, 2007

90730 Describe selected organic compounds and their uses

Credits: Four
9.30 am Wednesday 28 November 2007

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 answer ALL the questions in this booklet.

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 2–10 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.

For Assessor's use only	**Achievement Criteria**				
Achievement		**Achievement with Merit**		**Achievement with Excellence**	
Describe selected organic compounds and their uses.		Explain selected organic compounds and their uses.		Discuss selected organic compounds and their uses.	
Overall Level of Performance					

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You are advised to spend 45 minutes answering the questions in this booklet.

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QUESTION ONE: ORGANIC COMPOUNDS

(a) Complete the following table with the name or structure of each compound.

Name	Structure
Hexane	(i)
(ii)	$CH_3CH{=}CH_2$
Ethanoic Acid	(iii)
(iv)	$CH_3(CH_2)_3OH$

(b) Name and draw the structure of the ester formed from compounds (iii) and (iv) above.

Ester name _____

QUESTION TWO: CRUDE OIL

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Crude oil is a mixture of hydrocarbons of different chain lengths called fractions. To obtain the different hydrocarbons that are used, the mixture needs to be separated into the fractions. This is done in a fractional distillation column, as shown in the diagram below.

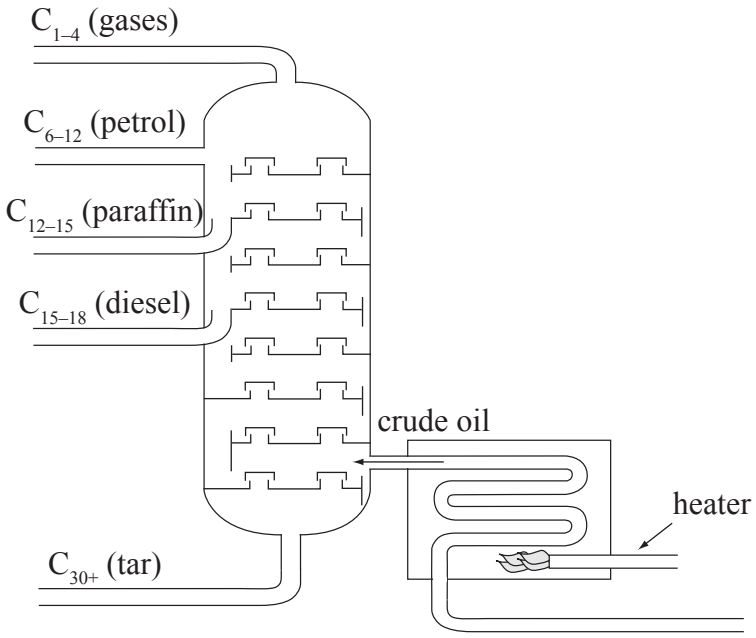

Diagram of a fractional distillation column

Crude oil is heated to 450°C before it is passed into the column, as indicated in the diagram.

(a) (i) Name the physical property on which the process of fractional distillation is dependent.

_____

(ii) Describe the reason the crude oil is heated to 450°C.

_____

_____

(iii) Explain why the crude oil enters the column, as shown in the diagram, and not closer to the bottom where the tar is collected.

_____

_____

_____

_____

(iv) Discuss why petrol leaves higher up the column than diesel. Consider the length of the hydrocarbon chains and the forces of attraction between them in your answer.

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(b) A major component of petrol is octane.

Write a balanced symbol equation in the box below for the **complete** combustion of octane.

QUESTION THREE: ALKENES AND ALKANES

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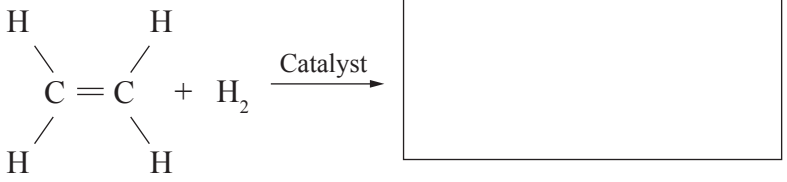
A by-product of crude oil refining is ethene. Ethene belongs to the alkene hydrocarbon group. Ethene is insoluble in water.

(a) Ethene will react with hydrogen in the presence of a catalyst.

In the box below, draw the structural formula of the organic chemical that would be formed when ethene reacts with hydrogen gas in the presence of a catalyst. Name the new chemical formed.



Ethene Name = _____

(b) Discuss why alkanes and alkenes are soluble in other hydrocarbons, but insoluble in water.

Ethene molecules react to form the polymer polyethene (polythene).

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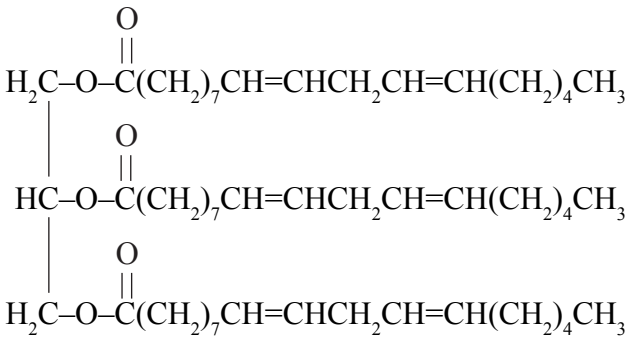
(c) Describe what is meant by the term **polymer**.

(d) Draw the structure of a short chain of polythene made from **three** ethene molecules.

QUESTION FOUR: FATS AND OILS

Fats and oils are also known as triglycerides.
The following compound represents a triglyceride.

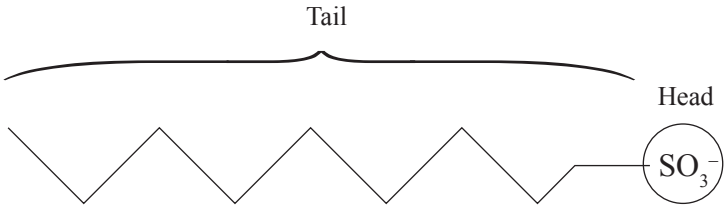


(a) **Circle** ONE ester functional group on the compound above.

(b) Name the two types of molecules that react together to form a triglyceride.

(c) Discuss the reasons why the triglyceride shown above is an **oil**.

To remove fat or oil from fabric a detergent is used.
The following diagram represents an anionic detergent molecule.



(d) On the diagram above, label the TWO key parts, showing the different properties of both ends of the detergent molecule.

(e) Discuss how detergent molecules like the one shown above would remove the fat or oil from fabric. Labelled diagrams in the box below may help your answer.

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Extra paper for continuation of answers if required.
Clearly number the question.

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Question number	

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