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SUPERVISOR'S USE ONLY

NEW ZEALAND QUALIFICATIONS AUTHORITY
MANA TOHU MĀTAURANGA O AOTEAROA

Level 2 Chemistry, 2013

91165 Demonstrate understanding of the properties of selected organic compounds

9.30 am Tuesday 19 November 2013
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.

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 2–10 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

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

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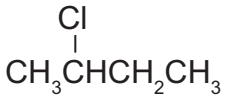
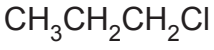
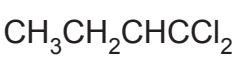
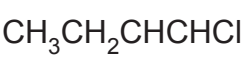
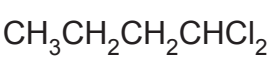
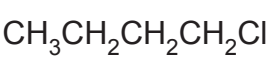
QUESTION ONE

(a) The structures of some organic compounds containing chlorine are shown below.

A 	**B** 
C 	**D** 
E 	**F** 

(i) Write the letter of the molecule that is a secondary chloroalkane. ☐

(ii) Describe why you chose the molecule in (i).

(b) Identify two molecules from the table in (a) that are constitutional (structural) isomers of each other.

Write the letters in the boxes below.

☐ and ☐

Justify your choice.

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(c) Molecule **D** can exist as geometric (*cis* and *trans*) isomers.

(i) Draw the geometric (*cis* and *trans)* isomers for molecule **D** in the boxes below.

cis isomer	*trans* isomer

(ii) Justify why molecule **D** can exist as geometric (*cis* and *trans)* isomers.

Your answer should include:

- an explanation of the requirements for *cis* and *trans* isomers
- reference to the structure of molecule **D**.

(d) Complete the following table to show the structural formula and IUPAC (systematic) name for each compound.

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Structural formula	IUPAC (systematic) name
	pentanoic acid
	3-methylbut-1-ene
$CH_3CH_2CH_2NH_2$	
$CH_3\underset{\displaystyle Cl}{\underset{\vert}{C}}HCH_2OH$	
$\begin{matrix} CH_2 & CH & CH_2 & CH_2 & CH_3 \\ \vert & \vert & & & \\ CH_3 & CH_3 & & & \end{matrix}$	

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The examination continues on the following page.

QUESTION TWO

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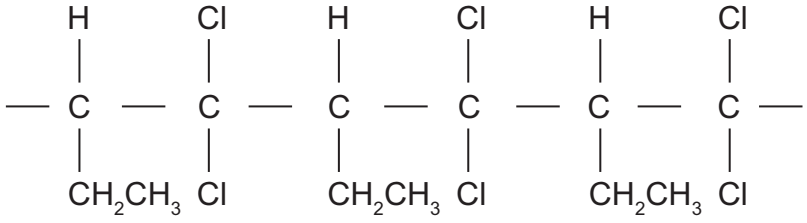
(a) (i) The molecule tetrafluoroethene, shown below, is the monomer for the polymer commonly known as Teflon.

$CF_2=CF_2$

Draw TWO repeating units for the Teflon polymer in the box below.

(ii) The following diagram shows three repeating sections of another polymer.



Draw the structural formula of the monomer molecule used to make this polymer.

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(b) Five separate colourless organic liquids are known to be:

- pentan-1-ol
- ethanol
- pent-1-ene
- pentane
- ethanamine.

Write a valid method to show how each of these liquids can be identified using **only** water, litmus paper, and bromine water, $Br_2(aq)$.

Your method should allow another student to identify these liquids, and include:

- the reagent used
- any observations made.

You do not need to include equations in your answer.

QUESTION THREE

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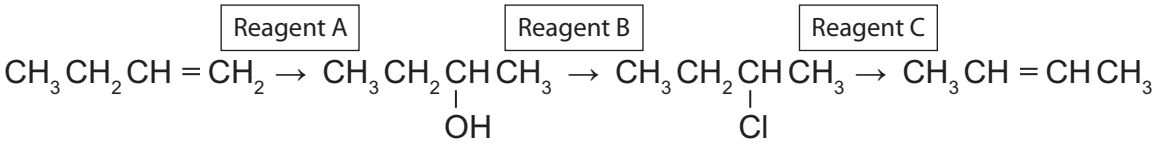
(a) The flow diagram below shows a reaction scheme for the conversion of but-1-ene into but-2-ene.

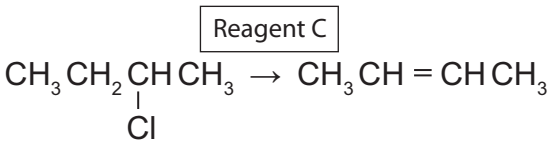


(i) Use the reaction scheme above to complete the following table to show:

- the formula of each reagent, including any necessary conditions
- the type of reaction occurring.

Reagent	Formula of reagent / conditions	Type of reaction
A		
B		
C		

(ii) For the following reaction:



Circle the words below that describe the product formed.

major product **minor product**

Explain your answer.

(b) Butan-1-ol can react separately with each of PCl_5, $Cr_2O_7^{2-}/H^+$, and concentrated H_2SO_4.

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Elaborate on the reactions of butan-1-ol with each of the three reagents.

For each reaction, your answer should include:

- the type of reaction occurring and the reason why it is classified as that type
- the name of the functional group formed in each product
- the structural formula of the **organic** product.

Extra paper if required.
Write the question number(s) if applicable.

QUESTION NUMBER

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