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NZQA

NEW ZEALAND QUALIFICATIONS AUTHORITY
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For Supervisor's use only

Level 2 Chemistry, 2008

90309 Describe the structural formulae and reactions of compounds containing selected organic functional groups

Credits: Four
2.00 pm Friday 28 November 2008

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 2–12 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.

For Assessor's use only	**Achievement Criteria**	
Achievement	**Achievement with Merit**	**Achievement with Excellence**
Describe structures and reactions of organic compounds. ☐	Link structure and reactivity of organic compounds. ☐	Discuss reactivity and structure of organic compounds. ☐
Overall Level of Performance ☐		

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

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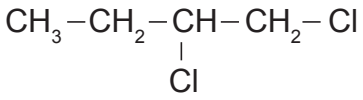
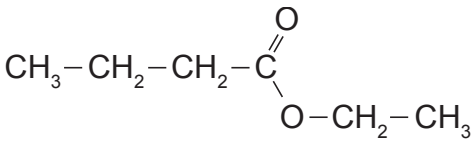
QUESTION ONE

Complete the following table to show the structural formula and IUPAC (systematic) name for each of the organic compounds.

Compound	Structural formula	IUPAC name
A		pentan-2-ol
B		
C		4-methylpent-2-yne
D		

QUESTION TWO

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The compound below has been named **incorrectly**.

(a) Draw the structure implied by the name.

(b) Explain why the given name is incorrect.

(c) Write the correct IUPAC name.

Compound: **2-chloro-4-ethylpentane**

(a) Implied structure:

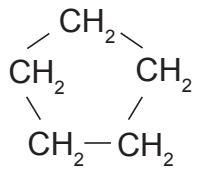
(b) The given name is incorrect because:

(c) The correct IUPAC name is: _____

QUESTION THREE

Assessor's use only

Four different molecules with the molecular formula C_5H_{10} are given below.

A $CH_3-CH=CH-CH_2-CH_3$	**B** $CH_3-CH=C(CH_3)-CH_3$
C 	**D** $CH_2=C(CH_3)-CH_2-CH_3$

(a) Describe why these molecules are **structural isomers**.

(b) One of the molecules shown above may exist as ***cis-trans* isomers**.

(i) Identify this molecule using the **bold** letter from the above table. _____

(ii) Draw the *cis* and *trans* isomers of the molecule identified in (i).

***cis* isomer**	***trans* isomer**

(c) Discuss why the molecule you selected in (b)(i) may exist as *cis-trans* isomers, while the other three isomers cannot.

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QUESTION FOUR

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For each of the THREE following reactions:

(i) Write the **IUPAC name** or the **structural formula** of the product formed.

(ii) State the type of reaction occurring. Choose from the box below.

acid-base	addition	elimination	esterification
hydrolysis	oxidation	polymerisation	substitution

(a) Ethanol is heated with a catalyst (either concentrated sulfuric acid or aluminium oxide).

(i) Product:

(ii) Type of reaction: _____

(b) Propanoic acid is reacted with sodium hydroxide solution.

(i) Product:

(ii) Type of reaction: _____

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(c) Propene is reacted with hydrogen in the presence of a nickel catalyst at 150°C.

(i) Product:

(ii) Type of reaction: _____

QUESTION FIVE

Assessor's use only

Compare and contrast the reactions of ethene and ethanol with acidified potassium permanganate.

For each reaction you must include:

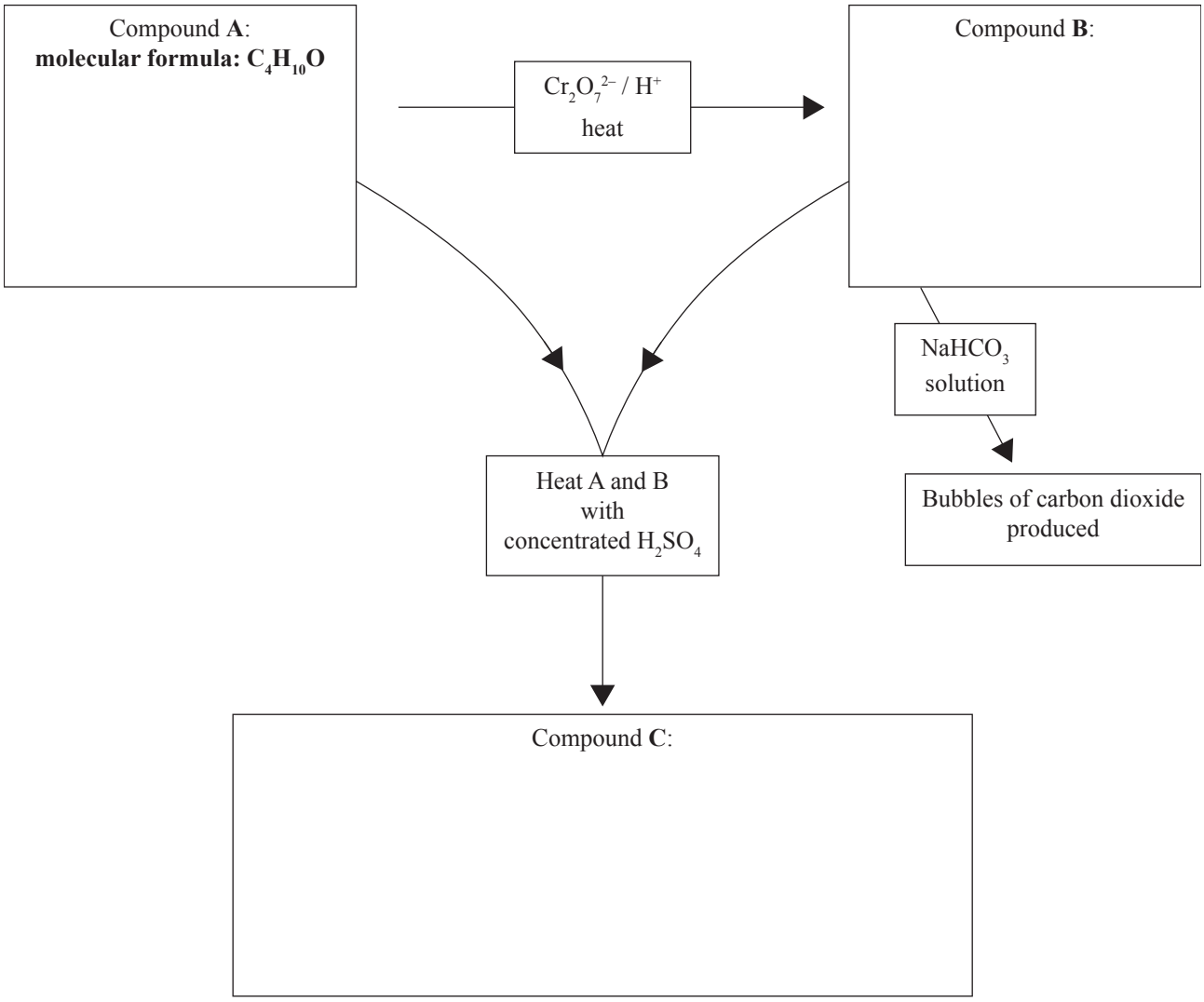
- observations
- equations showing the structural formulae of the organic reactant and product
- type of reaction occurring.

QUESTION SIX

Assessor's use only

The flow diagram below shows some reactions involving organic substances.

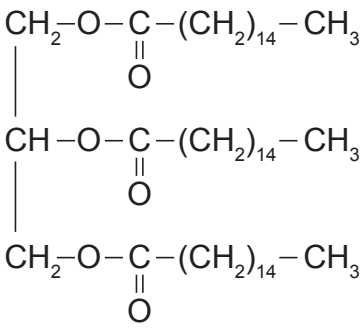
Complete the diagram by drawing **structural formulae** for the compounds **A**, **B** and **C**.



QUESTION SEVEN

Assessor's use only

The triglyceride shown below was heated with aqueous sodium hydroxide, NaOH.



Draw the structural formulae of the two products formed in this reaction.

QUESTION EIGHT

Assessor's use only

Samples of **ethyl ethanoate, 1-hexene** and **ethanoic acid** require identification.
Two reagents are available: bromine water and zinc metal.

Discuss how the three samples can be identified using the reagents above.

Your answer must include:

- the reagent used
- observations
- equations showing the structural formulae for any reactions occurring.

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

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Question number