

1. Consider the following compounds:

Compound A	Compound B	Compound C
$ \begin{array}{c} \text{CH}_2 - \text{CH}_2 - \text{C} \begin{array}{l} \nearrow \text{O} \\ \searrow \text{O} - \text{CH}_3 \end{array} \\ \\ \text{CH}_2 \\ \\ \text{CH}_3 \end{array} $	$ \begin{array}{c} \text{CH}_3 \\ \\ \text{CH}_3 - \text{CH}_2 - \text{C} - \text{C} \begin{array}{l} \nearrow \text{O} \\ \searrow \text{OH} \end{array} \\ \\ \text{CH}_3 \end{array} $	$ \begin{array}{c} \text{NH}_2 \\ \\ \text{CH}_2 - \text{CH} - \text{CH}_3 \\ \\ \text{Br} \end{array} $

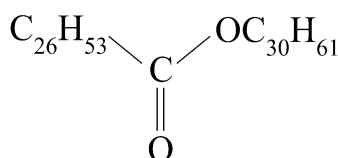
- Write the systematic name for compound A. /2
 - Write the systematic name for compound B. /3
 - Write the systematic name for compound C. /2
 - State whether Compound C is a primary, secondary or tertiary amine. /1
 - Explain why the boiling point of Compound B is higher than the boiling point of Compound A. /2
 - Circle and name any functional groups in Compound B. /2
 - State why Compounds A and B are classified as isomers. /1
 - Write an annotated equation for the formation of the Compound A. /3
2. Ethanol can be produced by fermentation of glucose.
- Write an equation for the conversion of the polysaccharide starch into glucose. /2
 - Write an equation for the fermentation of glucose. /2
 - State two conditions necessary for fermentation to occur. /2

3. Consider three members of a homologous series, shown below along with some of their properties:

Name	Molecular Formula	Boiling Point	Solubility in Water
1-butanol	C ₄ H ₁₀ O	65	9.1
1-pentanol	C ₅ H ₁₂ O	138	2.7
1-hexanol	C ₆ H ₁₄ O	152	0.59

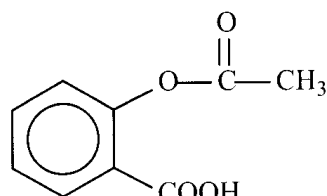
Explain why the solubility in water decreases as the length of the carbon chain increases. /2

4. The structural formula of a wax is shown in the diagram below:

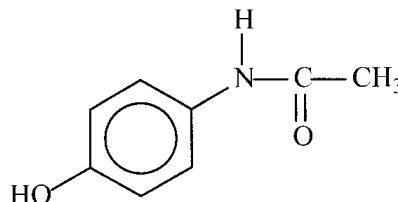


- Circle and name one functional group present in the molecule above. /1
- Write the molecular formula of the carboxylic acid formed by hydrolysis of the wax. /2

5. The two structures shown below are those of popular remedies for headaches.



Aspirin

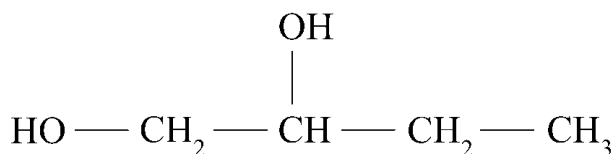


Paracetamol

- (a) To make aspirin more water soluble the tablet also contains sodium carbonate. Explain why the presence of sodium carbonate makes the aspirin more water soluble. /3
- (b) Describe and explain what would be observed as an aspirin tablet dissolves in water. /2
- (c) Circle the amide group in paracetamol. /1
- (d) Draw the structure for the organic substance formed when paracetamol is reacted with propanoic acid under reflux and in the presence of a trace of concentrated sulphuric acid. /2
- (e) Name the type of reaction described in part (d). /1

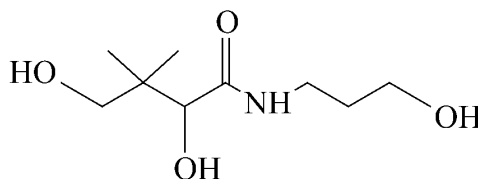
6.

- (a) Write the systematic name for compound X, shown below:



/2

One brand of hairspray contains panthenol, which is also known as vitamin B5. The structural formula of panthenol is shown in the diagram below:



- (b) Samples of compound X and panthenol are added to separate test-tubes containing acidified dichromate and warmed. State and explain the colour of the solution in each test tube after 5 minutes. /3
- (c) The compound 2-methyl-1-propanol is added to hairspray to help it to dry quickly on the hair. Draw the structural formula of 2-methyl-1-propanol. /2

7. Methanamine, ethanamine and 1-propanamine are three members of a homologous series. Some properties of these compounds are shown below.

Name	Formula	Boiling Point
methanamine	CH_3NH_2	-8
ethanamine	$\text{CH}_3\text{CH}_2\text{NH}_2$	20
1-propanamine	$\text{CH}_3\text{CH}_2\text{CH}_2\text{NH}_2$	50

- (a) Write the general formula for this homologous series. /1
- (b) State whether these compounds are primary, secondary or tertiary amines. /1
- (c) When methanamine is treated with acid, CH_3NH_3^+ forms. Explain why this ion forms. /2

TOTAL /47