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Level 2 Chemistry, 2019

91165 Demonstrate understanding of the properties of selected organic compounds

2.00 p.m. Monday 11 November 2019
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 in the Resource Booklet 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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The examination continues on the following page.

QUESTION ONE

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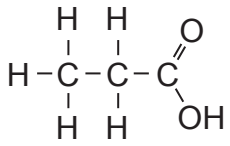
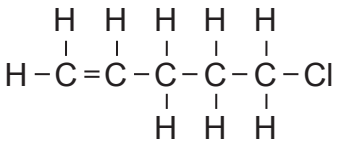
(a) Complete the following table.

Compound	IUPAC (systematic name)
	
	propan-2-amine
	
	2,3-dimethylbutane

(b) Draw four structural (constitutional) isomers of $C_4H_{10}O$ that are alcohols.
Classify the alcohols as either primary, secondary or tertiary.

1.	2.
Type of alcohol:	Type of alcohol:
3.	4.
Type of alcohol:	Type of alcohol:

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(c) Refer to the compounds in the table below to answer parts (i) to (iv).

A	$CH_3-CH=CH-CH_3$
B	$CH_3-CH_2-CH_2-CH_3$

(i) Draw and name the two geometric (*cis-trans*) isomers of compound **A**.

(ii) Explain why compound **A** exists as geometric (*cis-trans*) isomers while compound **B** does not.

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(iii) Explain how acidified potassium permanganate solution, $KMnO_4/H^+(aq)$, can be used to distinguish between compounds **A** and **B**.

In your answer you should:

- identify the type of reaction
- describe any relevant observations.

(iv) Compounds **A** and **B** will both react with bromine water, $Br_2(aq)$.

Compare and contrast these reactions by referring to the conditions required, the observations, the products formed, and the type of reaction.

QUESTION TWO

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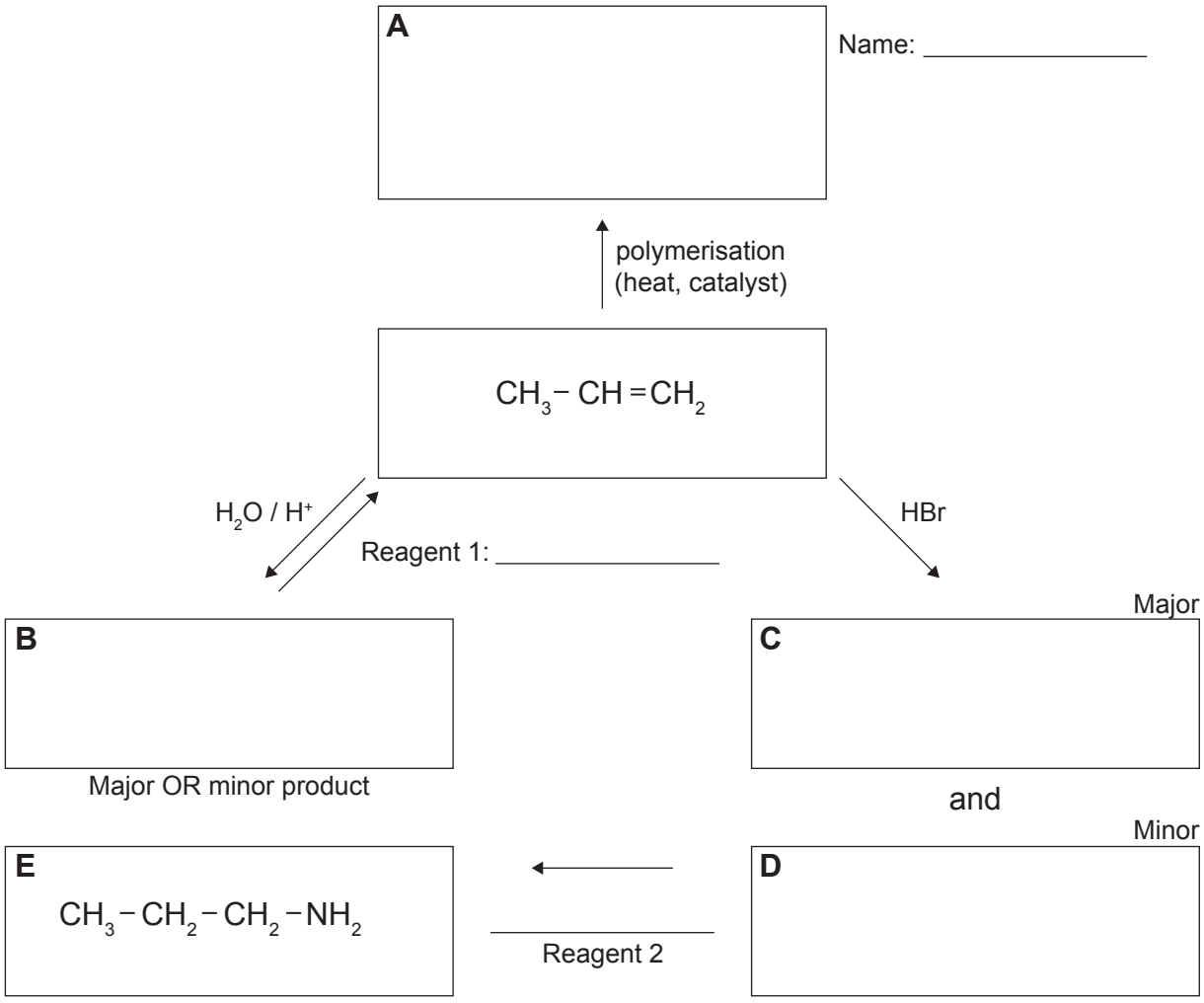
(a) Complete the following reaction scheme for propene, C_3H_6, by drawing the structural formulae for the organic compounds **A** to **D**, naming compound **A** and identifying Reagents **1** and **2**, including any conditions.



(b) Explain how you identified the major and minor products (**C** and **D**) in the reaction of propene with hydrogen bromide solution, HBr(*aq*).

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(c) Compare and contrast the reaction that forms compound **B** to the reverse reaction that forms propene, C_3H_6, from compound **B**.

QUESTION THREE

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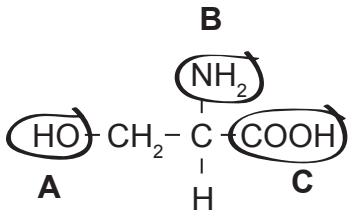
(a) Each circled functional group is found in different organic molecules commonly used in school laboratories:



(i) Using the list below, choose a reagent and describe the observations that could identify each of these functional groups.

- red litmus paper
- blue litmus paper
- bromine water, $Br_2(aq)$
- acidified dichromate solution, $H^+/Cr_2O_7^{2-}(aq)$

	Functional Group	Chemical test	Observations
A			
B			
C			

(ii) Describe an alternative method to distinguish between functional groups **B** and **C**.

Identify the reagent needed, the expected observations, and explain the type of reaction occurring.

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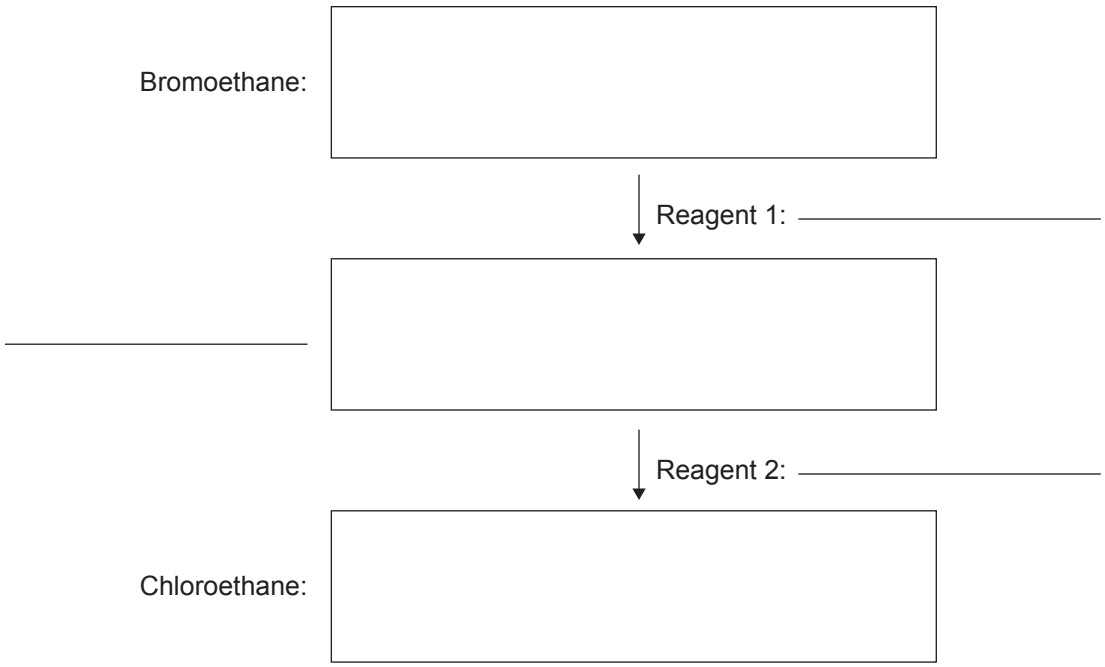
(b) The conversion of bromoethane to chloroethane requires two steps, with alcohol as an intermediate product.

(i) Use this information to complete the reaction scheme below by drawing the structural formulae of each organic molecule and naming the intermediate alcohol and the reagents required.



(ii) Elaborate on the reaction scheme for this conversion.

In your answer, you should identify:

- any conditions needed for each step of the conversion
- the type of reaction occurring for each step of the conversion.

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

QUESTION NUMBER

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