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Level 3 Chemistry, 2016

91391 Demonstrate understanding of the properties of organic compounds

2.00 p.m. Monday 21 November 2016
Credits: Five

Achievement	Achievement with Merit	Achievement with Excellence
Demonstrate understanding of the properties of organic compounds.	Demonstrate in-depth understanding of the properties of organic compounds.	Demonstrate comprehensive understanding of the properties of 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 Sheet L3–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.

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QUESTION ONE

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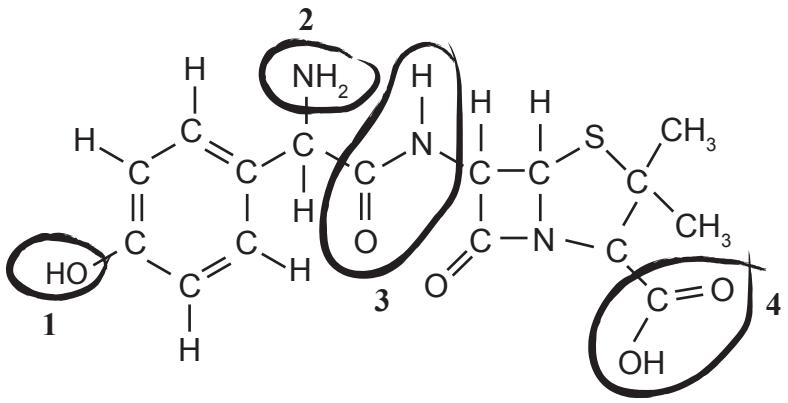
(a) Complete the table below by drawing the structural formula for the named compounds.

IUPAC systematic name	Structural Formula
butylethanoate	
2-hydroxybutanal	
ethanamide	

(b) The structure of amoxycillin is given below. It is an antibiotic used in the treatment of bacterial infections.



Name the four different functional groups circled within the amoxycillin molecule above.

1		**2**	
3		**4**	

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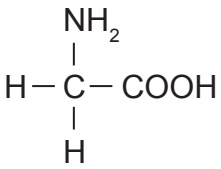
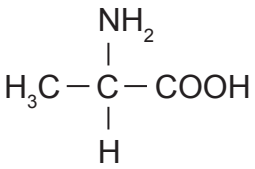
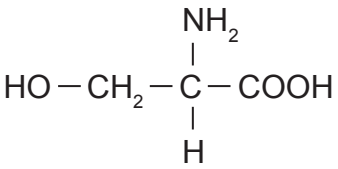
(c) Glycine, alanine, and serine are three amino acids shown below.



glycine



alanine



serine

(i) Draw the 3-D structures of the enantiomers (optical isomers) of **serine** in the boxes below.

(ii) Circle the amino acid below which does NOT display optical isomerism:

glycine **alanine** **serine**

Explain your answer.

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(iii) Draw the two possible dipeptides formed from the amino acids **glycine** and **alanine**.

(iv) Name the type of reaction that occurred when the dipeptides formed in (iii) above.

Explain your choice.

(v) Draw the products of an acidic hydrolysis for ONE of the dipeptides from (iii) above.
Explain why these products are formed.

QUESTION TWO

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(a) (i) What reagent can be used to reduce aldehydes and ketones?

(ii) For the **reduction** of pentanal and pentan-2-one, draw the structure of the organic product formed in each case.

Identify the functional group of each product formed.

pentanal	Structure of the product: Functional group:
pentan-2-one	Structure of the product: Functional group:

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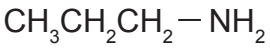
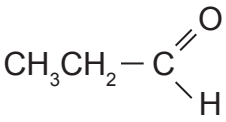
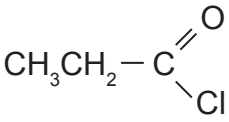
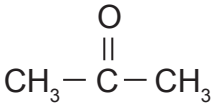
(b) The structures of four different organic substances are shown in the table below.

(i) Name the organic substances **A** to **D**.

Letter	Structure	Name
A		
B		
C		
D		

(ii) Explain how you would identify each of the organic substances, **A** to **D**, from the table in (b)(i), using only moist litmus paper, water, and Benedict's solution.

In your answer, you should include:

- a description of any tests carried out and any observations you would make
- equations to show the organic products formed, if applicable.

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QUESTION THREE

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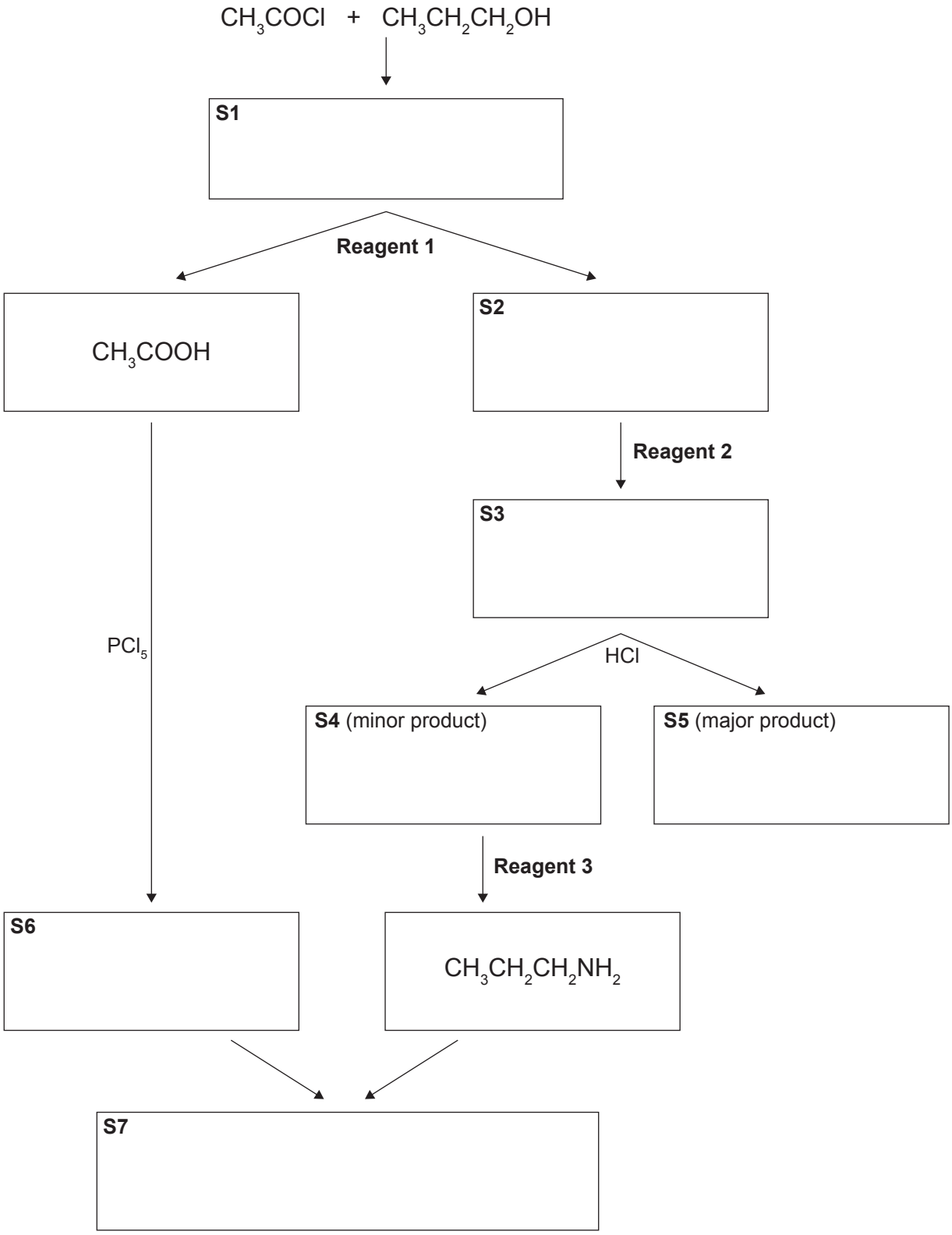
(a) Complete the following reaction scheme by drawing organic structures for **S1** to **S7**, and identifying reagents **1** to **3**.



Reagent 1 is: _____

Reagent 2 is: _____

Reagent 3 is: _____

(b) Draw a reaction scheme to show the conversion of **butan-1-ol** to **butan-2-one**.

You should include any relevant reagents, conditions required, and the structures of all organic substances involved.

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Question Three continues on the following page.

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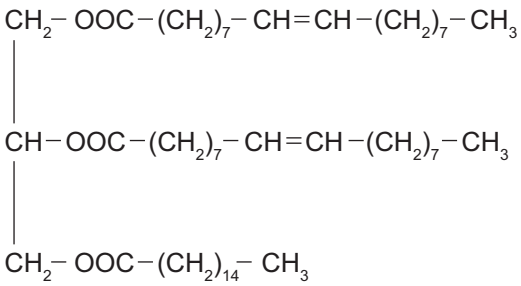
(c) A triglyceride found in olive oil has the following structure:



(i) Put a **circle** around one of the ester groups in the triglyceride molecule shown above.

(ii) Draw the structural formulae of the products produced by the hydrolysis of this triglyceride in basic conditions, using aqueous sodium hydroxide, NaOH.

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

QUESTION NUMBER

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Write the question number(s) if applicable.

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