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Level 2 Chemistry, 2016

91165 Demonstrate understanding of the properties of selected organic compounds

9.30 a.m. Monday 21 November 2016
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 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 2–12 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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QUESTION ONE

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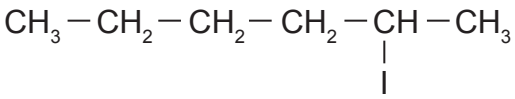
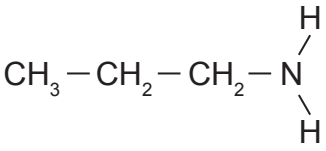
(a) (i) Complete the following table.

Structural formula	IUPAC (systematic) name
	
	3-methylpentanoic acid
	but-1-yne
	

(ii) Draw and name the THREE constitutional (structural) isomers of the organic compound C_5H_{12}.

(b) (i) Classify the following haloalkanes as primary, secondary or tertiary.

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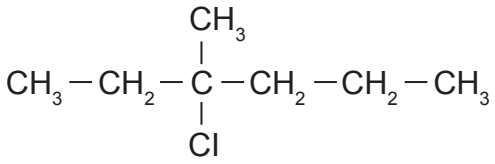
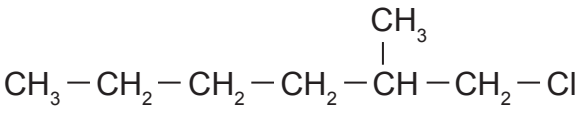
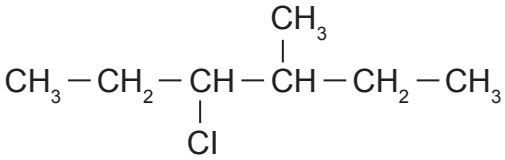
	Haloalkane	Classification
A		
B		
C		

(ii) Explain your choice for haloalkane **A**.

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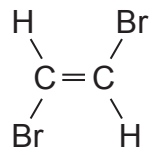
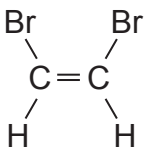
(c) Some alkenes are able to form *cis* and *trans* (geometric) isomers.

(i) Complete the names of structures **A** and **B** in the table below.

A	**B**
	
_____ 1,2-dibromoethene	_____ 1,2-dibromoethene

(ii) Elaborate on the structure of the organic compound 1,2-dibromoethene to explain why it is able to form *cis* and *trans* (geometric) isomers.

QUESTION TWO

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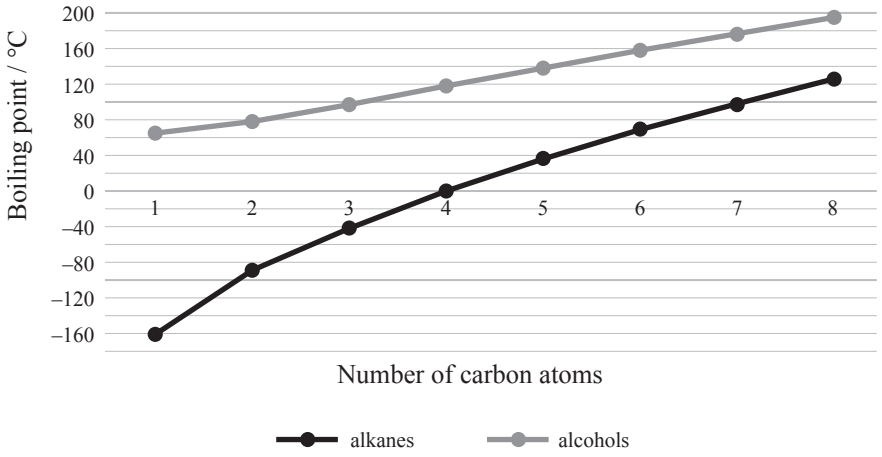
(a) **Boiling points of straight chain alkanes and primary alcohols**



(i) Identify the trends shown on the graph above.

(ii) Identify which alkanes will be gases at room temperature (20°C) according to the graph above.

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(b) Solutions of amines are described as bases, and solutions of carboxylic acids are described as acids.

(i) Complete the balanced equation for the reaction between solutions of ethanamine, $CH_3CH_2NH_2(aq)$ and hydrochloric acid, $HCl(aq)$.

$$CH_3CH_2NH_2(aq) + HCl(aq) \rightarrow$$

(ii) Explain the statement 'carboxylic acids have acidic properties'.

Refer to the reaction between ethanoic acid, $CH_3COOH(aq)$, and water, $H_2O(\ell)$ in your answer.

(c) Ethane gas, $C_2H_6(g)$, and ethene gas, $C_2H_4(g)$, will both react with bromine water, $Br_2(aq)$.

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Compare and contrast these two reactions.

In your answer you should refer to:

- any conditions required
- the observations made
- the types of reactions occurring
- structural formulae of the organic products formed.

QUESTION THREE

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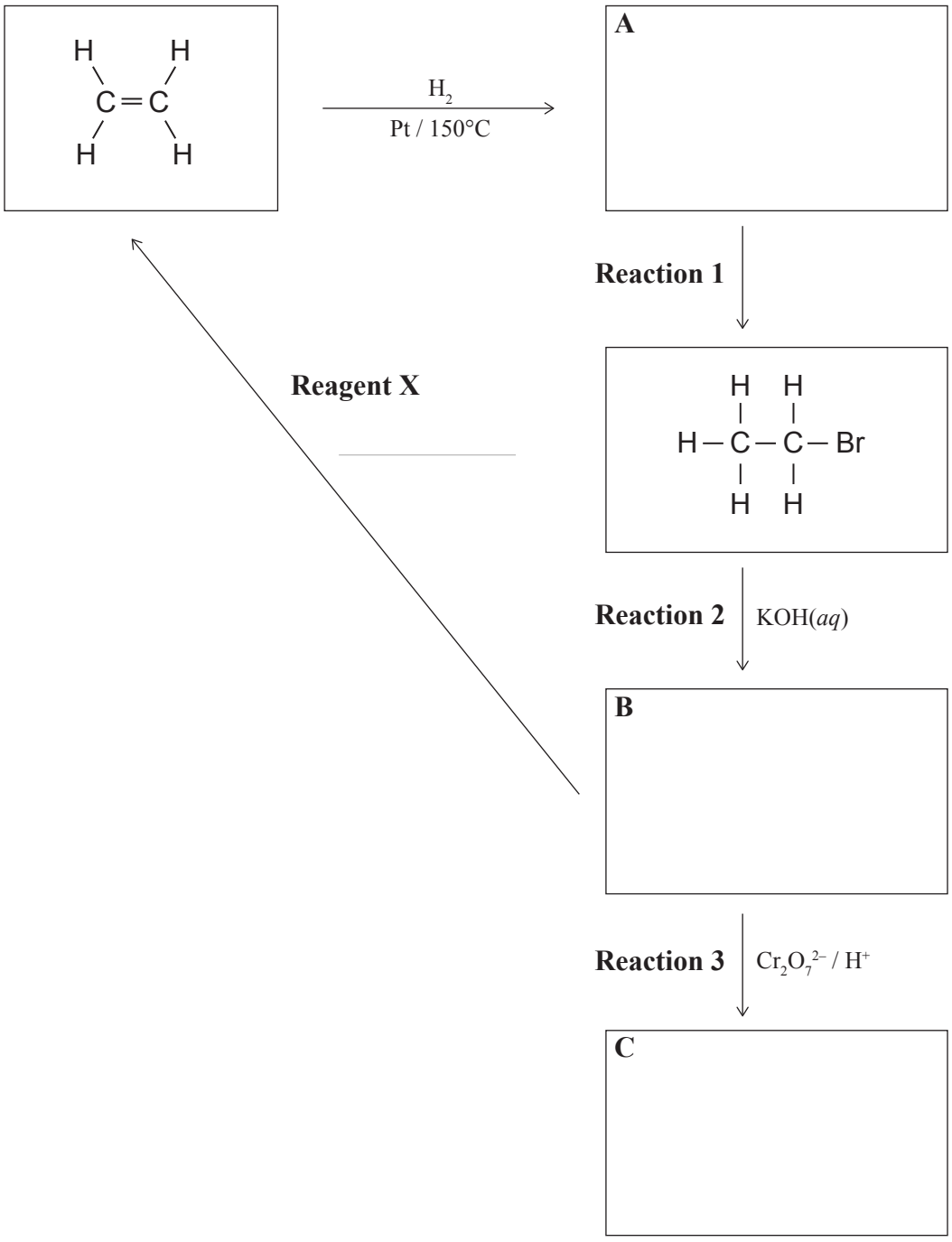
(a) (i) Complete the following chart by drawing the structural formulae for the organic compounds **A**, **B**, and **C** and identifying reagent **X**.



(ii) Identify the type of organic reaction occurring in each of Reactions 1, 2, and 3.

Reaction 1 _____

Reaction 2 _____

Reaction 3 _____

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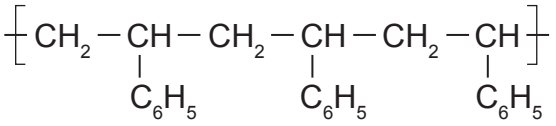
(b) Polystyrene is a polymer with the structure:



(i) Draw the monomer used to make the polymer polystyrene.

(ii) Explain why the formation of polystyrene from its monomer is classified as an addition polymerisation reaction.

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(c) The reaction between propene, $C_3H_6(g)$, and hydrogen chloride, $HCl(g)$, produces a mixture of products.

One of these products, the major product, is made in higher proportions than the other, the minor product.

$$CH_2=CH-CH_3 + HCl \rightarrow$$

(i) Draw and name the major and minor products for this reaction.

Major Product	Minor Product
Name:	**Name:**

(ii) Elaborate on the reaction that occurs between propene and hydrogen chloride.

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

QUESTION NUMBER

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