

Paper Reference(s) 9CH0/02
Pearson Edexcel Level 3 GCE

Chemistry

Advanced

**PAPER 2: Advanced Organic and Physical
Chemistry**

Diagram Booklet

**In the boxes below, write your name, centre
number and candidate number.**

Surname					
Other names					
Centre Number					
Candidate Number					

INSTRUCTIONS

There may be spare copies of some diagrams in case you need them.

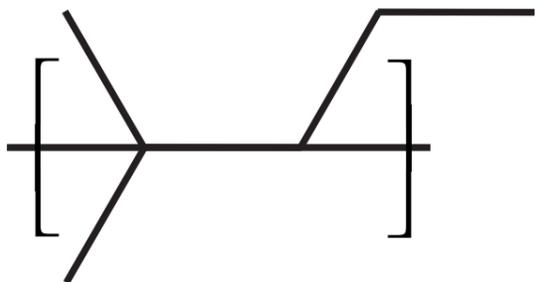
**THIS DIAGRAM BOOKLET MUST BE
RETURNED WITH THE QUESTION PAPER
AT THE END OF THE EXAMINATION.**

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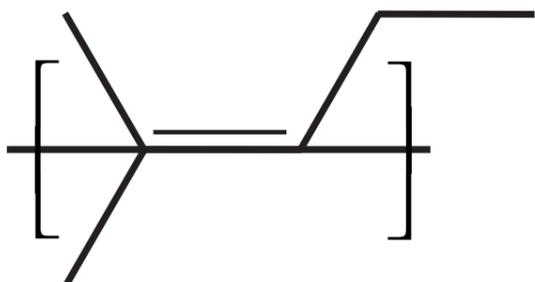
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Question 1(a)

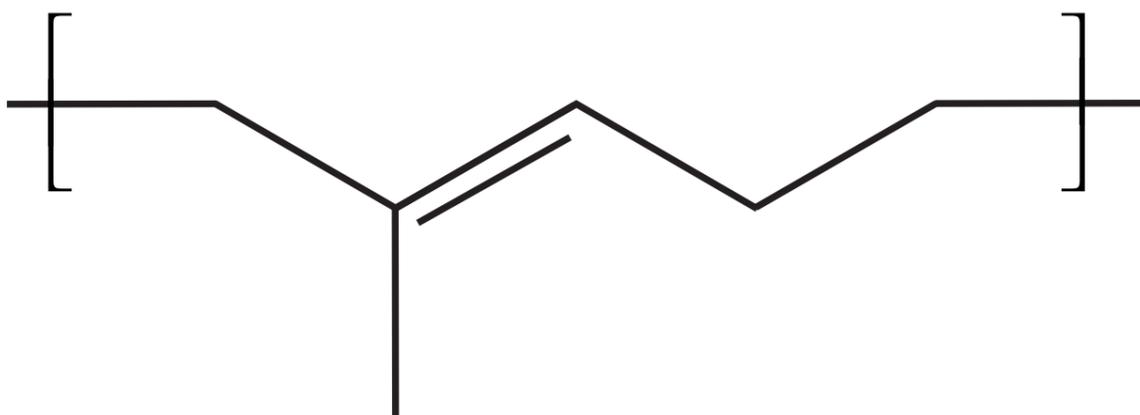
Structure A



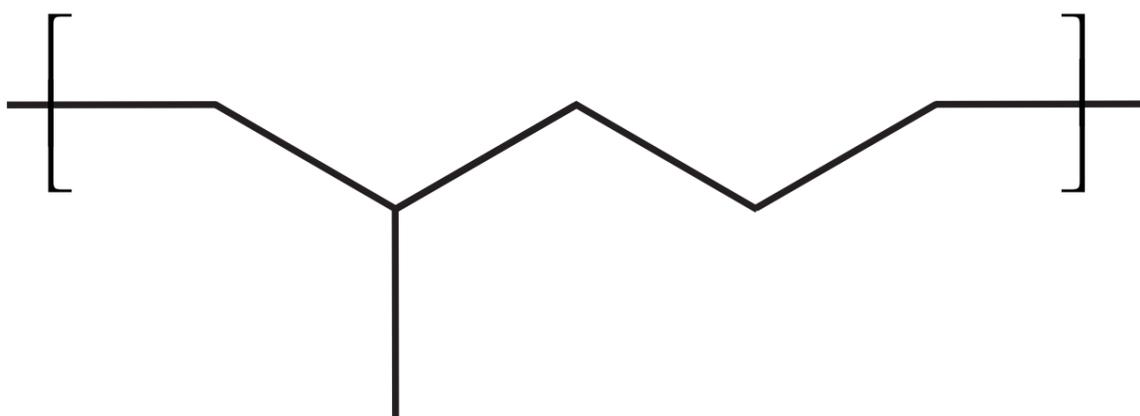
Structure B



Structure C

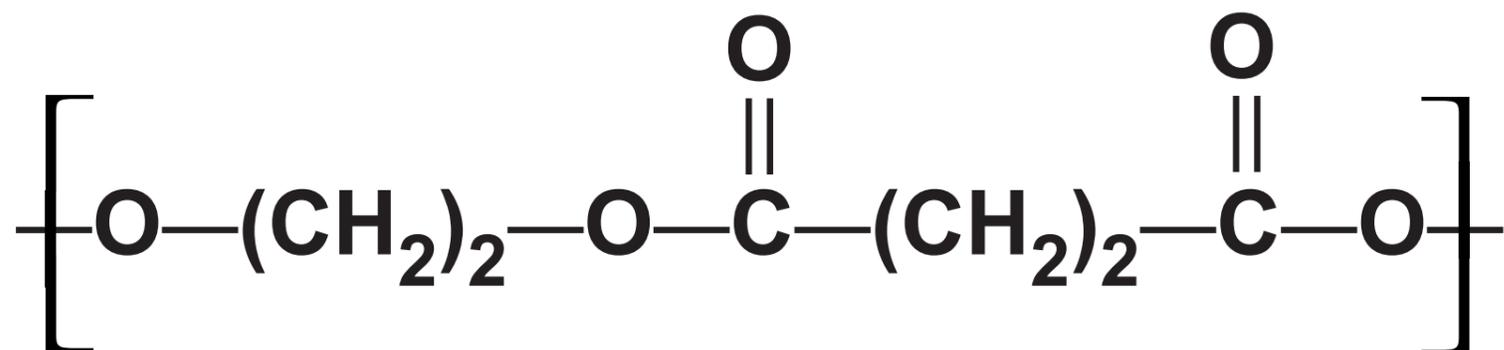


Structure D

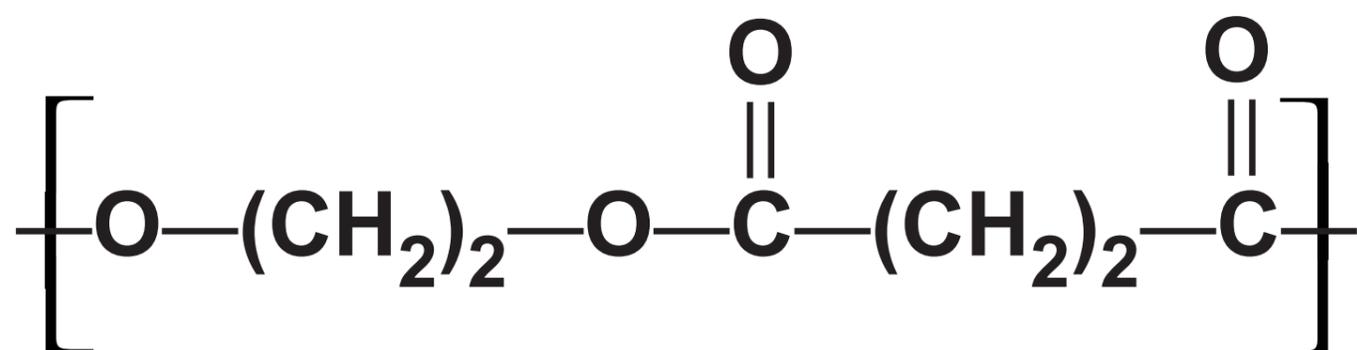


Question 1(c)

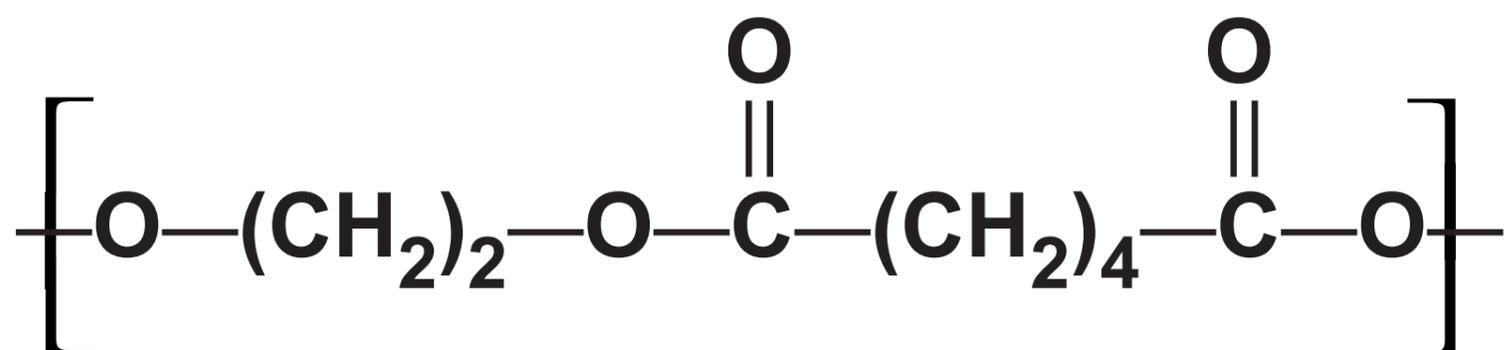
Structure A



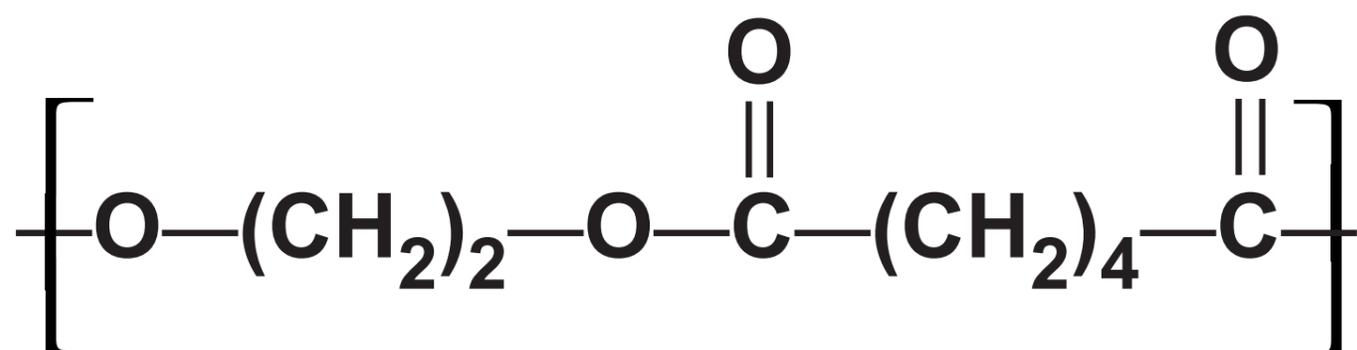
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Structure C

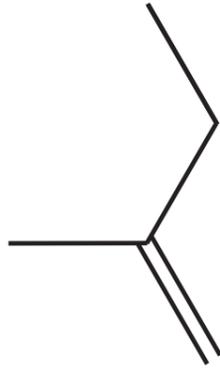


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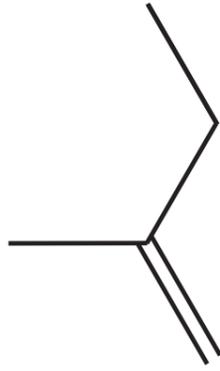


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Question 3(a)

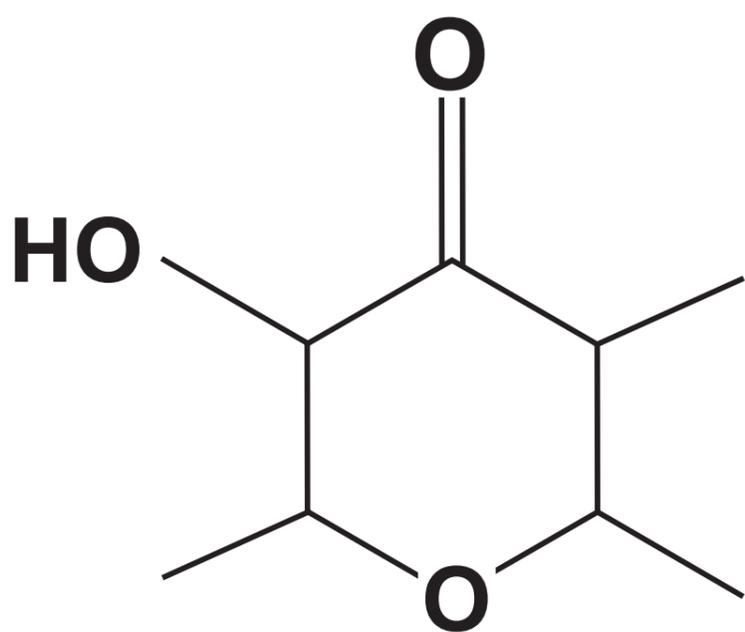


Question 3(a)

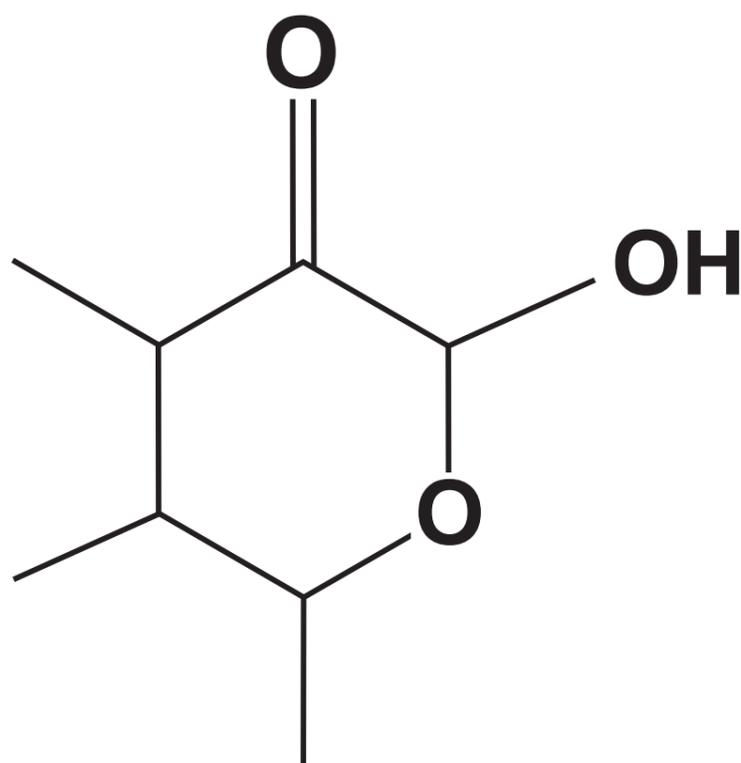


Question 6(a)

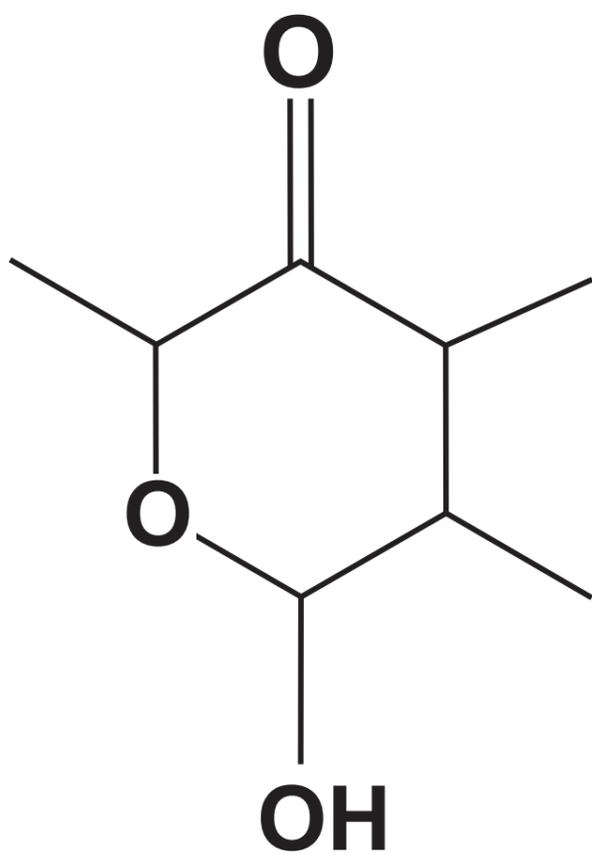
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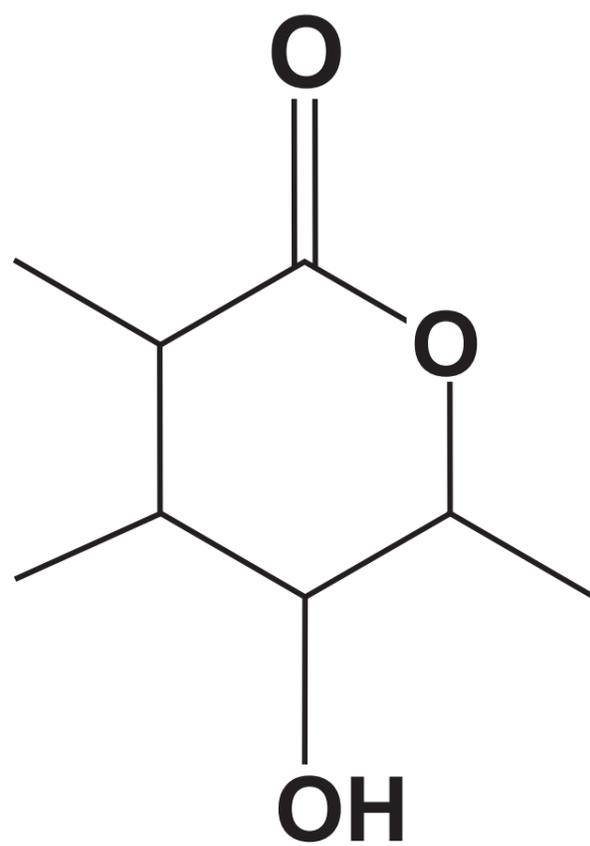
Structure B



Structure C

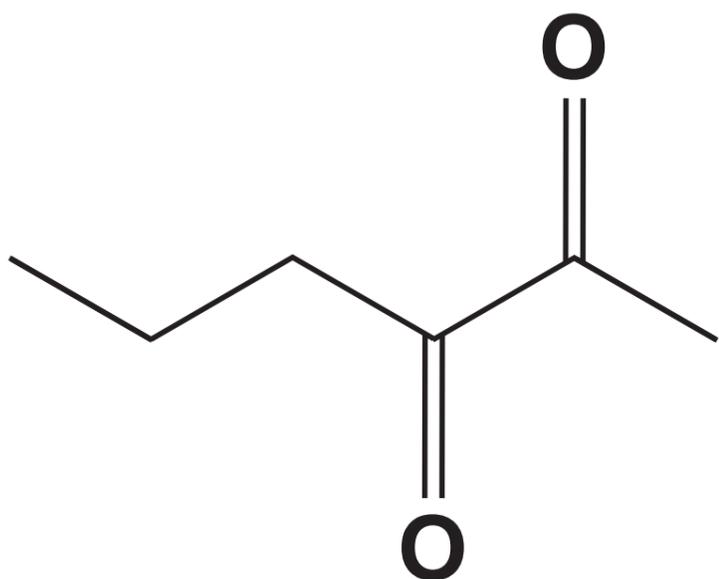


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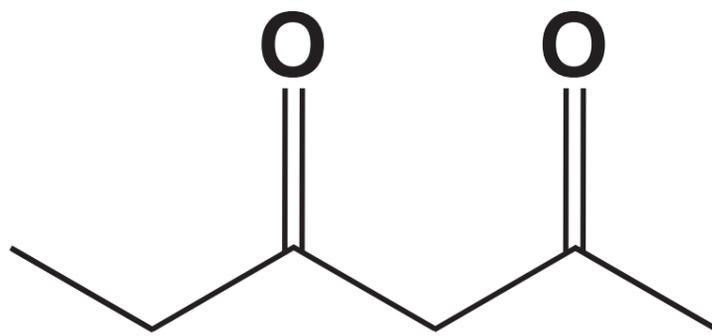


Question 6(b)

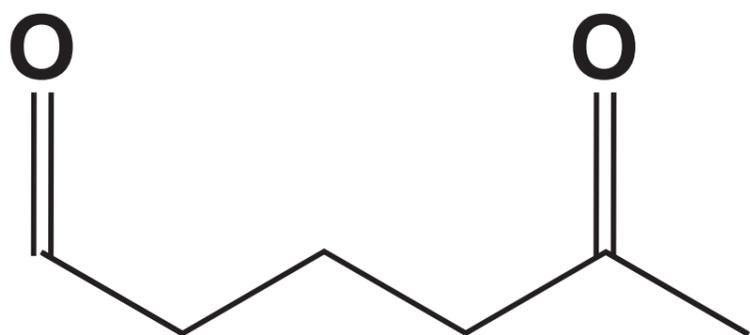
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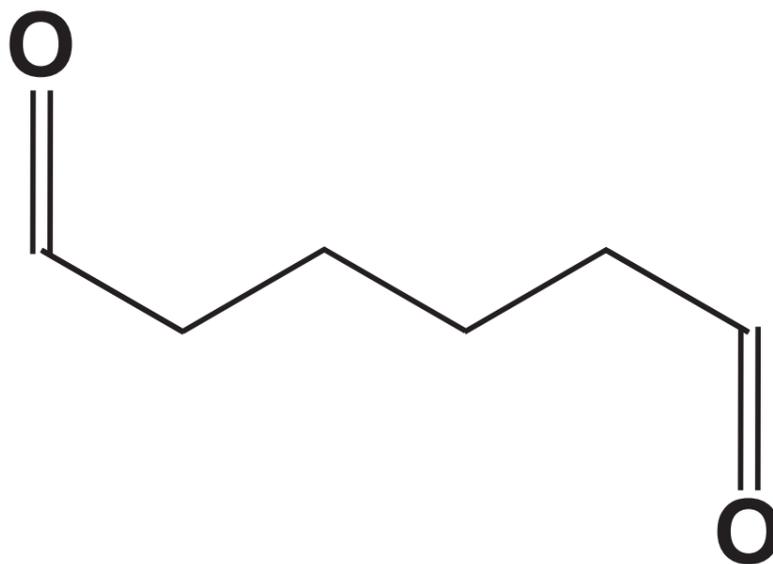
Structure B



Structure C

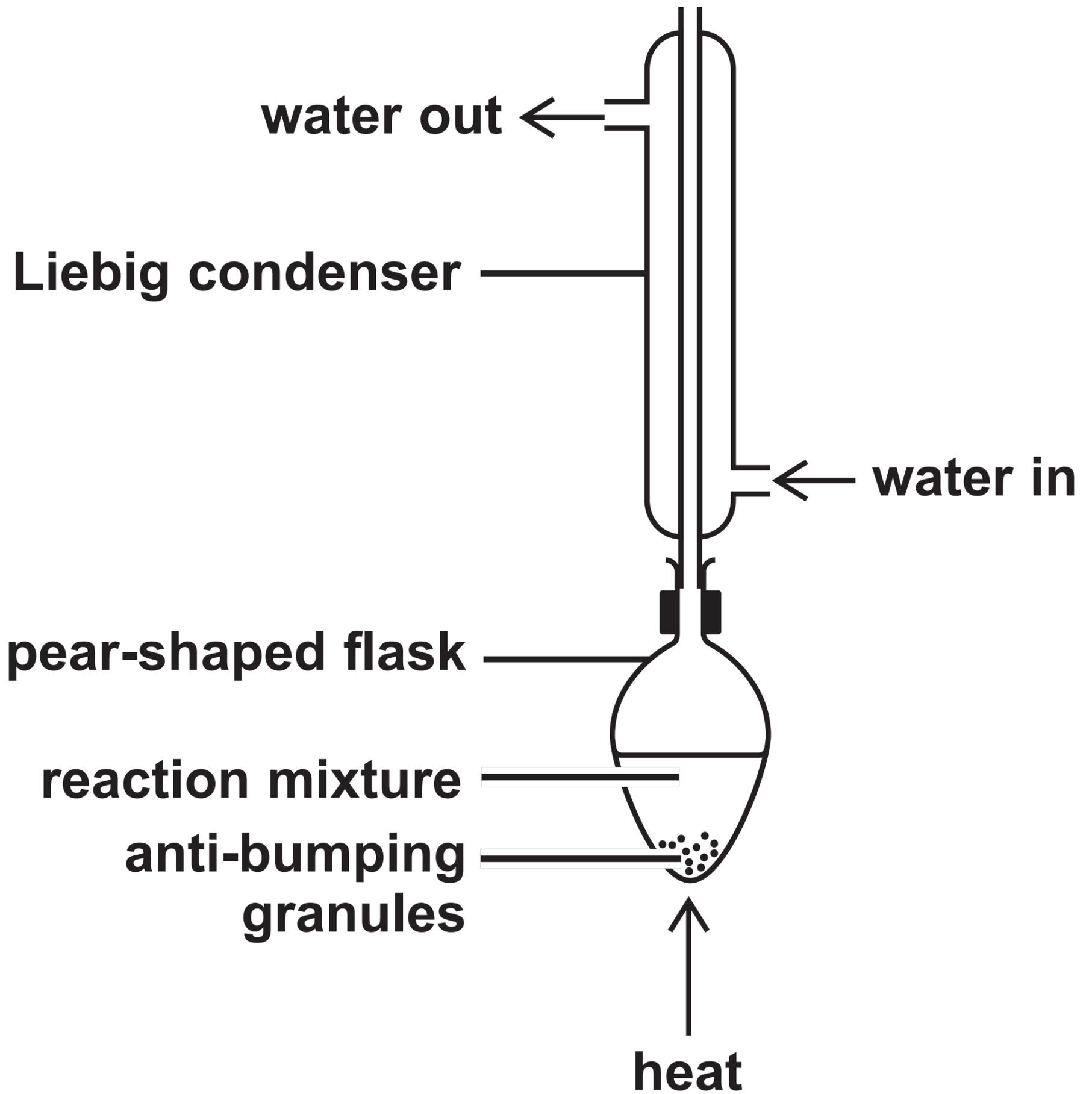


Structure D



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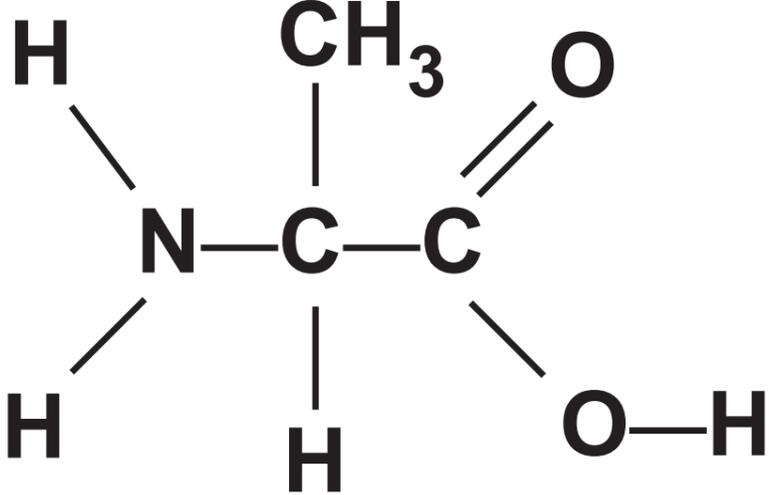
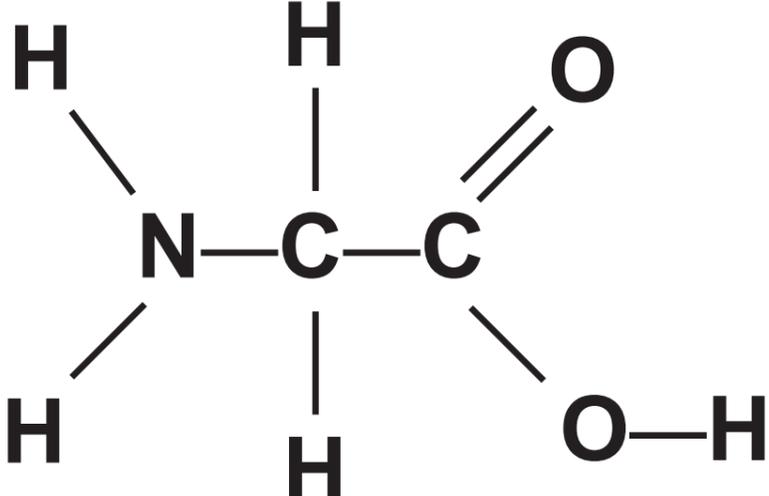
Question 6(c)(i)



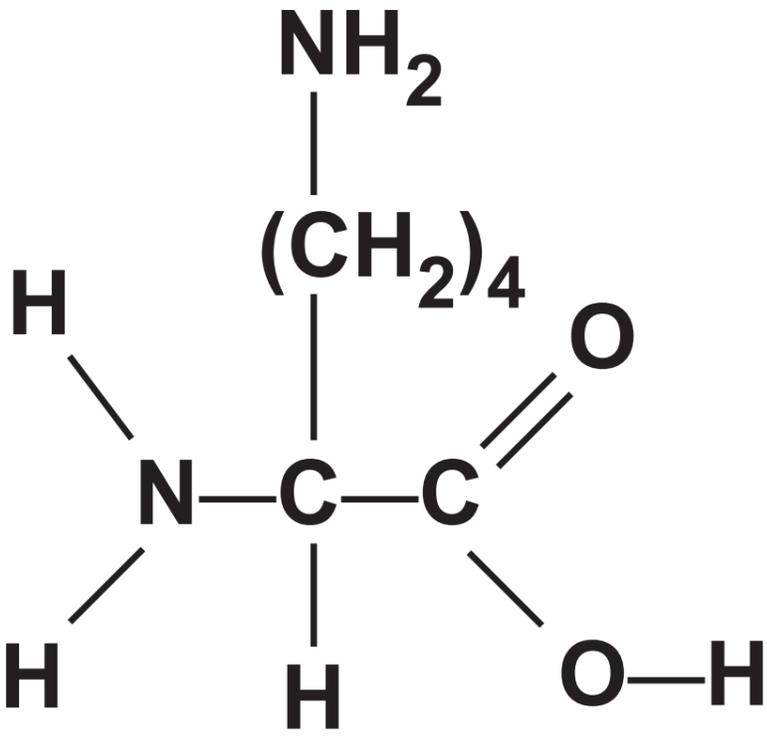
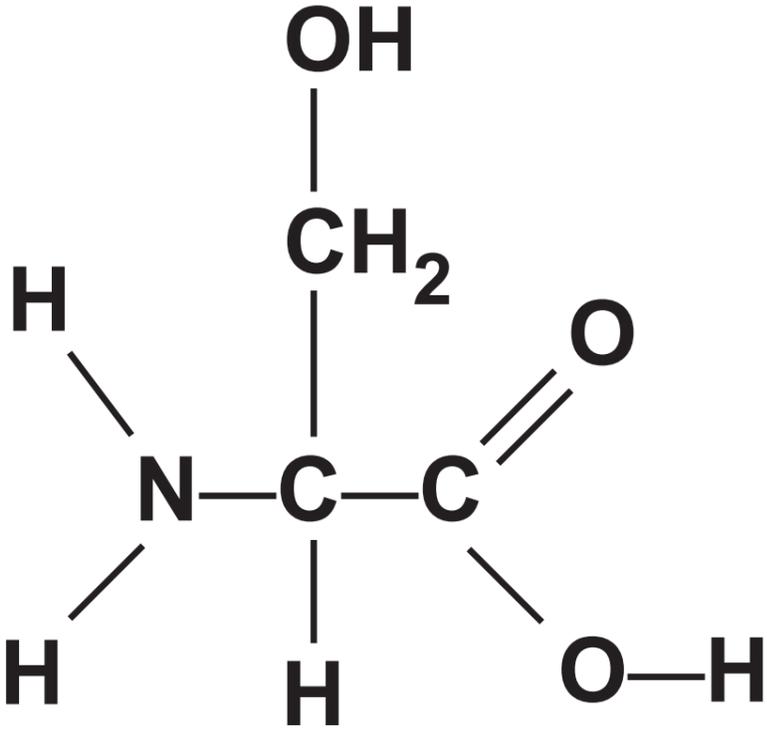
Question 6(d)

Substance	Molar mass / g mol^{-1}	Boiling temperature / $^{\circ}\text{C}$	Solubility in water
Propanone	58	56	completely miscible
Ethanoic acid	60	118	completely miscible

Question 7(c)

Amino acid	Structure
alanine	 <p>The structural formula of alanine shows a central alpha carbon atom bonded to a hydrogen atom (H) below, an amino group (NH₂) to the left, a methyl group (CH₃) above, and a carboxyl group (COOH) to the right. The amino group consists of a nitrogen atom (N) bonded to two hydrogen atoms (H), one above and one below. The carboxyl group consists of a carbon atom (C) double-bonded to an oxygen atom (O) above and single-bonded to a hydroxyl group (OH) below.</p>
glycine	 <p>The structural formula of glycine shows a central alpha carbon atom bonded to a hydrogen atom (H) below, an amino group (NH₂) to the left, and two hydrogen atoms (H) above and to the right. The amino group consists of a nitrogen atom (N) bonded to two hydrogen atoms (H), one above and one below. The carboxyl group consists of a carbon atom (C) double-bonded to an oxygen atom (O) above and single-bonded to a hydroxyl group (OH) below.</p>

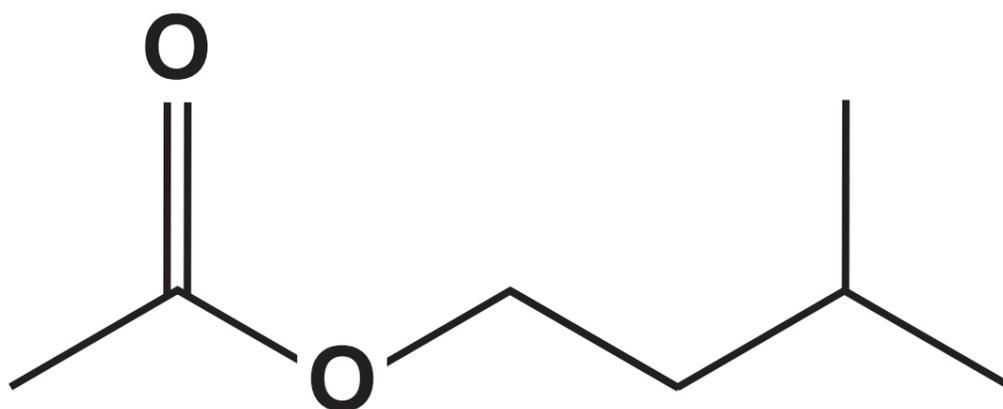
Question 7(d)

Amino acid	Structure of amino acid
lysine	 <p>The structure shows the central alpha-carbon of lysine bonded to a hydrogen atom (H) below, an amino group (NH₂) above, and a carboxyl group (COOH) to the right. The carboxyl group consists of a carbon atom double-bonded to an oxygen atom (O) above and single-bonded to a hydroxyl group (OH) below. A four-carbon chain, represented as (CH₂)₄, is attached to the alpha-carbon, extending upwards.</p>
serine	 <p>The structure shows the central alpha-carbon of serine bonded to a hydrogen atom (H) below, an amino group (NH₂) above, and a carboxyl group (COOH) to the right. The carboxyl group consists of a carbon atom double-bonded to an oxygen atom (O) above and single-bonded to a hydroxyl group (OH) below. A single-carbon chain, represented as CH₂, is attached to the alpha-carbon, extending upwards.</p>

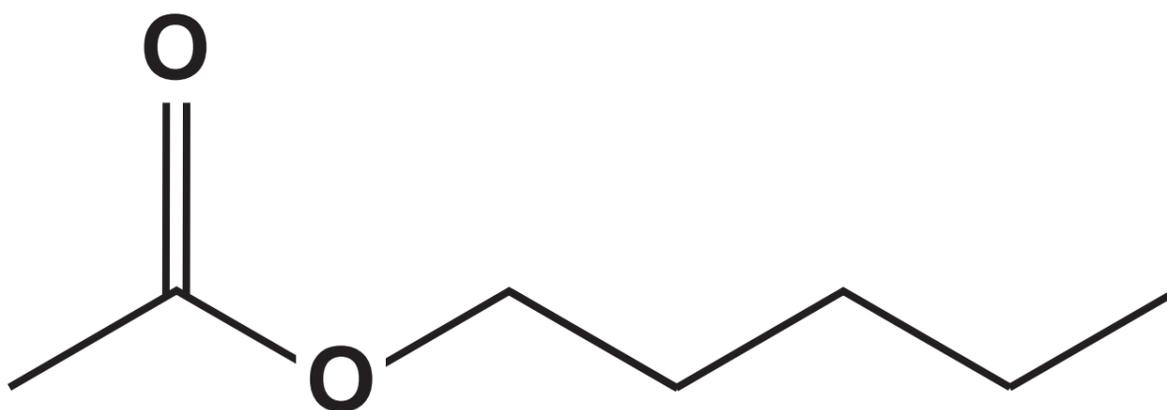
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Question 8(a)

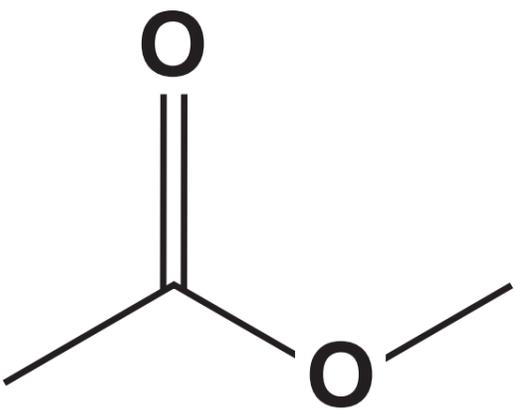
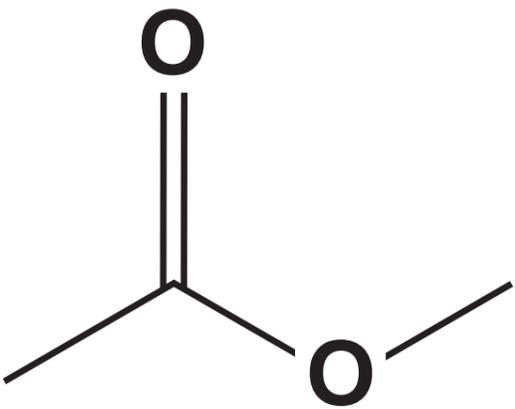
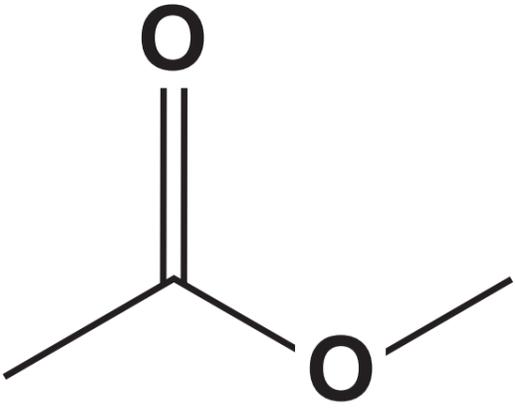
isoamyl acetate



amyl acetate

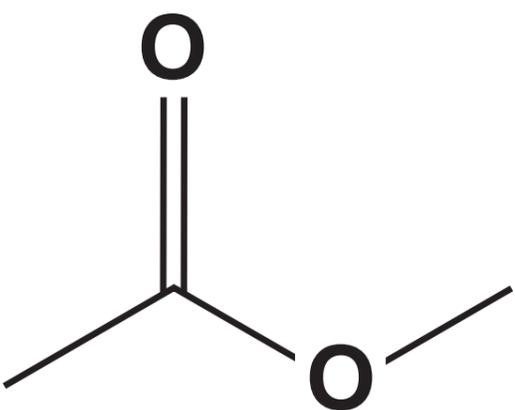
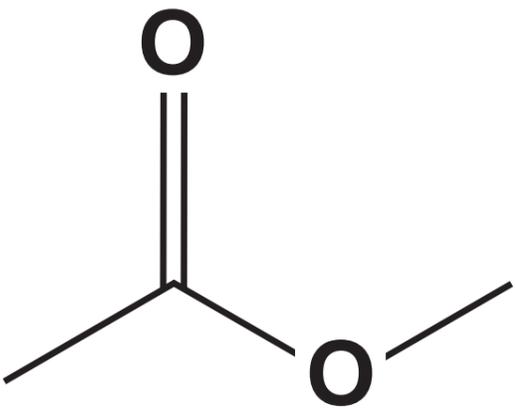
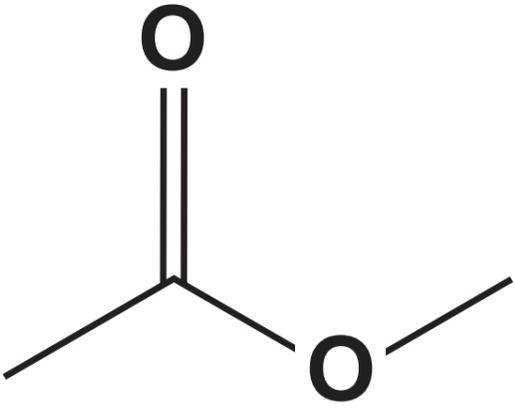


Question 8(f)(i)



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Question 8(f)(i)



Question 9(c)

Time / s	Concentration of ethanal / mol dm⁻³
0	0.72
420	0.36
1260	0.18

Question 9(e)

Temperature (T) / K	1 / Temperature (1/T) / K ⁻¹	Rate constant (k) / units in (b)	ln k
700	1.43×10^{-3}	0.011	-4.51
730	1.37×10^{-3}	0.035	-3.35
760	1.32×10^{-3}	0.105	-2.25
790		0.343	
810	1.23×10^{-3}	0.787	-0.24

Question 9(e)

Temperature (T) / K	1 / Temperature (1/T) / K ⁻¹	Rate constant (k) / units in (b)	ln k
700	1.43×10^{-3}	0.011	-4.51
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