Aldehydes and Ketones

Question Paper 1

Level	International A Level
Subject	Chemistry
Exam Board	Edexcel
Topic	Rates, Equilibria & Further Organic Chemistry
Sub Topic	Aldehydes and Ketones
Booklet	Question Paper 1

Time Allowed: **32 minutes**

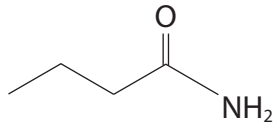
Score: **/26**

Percentage: **/100**

Grade Boundaries:

A*	A	B	C	D	E	U
>85%	'77.5%	70%	62.5%	57.5%	45%	<45%

1 This question is about four organic compounds.

1


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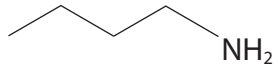

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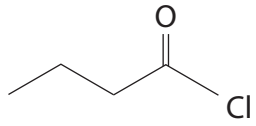

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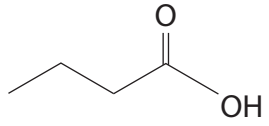


(a) Which compounds react with methanol under suitable conditions to form methyl butanoate?

(1)

☒ **A** 1 and 3 only

☒ **B** 1 and 4 only

☒ **C** 3 and 4 only

☒ **D** 2, 3

(b) Which compound reacts with water to form two different acids?

(1)

☒ **A** 1

☒ **B** 2

☒ **C** 3

☒ **D** 4

(c) Which compounds react together to form an amide?

(1)

☒ **A** 1 an

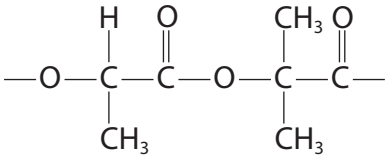
☒ **B** 3 an

☒ **C** 2 an

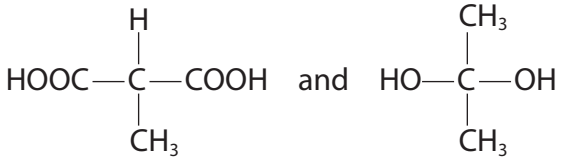
☒ **D** 2 an

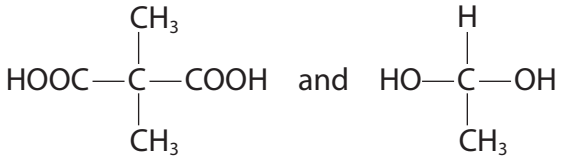
(Total for Question 1 = 3 marks)

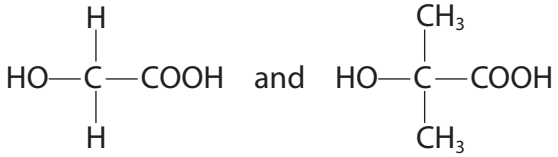
2 A polymer has the repeat unit

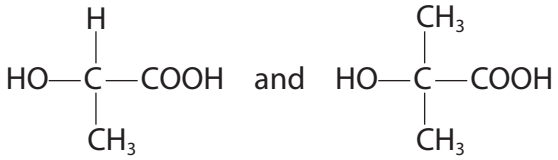


It could be made from the monomers

☒ **A** 

☒ **B** 

☒ **C** 

☒ **D** 

(Total for Question 2 = 1 mark)

3 Which of the following isomers has the highest boiling temperature?

☒ **A** $CH_3CH_2CH_2COOH$

☒ **B** $CH_3CH_2COOCH_3$

☒ **C** $HCOOCH_2CH_2CH_3$

☒ **D** $HCOOCH(CH_3)_2$

(Total for Question 3 = 1 mark)

4 Which classes of halogenoalkane can react with alkali by an S_N2 mechanism?

☒ **A** Primary and secondary.

☒ **B** Secondary and tertiary.

☒ **C** Primary and tertiary.

☒ **D** Primary, secondary and tertiary.

(Total for Question 4 = 1 mark)

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5 An organic compound gave a pale yellow precipitate when warmed with a solution of iodine in sodium hydroxide. It also gave steamy fumes when tested with phosphorus(V) chloride.

The organic compound consistent with these results is

☒ **A** $BrCH_2CH_2CH_2COOH$

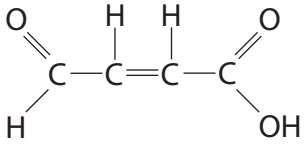
☒ **B** $BrCH_2CH_2COCH_3$

☒ **C** $HOCH_2CH_2CH_2COOH$

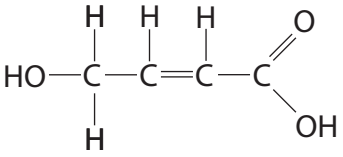
☒ **D** $HOCH_2CH_2COCH_3$

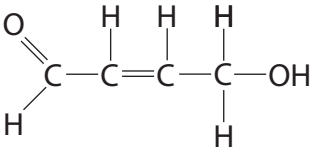
(Total for Question 5 = 1 mark)

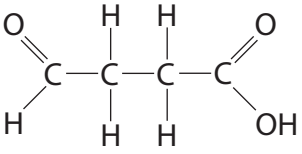
6 The molecule shown below was reacted with excess lithium tetrahydridoaluminate(III) (lithium aluminium hydride) in dry ether, followed by the addition of acid.

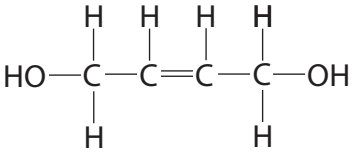


The product of the reaction is

☒ **A** 

☒ **B** 

☒ **C** 

☒ **D** 

(Total for Question 6 = 1 mark)

7 The molecule $CH_3CH_2CONHCH_2CH_3$ can be made in a single step at room temperature from

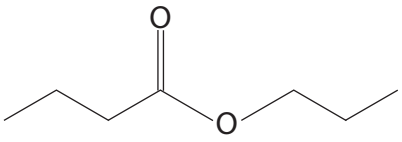
- ☒ **A** CH_3COCl and $CH_3CH_2CH_2NH_2$
- ☒ **B** CH_3CH_2COCl and $CH_3CH_2NH_2$
- ☒ **C** CH_3COOH and $CH_3CH_2CH_2NH_2$
- ☒ **D** CH_3CH_2COOH and $CH_3CH_2NH_2$

(Total for Question 7 = 1 mark)

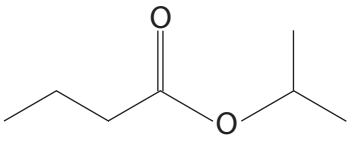
8 The products of the hydrolysis of an ester were propan-2-ol and 2-methylpropanoic acid.

The ester was

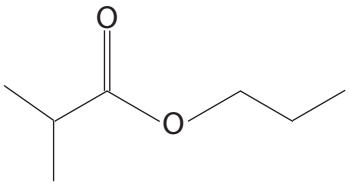
☒ **A**



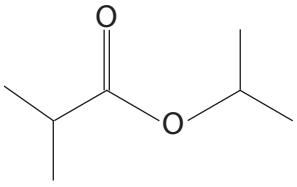
☒ **B**



☒ **C**



☒ **D**



(Total for Question 8 = 1 mark)

9 Which method may be used to make a carboxylic acid in a single reaction?

☒ **A** Hydrolysis of an ester with sodium hydroxide.

☒ **B** Hydrolysis of an ester with hydrochloric acid.

☒ **C** Reaction of acidified potassium manganate(VII) with an alkene.

☒ **D** Reaction of an acyl chloride with ammonia.

(Total for Question 9 = 1 mark)

10 Which of the following pairs of compounds would react to form a polyester?

☒ **A** Ethanol and benzoic acid.

☒ **B** Ethane-1,2-diol and benzoic acid.

☒ **C** Ethanol and benzene-1,4-dicarboxylic acid.

☒ **D** Ethane-1,2-diol and benzene-1,4-dicarboxylic acid.

(Total for Question 10 = 1 mark)

11 Chemists in Asia have been investigating the use of a range of non-edible seeds to produce oil for bio-diesel production, instead of using edible oils. The oils are obtained by pressing the seeds to release the oil. The relatively impure oil is filtered, and then purified using an industrial version of a standard laboratory technique. The oil can then be converted to bio-diesel by the reaction with methanol in the presence of a suitable catalyst.

(a) (i) Suggest a 'standard laboratory technique' that could be used to purify the oil.

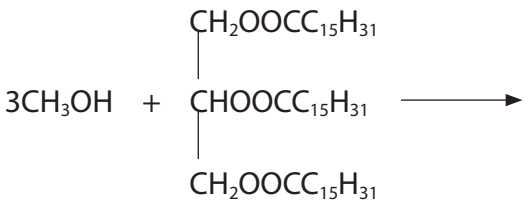
(1)

.....

.....

(ii) Complete the equation below for the formation of a bio-diesel from the reaction of an oil with methanol.

(2)



(iii) Suggest a suitable catalyst for the reaction in (a)(ii).

(1)

.....

*(b) Another source of oil currently being investigated for bio-diesel production is the edible plant known as samphire. It can be grown in marshy areas close to coastlines and is tolerant of salt.

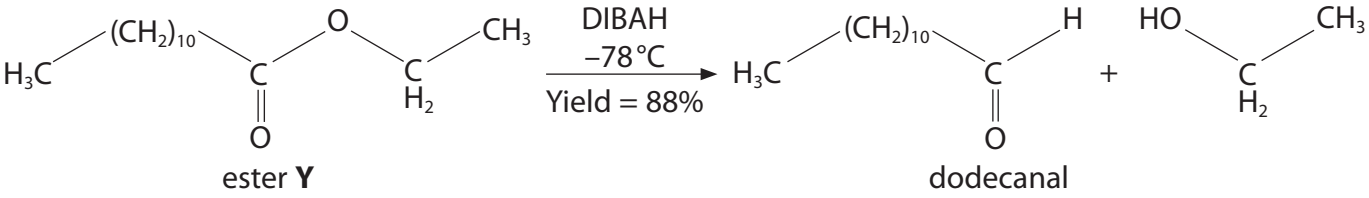
Consider the advantages and disadvantages of growing both samphire and non-edible seeds as sources of vegetable oil.

Suggest, giving your reasons, which of the two sources would provide a potentially greener, more sustainable supply of bio-diesel.

(4)

(Total for Question 11 = 8 marks)

12 Aldehydes can be synthesised in the laboratory by the reaction of esters with the reagent diisobutylaluminiumhydride (DIBAH), which acts as a source of hydride ions. An example is shown below.



ester **Y** dodecanal

(a) Give the systematic name of ester **Y**.

(1)

.....

(b) DIBAH acts as a source of hydride ions. What type of reagent is DIBAH?

(1)

.....

(c) Suggest why the reaction is kept at −78 °C.

(1)

.....

.....

(d) The overall yield for this process is 88%.

Calculate the mass, in g, of dodecanal that would be formed from 5.26 g of the ester **Y**.

[Molar masses / g mol^{-1}: ester **Y** = 228; dodecanal = 184]

(3)

(Total for Question 12 = 6 marks)