

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.**

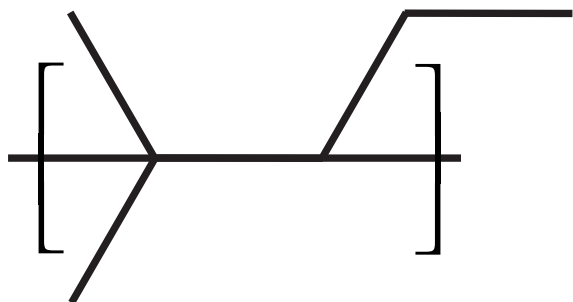
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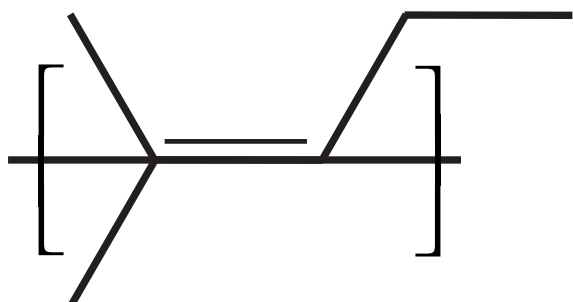
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Question 1(a)

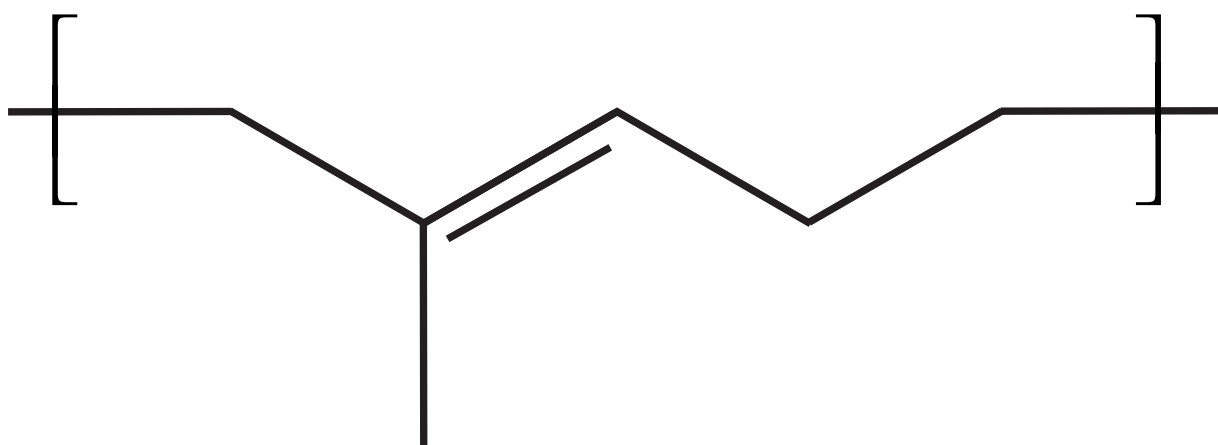
Structure A



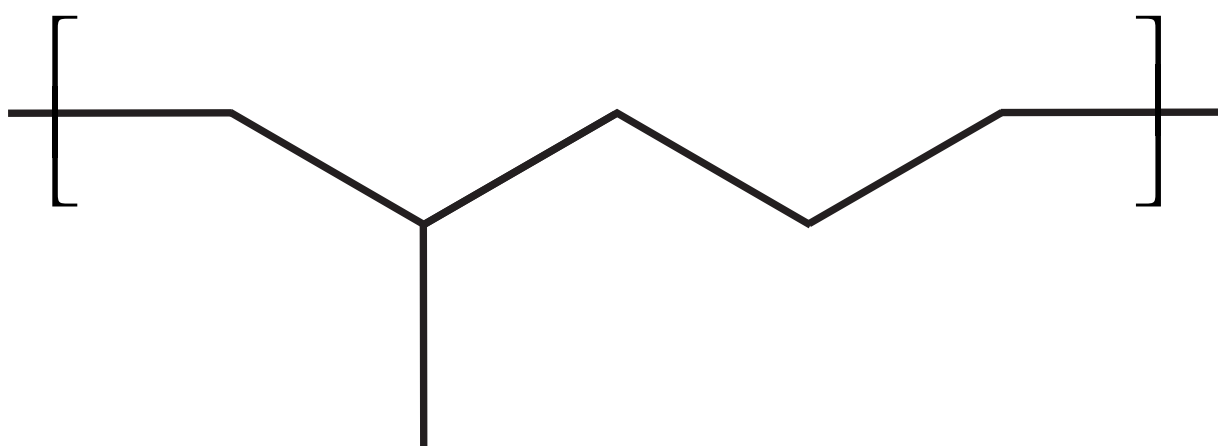
Structure B



Structure C

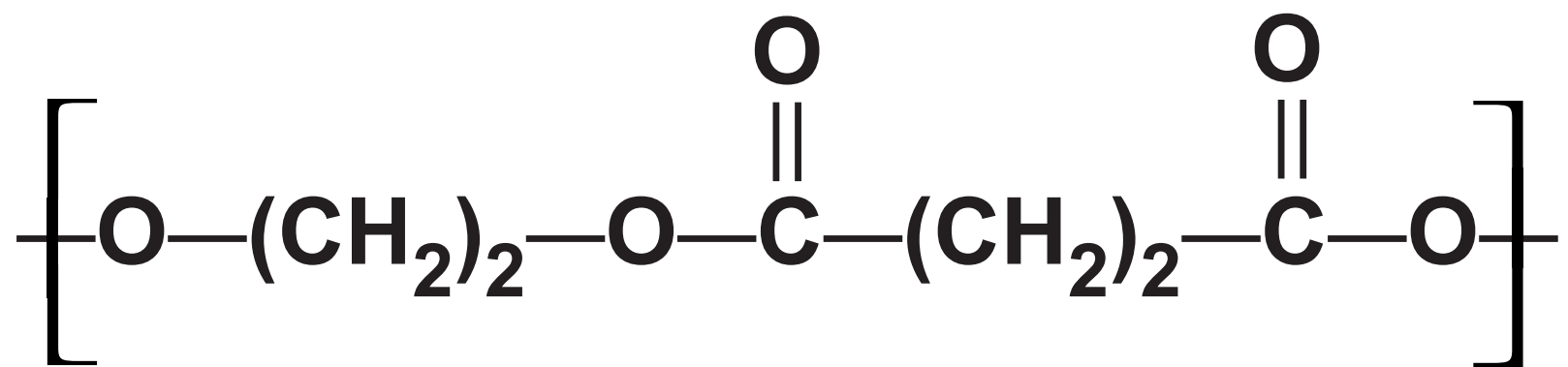


Structure D

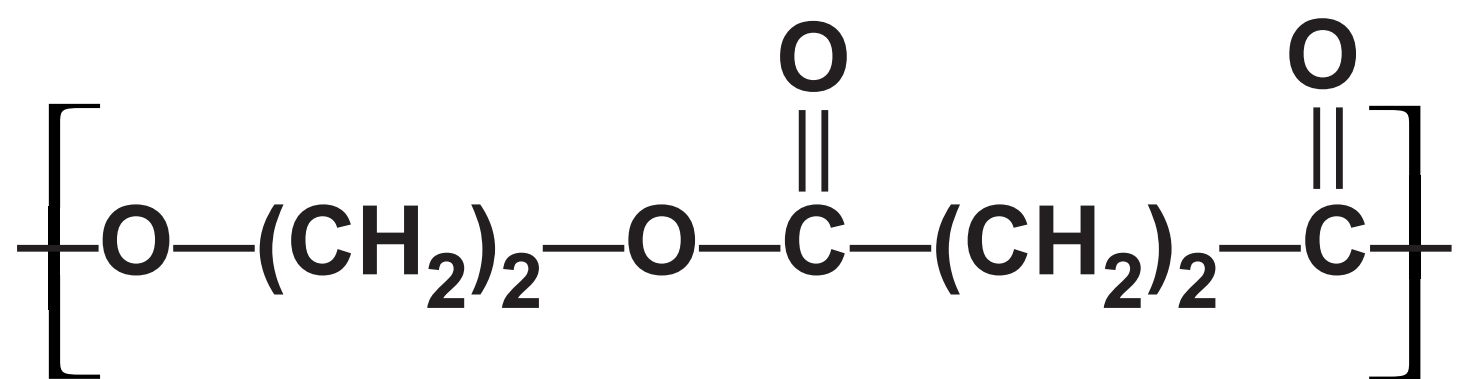


Question 1(c)

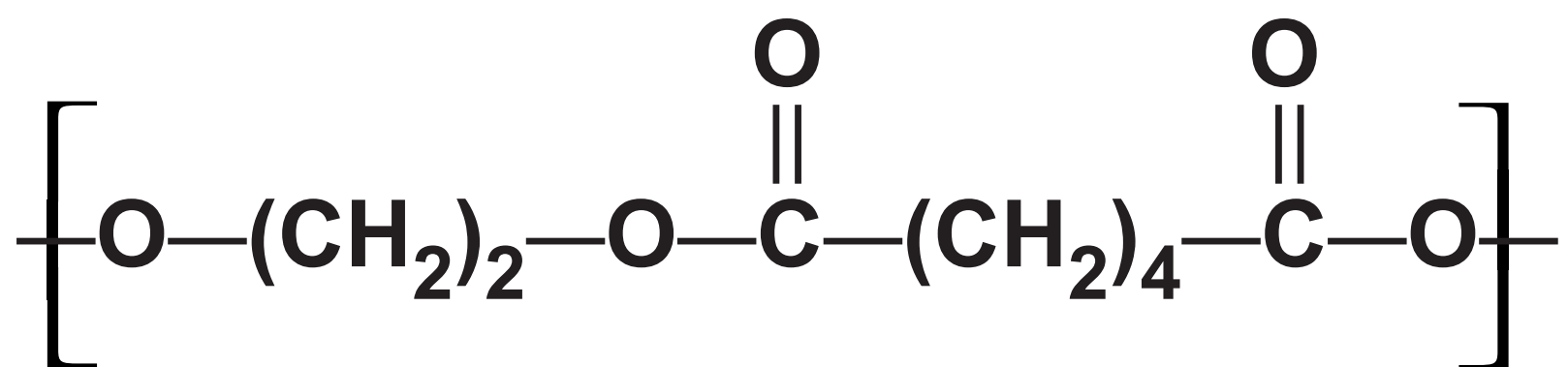
Structure A



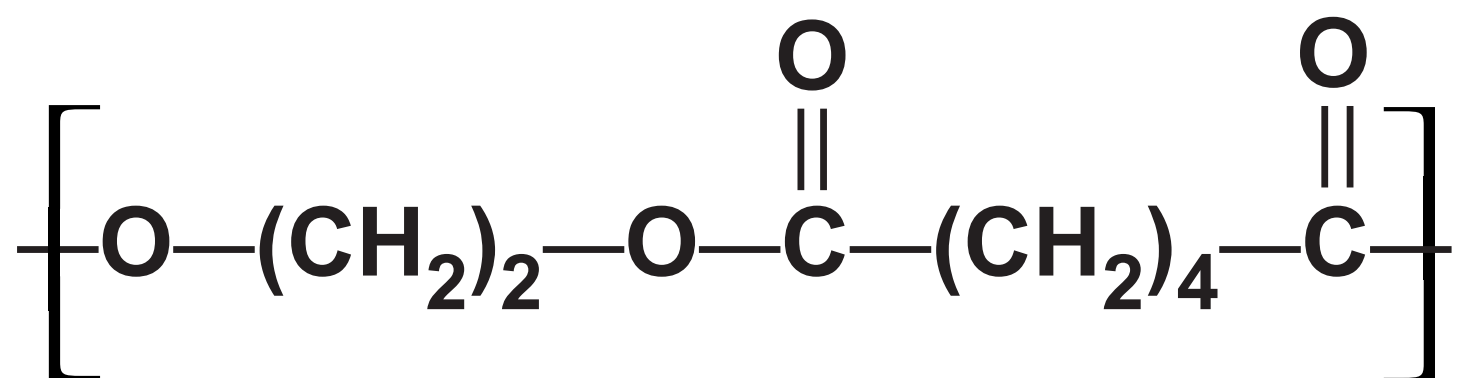
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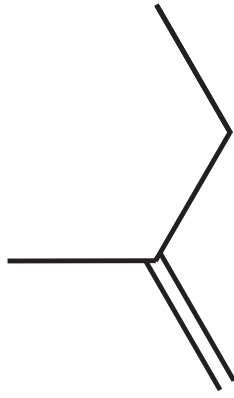
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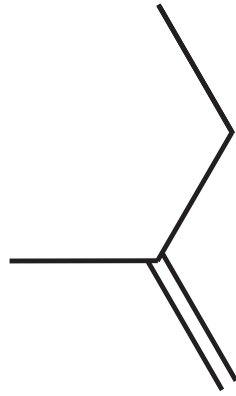
Structure D



Question 3(a)

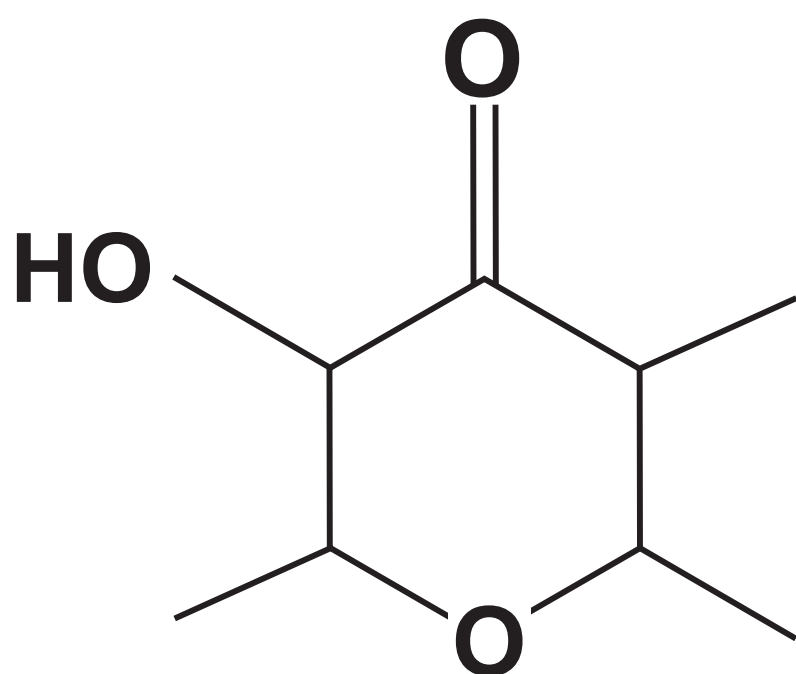


Question 3(a)

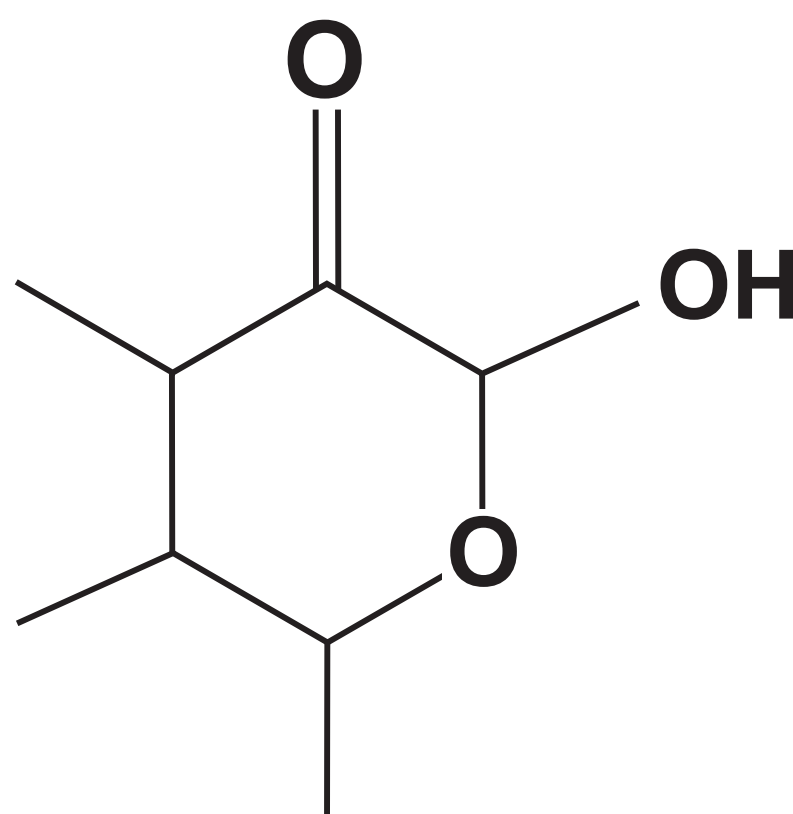


Question 6(a)

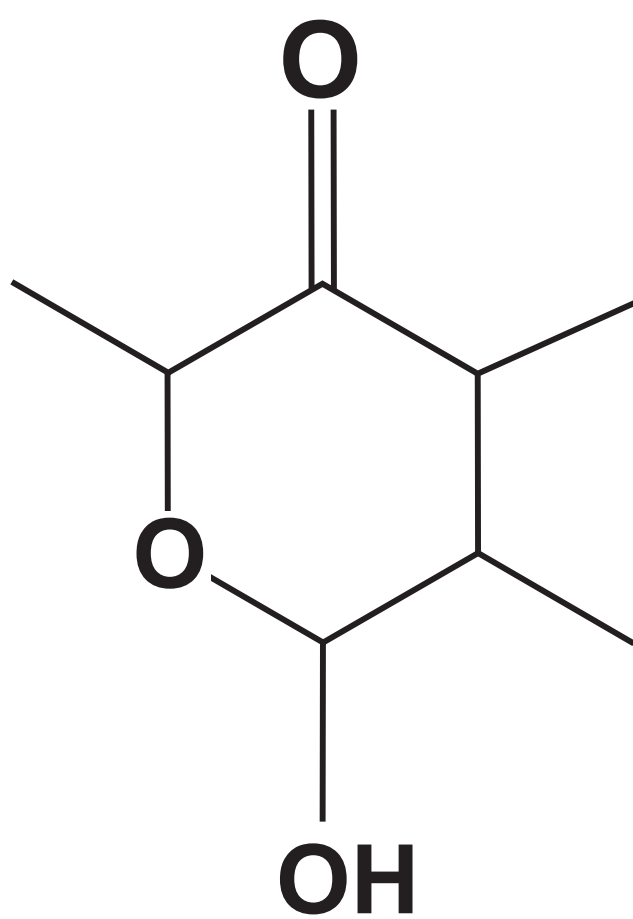
Structure A



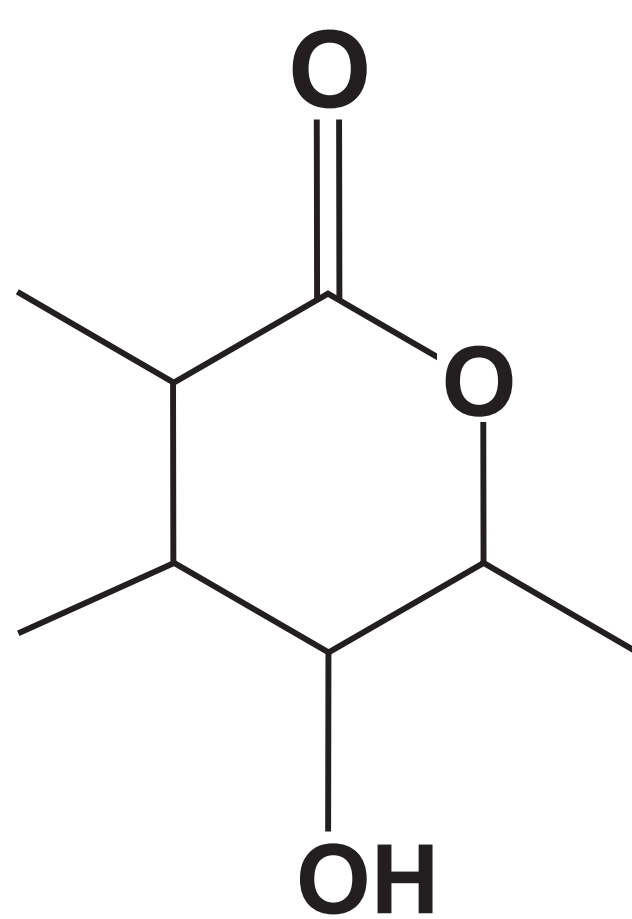
Structure B



Structure C

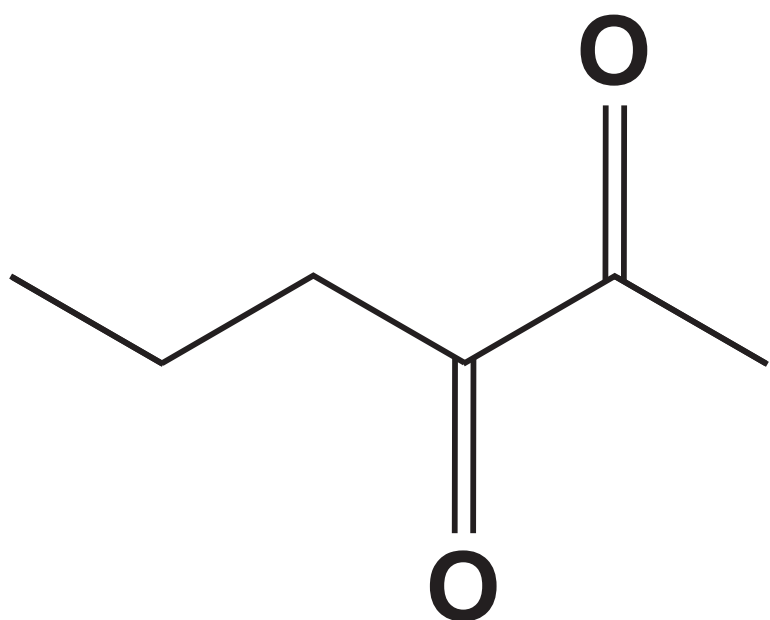


Structure D

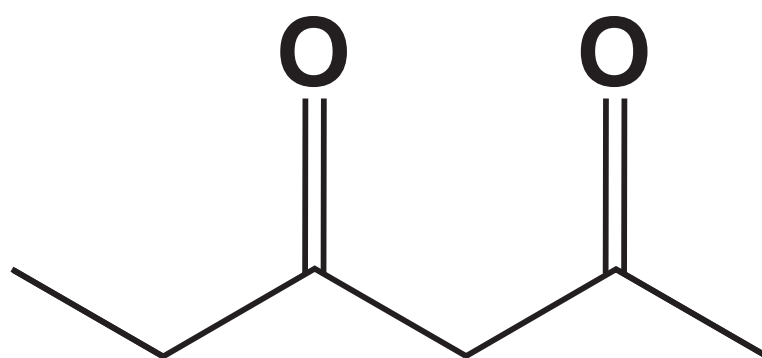


Question 6(b)

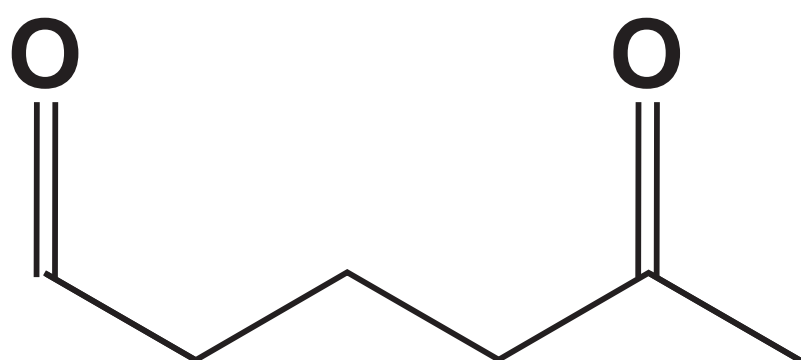
Structure A



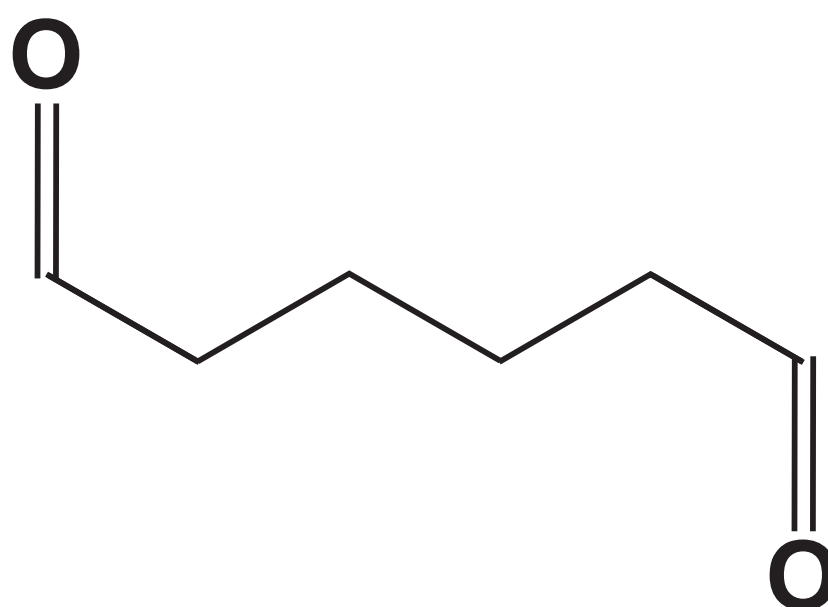
Structure B



Structure C

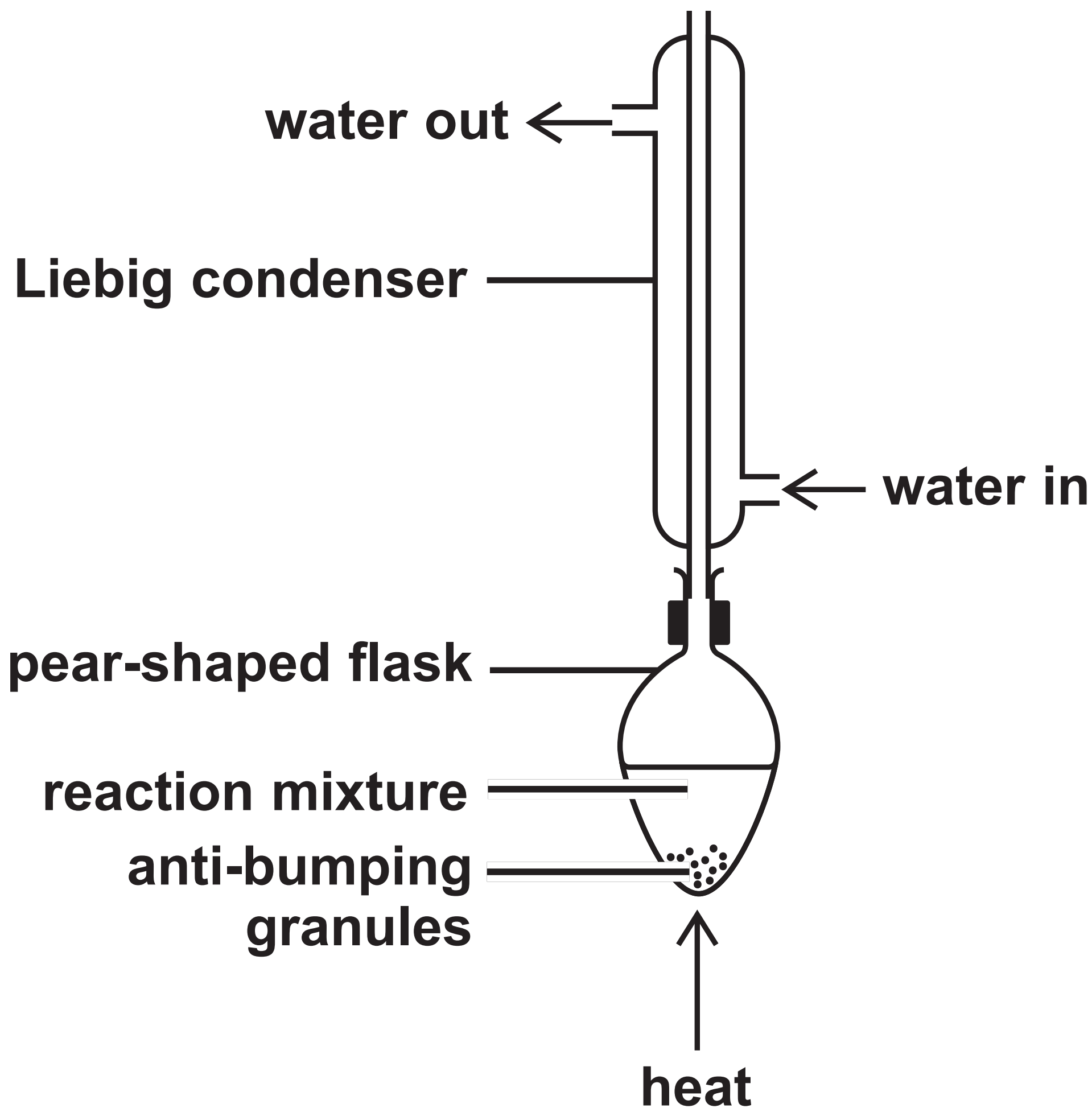


Structure D



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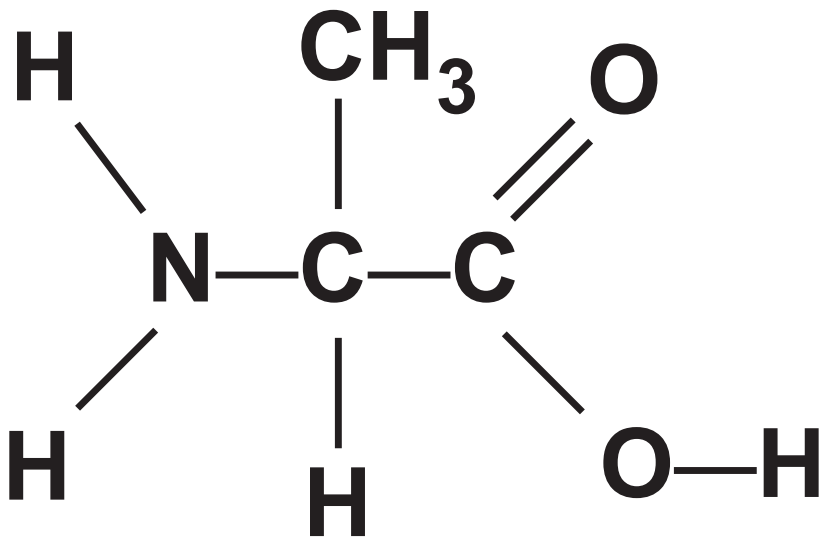
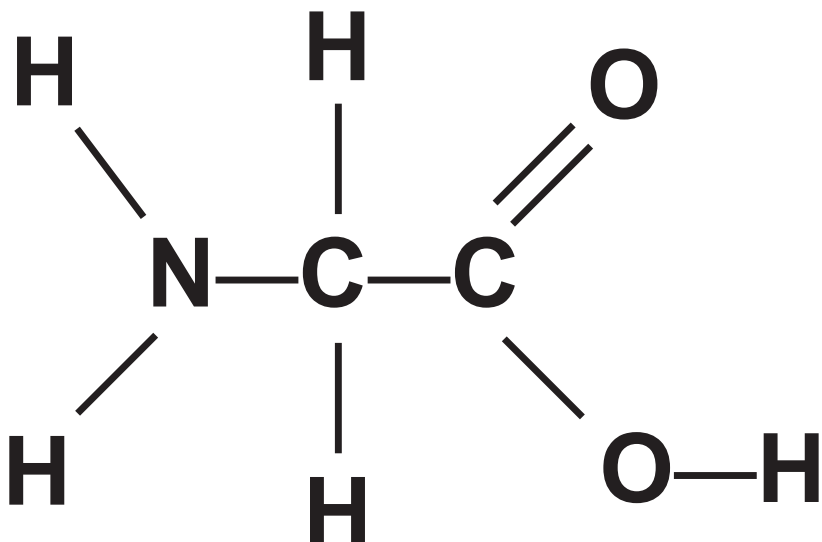
Question 6(c)(i)



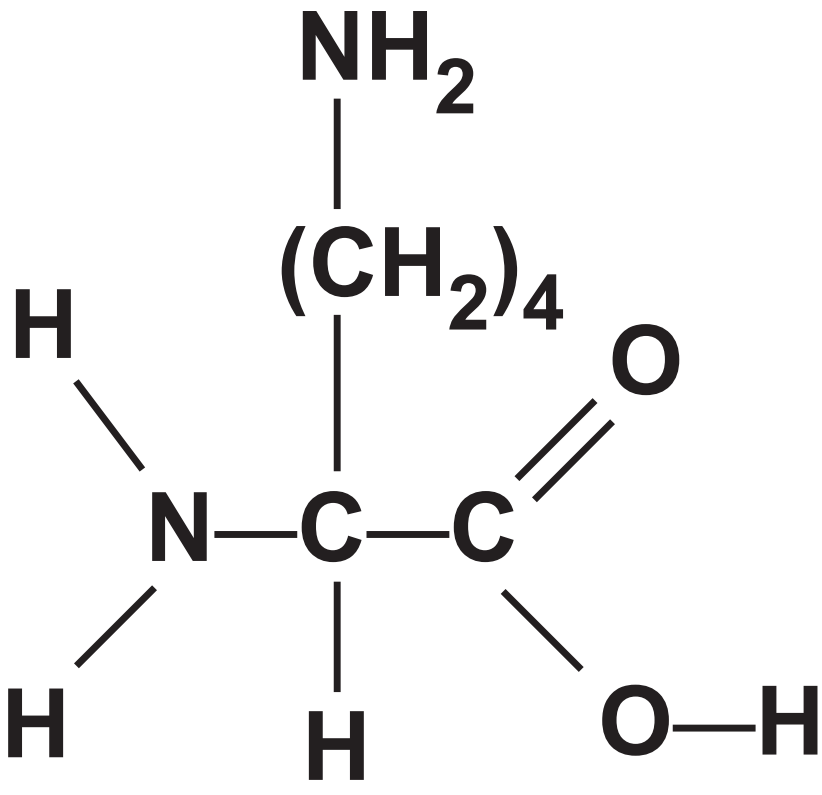
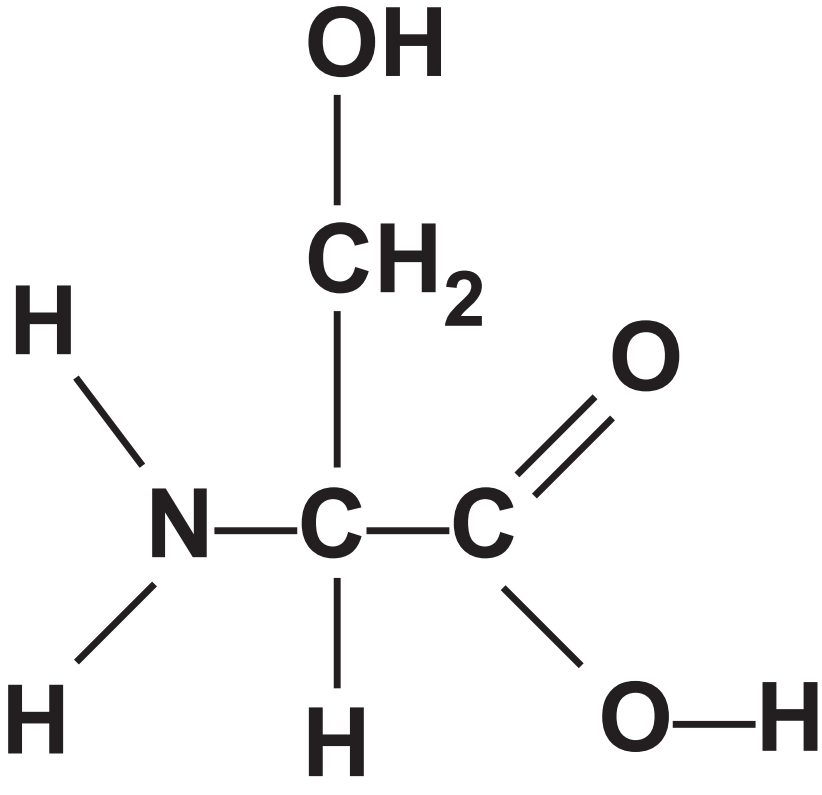
Question 6(d)

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 chemical structure of alanine is shown. It consists of a central carbon atom (C) bonded to a hydrogen atom (H) on the left, a hydrogen atom (H) below, a methyl group (CH₃) above, and a carboxyl group (COOH) on the right. The nitrogen atom (N) is bonded to two hydrogen atoms (H) and the central carbon atom.</p>
glycine	 <p>The chemical structure of glycine is shown. It consists of a central carbon atom (C) bonded to a hydrogen atom (H) on the left, a hydrogen atom (H) below, a hydrogen atom (H) above, and a carboxyl group (COOH) on the right. The nitrogen atom (N) is bonded to two hydrogen atoms (H) and the central carbon atom.</p>

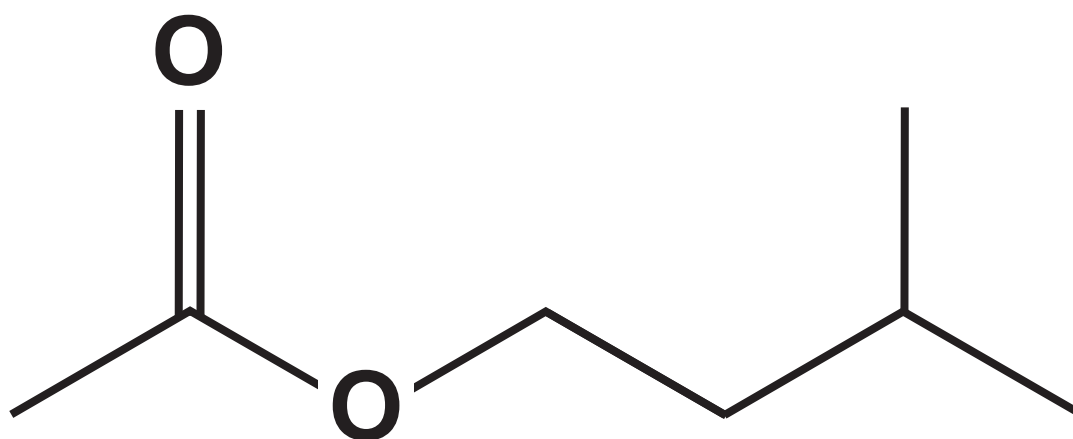
Question 7(d)

Amino acid	Structure of amino acid
lysine	 <p>The chemical structure of lysine is shown. It consists of a central alpha-carbon atom bonded to a hydrogen atom (H) below, an amino group (NH₂) above, a carboxyl group (COOH) to the right, and a nitrogen atom (N) to the left. The nitrogen atom is bonded to two hydrogen atoms (H) and a four-carbon chain (CH₂)₄ above it. The carboxyl group is represented by a carbon atom double-bonded to an oxygen atom (O) and single-bonded to a hydroxyl group (OH).</p>
serine	 <p>The chemical structure of serine is shown. It consists of a central alpha-carbon atom bonded to a hydrogen atom (H) below, a hydroxyl group (OH) above, a carboxyl group (COOH) to the right, and a nitrogen atom (N) to the left. The nitrogen atom is bonded to two hydrogen atoms (H) and a methylene group (CH₂) above it. The carboxyl group is represented by a carbon atom double-bonded to an oxygen atom (O) and single-bonded to a hydroxyl group (OH).</p>

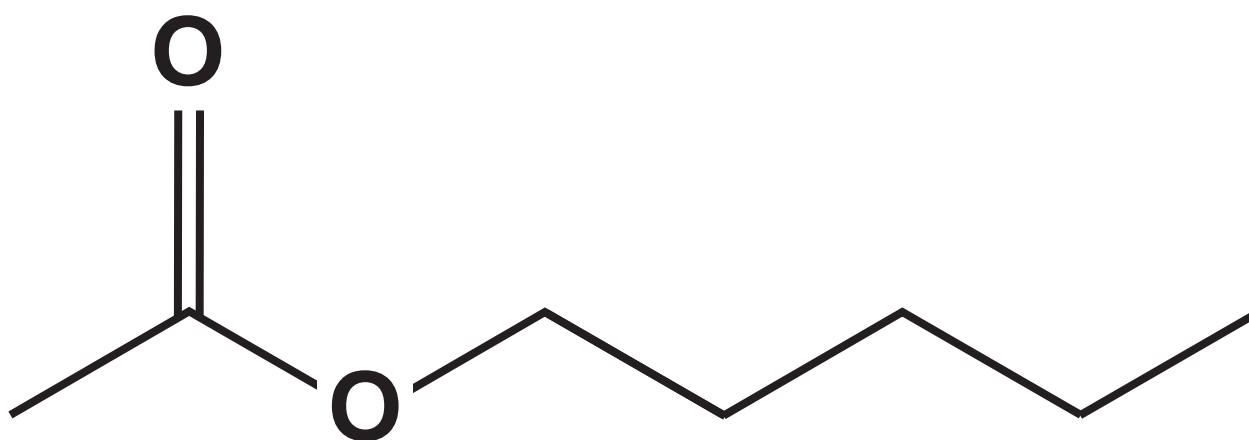
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Question 8(a)

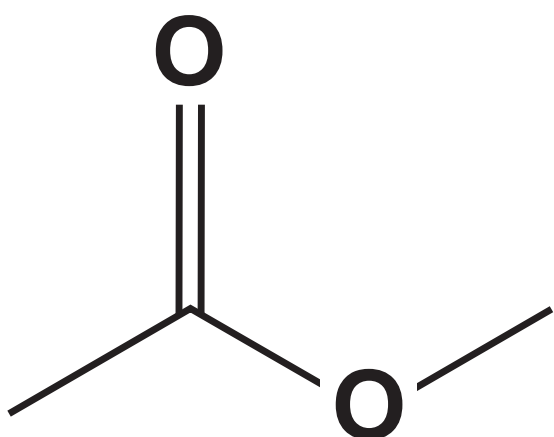
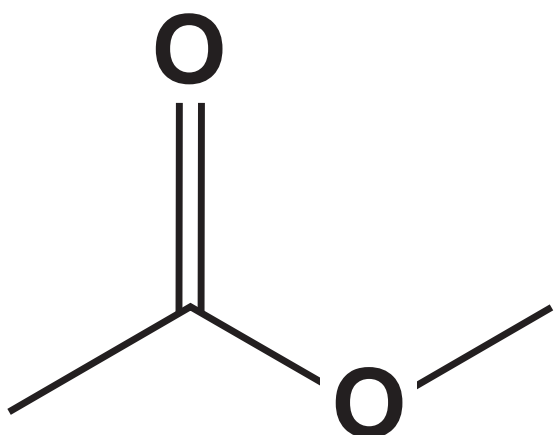
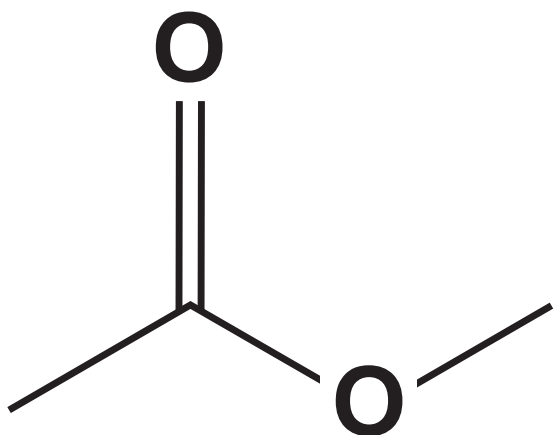
isoamyl acetate



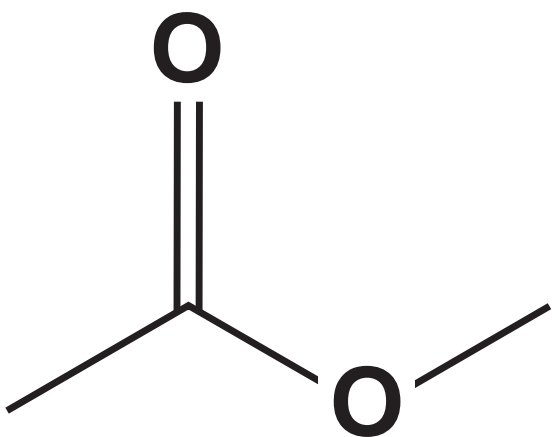
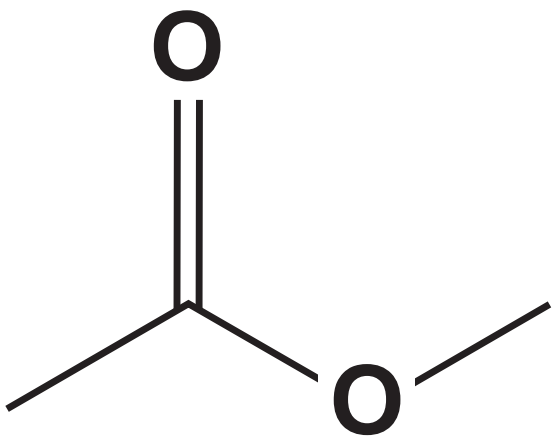
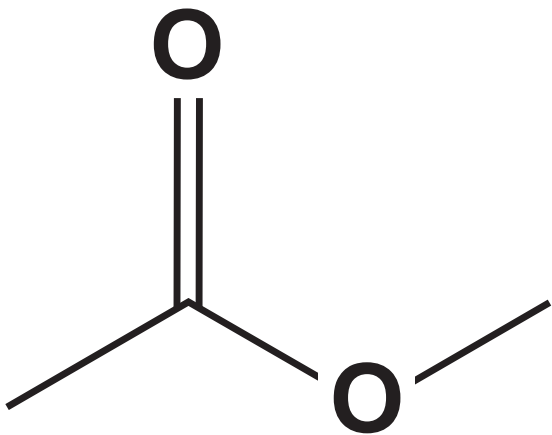
amyl acetate



Question 8(f)(i)



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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Question 9(e)

[illegible]

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Question 9(e)

[illegible]