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Level 2 Chemistry 2020

91165 Demonstrate understanding of the properties of selected organic compounds

9.30 a.m. Thursday 26 November 2020
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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QUESTION ONE

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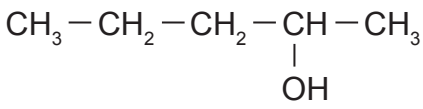
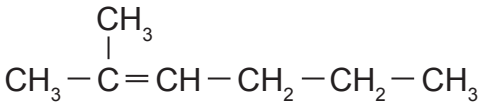
(a) Complete the following table.

Compound	IUPAC (systematic name)
	butan-2-amine
	
	
	iodoethane

(b) Classify the alcohol in the table above as primary, secondary, or tertiary, and explain your choice.

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(c) Depending upon the conditions in which it is used, sulfuric acid, H_2SO_4, can enable the two reactions below to occur.

alcohol → alkene

alkene → alcohol

(i) In the boxes below, draw the structural formula for a molecule containing two carbon atoms that could be used in the reactions above.

Alcohol	**Alkene**

(ii) Elaborate on how sulfuric acid is used in the conversion of both an alcohol to an alkene, and an alkene to an alcohol.

In your answer you should:

- state the conditions required for each reaction
- state the type of reaction occurring in each case, and justify your choices.

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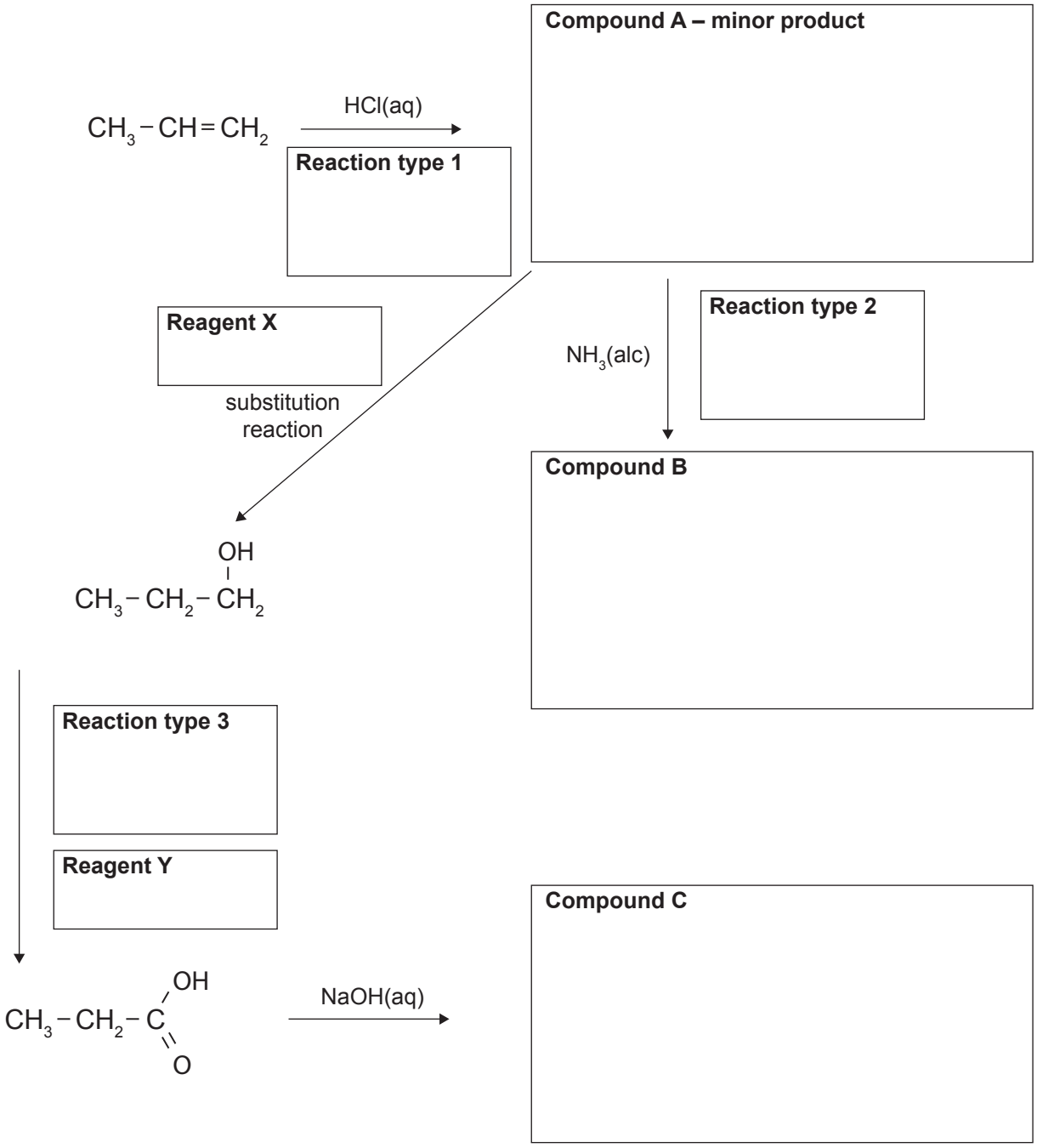
(d) Complete the following reaction scheme by drawing the structural formulae for the organic compounds **A**, **B** and **C**, identifying reagents **X** and **Y**, and reaction types **1**, **2**, and **3**.



QUESTION TWO

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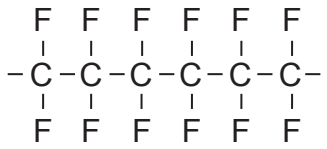
(a) A section of the Teflon polymer chain is shown below. Teflon is best known for its use in coating non-stick frying pans and other cookware.



(i) In the box below, draw and name the structure of the monomer used to make this polymer.

Name: _____

(ii) The chemical reactivity of the monomer and polymer are different.

Analyse this difference.

In your answer you should:

- link the structure of the monomer and polymer to its reactivity
- explain the importance of this difference for Teflon's use as a polymer.

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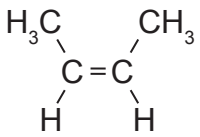
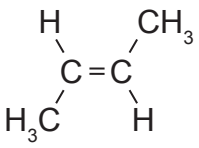
(b) The C_4H_8 (butene) molecule can display different forms of isomerism.

A	B	C
$CH_2=CHCH_2CH_3$		

(i) Circle the form of isomerism that exists between molecules **A** and **B**.

constitutional / structural **geometric**

(ii) Circle the form of isomerism that exists between molecules **B** and **C**.

constitutional / structural **geometric**

(iii) Compare and contrast the two forms of isomerism.

In your answer, you should:

- explain the requirements for each form of isomerism
- refer to molecules **A**, **B**, and **C** above.

QUESTION THREE

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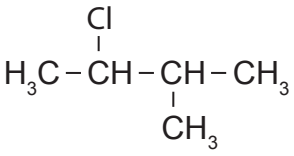
(a) When 3-methyl-2-chlorobutane, shown below, is reacted with KOH(alc) and heated, a mixture of products are formed.



(i) Draw the two products from this reaction.

Major product:	**Minor product:**

(ii) Give an account of the chemical process that occurs in this reaction.

In your answer you should:

- state the type of reaction and explain your choice
- explain why two products form, and justify how you decided which are the major and minor products.

There is more room for your answer on the following page.

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(b) (i) The labels have fallen off bottles of three colourless liquids. They are known to be ethanol, hexene, and propanoic acid.

Explain how you would identify the liquids, using a solution of sodium hydrogen carbonate, $NaHCO_3(aq)$, and your knowledge of the physical and chemical properties of the compounds.

In your answer you should:

- state any observations
- link your observations to chemical or physical properties of the organic molecule
- write chemical equations for any reactions that occur, including the structural formula of organic products.

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(ii) Explain how you could use an alternative reagent to do a **chemical test** that would allow you to distinguish between hexene and propanoic acid.

In your answer you should:

- identify a reagent
- state the observations that would allow you to distinguish the compounds
- identify any reaction type occurring.

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

QUESTION NUMBER

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