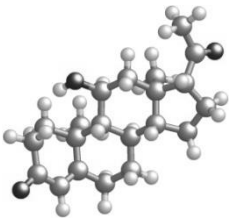

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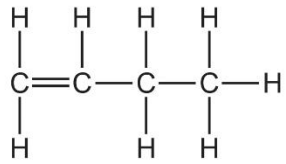
Date: …… **/** …… **/** ……

Multiple-Choice Questions on Organic Chemistry

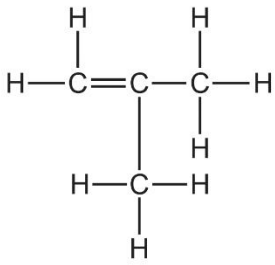
1. Substance **X**, molecular formula C_4H_8, does not react with hydrogen.

What is the structural formula of **X**?

A



B



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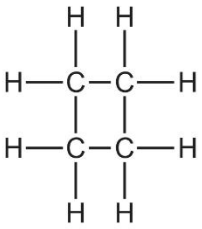

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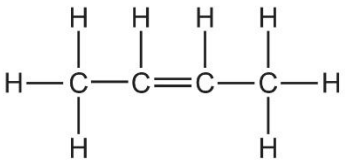


2. Cholesterol is an organic molecule that occurs in the blood stream.

What type of compound is cholesterol?

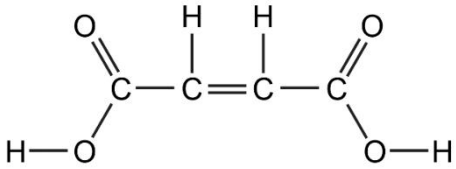
A An acid

B An alcohol

C An alkane

D An alkene

3. The structural formula of butenedioic acid is shown.



Which statement about butenedioic acid is **not** correct?

A It decolourises aqueous bromine.

B Its aqueous solution reacts with sodium carbonate.

C Its empirical formula is the same as its molecular formula.

D Its relative molecular mass is 116.

4. A mixture of four gases, methane, ethane, propane and butane is cooled until the first drop of liquid is formed. What compound is most likely to be present in this drop?

A Butane

B Ethane

C Methane

D Propane

5. Which statement about *Terylene* is correct?

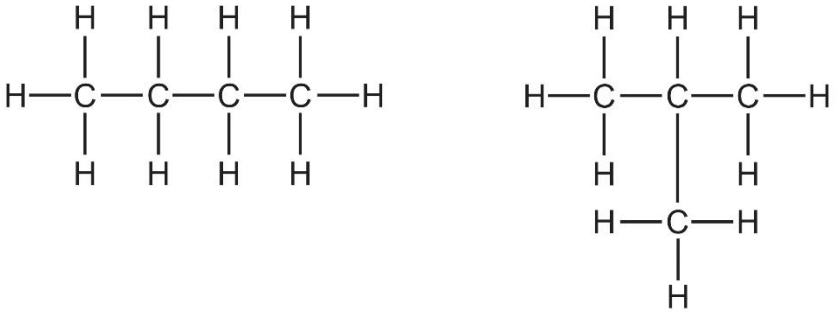
A It is an addition polymer.

B It is an alkene.

C It is a polyamide.

D It is a polyester.

6. The diagram shows two compounds.



It can be predicted from their formulae that the compounds have the same…

A Boiling point.

B Composition by mass.

C Melting point.

D Structural formula.

7. Which statement concerning isomers is true?

A Diamond and graphite are isomers of each other.

B Isomers have the general formula C_nH_{2n+2}.

C Isomers have the same molecular formula.

D Macromolecules are isomers of the small molecules from which they are made.

8. What is the name of the ester $CH_3COOC_2H_5$?

A ethyl ethanoate

B ethyl methanoate

C methyl ethanoate

D methyl methanoate

9. Which equation represents a combustion reaction?

A $C_2H_4 + H_2O \rightarrow C_2H_5OH$

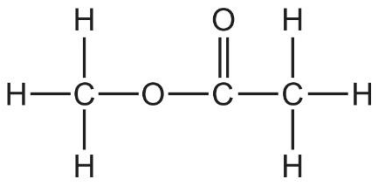
B $C_2H_5OH + O_2 \rightarrow CH_3CO_2H + H_2O$

C $CH_3CO_2H + 2O_2 \rightarrow 2CO_2 + 2H_2O$

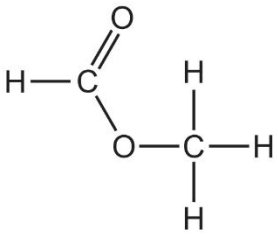
D $CH_3CO_2H + CH_3OH \rightarrow CH_3CO_2CH_3 + H_2O$

10. Which compound will react with ethanol to form an ester?

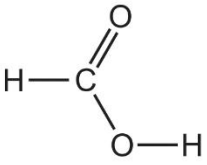
A



B



C



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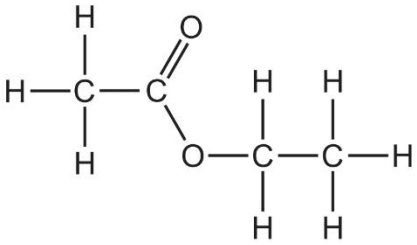


11. Four conversions are listed.

1 amino acids to proteins

2 ethene to poly(ethene)

3 proteins to amino acids

4 starch to glucose

Which two conversions are **not** examples of hydrolysis?

A 1 and 2 **B** 1 and 4 **C** 2 and 3 **D** 2 and 4

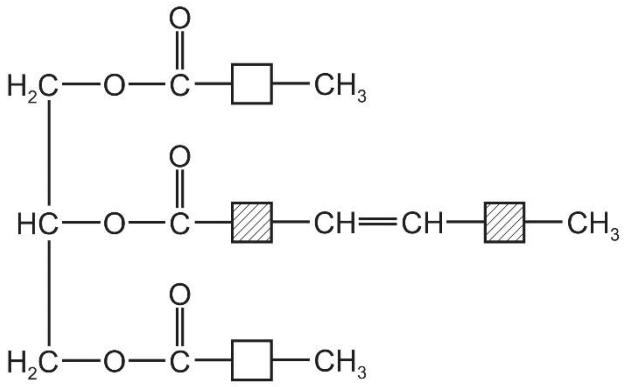
12. In the manufacture of ethanoic acid, the chemical industry uses the following sequence of reactions.

$$\text{compound } \mathbf{X} \xrightarrow{1} \text{ethene} \xrightarrow{2} \text{ethanol} \xrightarrow{3} \text{ethanoic acid}$$

What are the three processes?

	1	2	3
A	cracking	hydration	oxidation
B	cracking	polymerisation	hydration
C	hydration	polymerisation	oxidation
D	polymerisation	oxidation	hydration

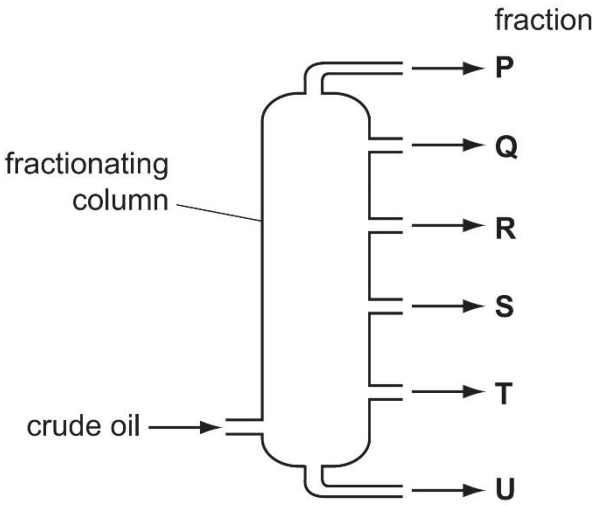
13. The diagram shows a simplified structure of a fat.



Which compounds in the table have linkages that can be found in this fat? (Do **not** consider C–H or C–C bonds as linkages.)

	ethene	nylon	*Terylene*
A	✓	✓	✓
B	✓	✓	×
C	✓	×	✓
D	×	✓	✓

14. The diagram shows the fractionation of crude oil.

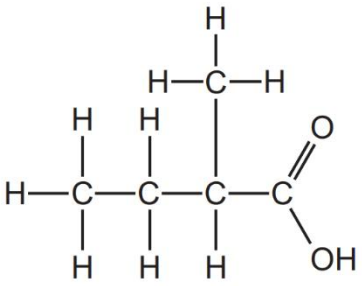


Which row explains why fraction **R** is collected above fraction **S**?

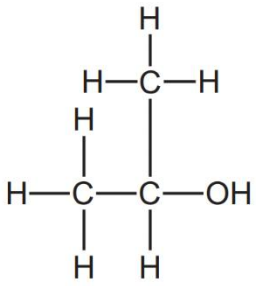
	boiling point of **R**	average molecular mass of **R**
A	higher than **S**	greater than **S**
B	higher than **S**	smaller than **S**
C	lower than **S**	greater than **S**
D	lower than **S**	smaller than **S**

15. Esters are formed when an alcohol reacts with a carboxylic acid.

Which ester would be formed using the carboxylic acid and alcohol shown?

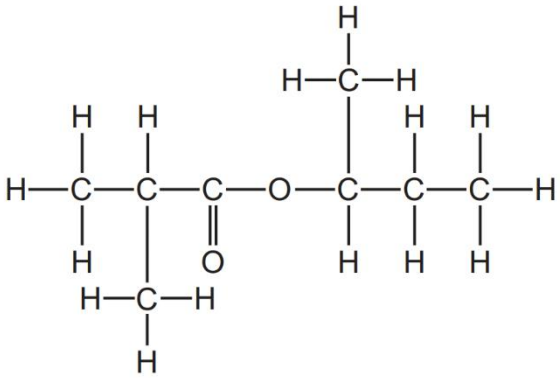


carboxylic acid



alcohol

A



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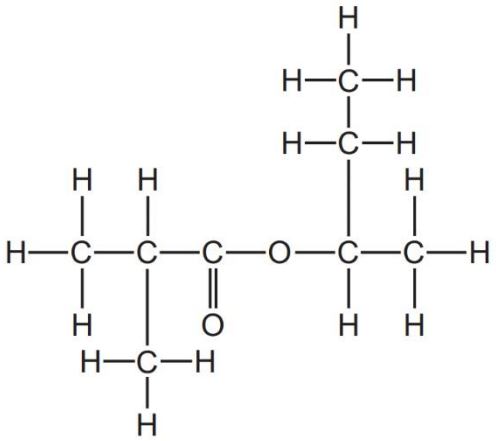

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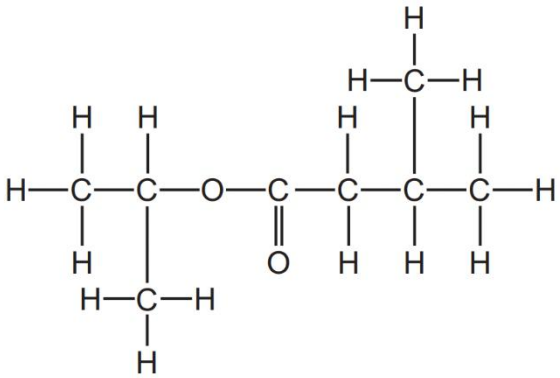

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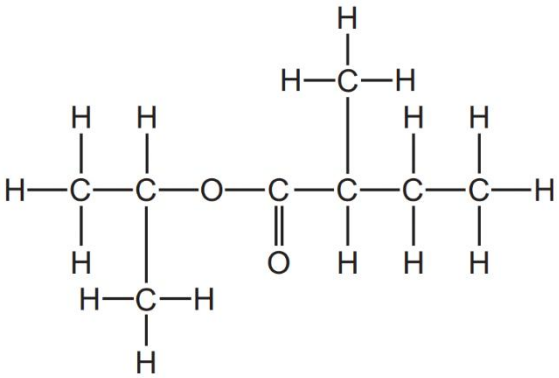


16. A compound **X** has the molecular formula $C_4H_8O_2$. It reacts with calcium carbonate to give Carbon dioxide. What is **X**?

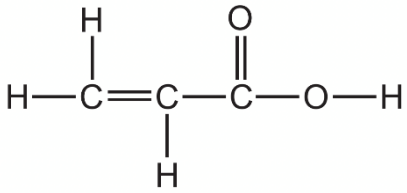
A $HCO_2C_3H_7$

B $CH_3CO_2C_2H_5$

C $C_2H_5CO_2CH_3$

D $C_3H_7CO_2H$

17. A compound has the following structure.



Which reactions will occur with this compound?

1 Bromine water will decolourise.

2 It will react with an alcohol to form an ester.

3 It will react with sodium metal.

A 1 only **B** 1 and 2 only **C** 1, 2 and 3 **D** 2 and 3 only

18. Methane is the first member of the alkane series of hydrocarbons. The second member is ethane. Which statements about ethane are correct?

1 Ethane has the formula C_2H_4.

2 Ethane has a higher boiling point than that of methane.

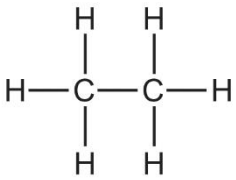
3 Ethane has the same empirical formula as methane.

4 Ethane has chemical properties very similar to those of methane.

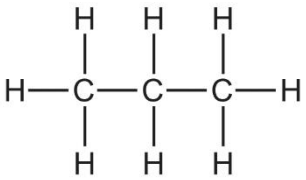
A 1, 2 and 3 **B** 1 and 4 **C** 2 and 4 **D** 3 only

19. Which alkane, when any one hydrogen atom is substituted by a chlorine atom, will not produce isomers?

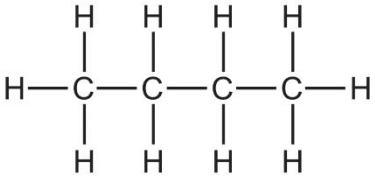
A



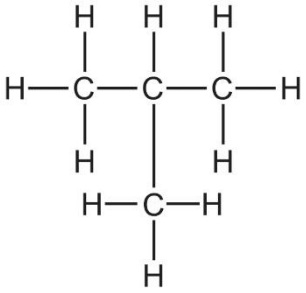
B



C



D



20. When ethanol reacts with ethanoic acid, the ester ethyl ethanoate is formed.

$$C_2H_5OH + CH_3CO_2H \rightarrow CH_3CO_2C_2H_5 + H_2O$$

What is the formula of the ester formed when methanol reacts with butanoic acid, $C_3H_7CO_2H$?

A $C_2H_5CO_2C_2H_5$

B $C_3H_7CO_2C_2H_5$

C $CH_3CO_2C_3H_7$

D $C_3H_7CO_2CH_3$

21. Which of these compounds could react together to form a polymer?

1 $H_2N(CH_2)_6NH_2$

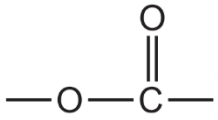
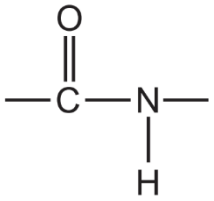
2 $CH_3(CH_2)_4COOH$

3 $HOOC(CH_2)_4COOH$

4 $H_2N(CH_2)_6CH_3$

A 1 and 2 **B** 1 and 3 **C** 2 and 4 **D** 3 and 4

22. The table gives some statements about some macromolecules.

1	fats contain the linkage 	proteins contain the linkage 
2	poly(ethene) is made by addition polymerisation	*Terylene* is made by condensation polymerisation
3	starch can be hydrolysed to produce sugars	proteins can be hydrolysed to produce amino acids
4	*Terylene* is a naturally occurring polymer	nylon is a man-made polymer

Which pairs of statements are correct?

A 1 and 2 only **B** 2 and 3 only **C** 3 and 4 **D** 1, 2 and 3

23. Which alcohol will, on oxidation, produce $CH_3CH_2CO_2H$?

A CH_3OH

B CH_3CH_2OH

C $CH_3CH_2CH_2OH$

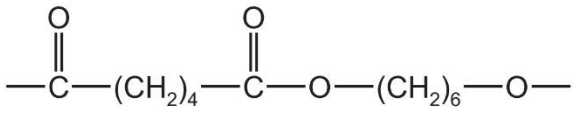
D $HOCH_2CH_2CH_2OH$

24. **P** is a polymer that

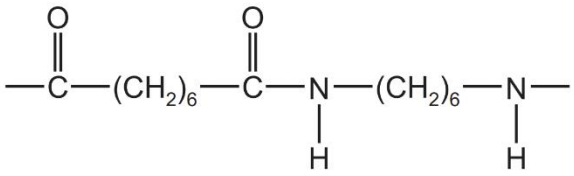
- Has six carbon atoms in each of the monomers from which it was formed.
- Is **not** a polyester.
- Was formed using condensation polymerisation.

What is the partial structure of **P**?

A



B



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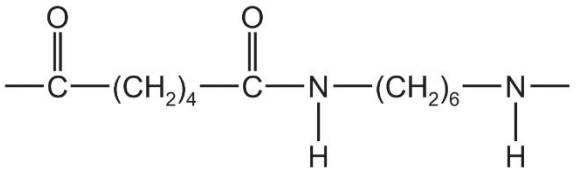
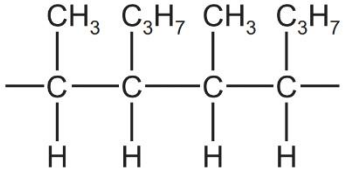
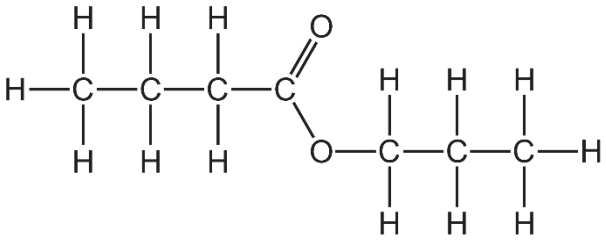


D



25. The diagram shows the structure of an ester.



What is the name of this ester?

A Butyl butanoate

B Butyl propanoate

C Propyl butanoate

D Propyl propanoate

26. An unsaturated hydrocarbon with six carbon atoms contains only three C=C double bonds. This hydrocarbon is reacted with excess hydrogen at a high temperature. What is the formula of the resulting hydrocarbon?

A C_6H_8 **B** C_6H_{10} **C** C_6H_{14} **D** C_6H_{16}

27. Which row correctly describes alkenes?

	general formula	result when shaken with aqueous bromine
A	C_nH_{2n+2}	no change
B	C_nH_{2n+2}	the aqueous bromine is decolourised
C	C_nH_{2n}	no change
D	C_nH_{2n}	the aqueous bromine is decolourised

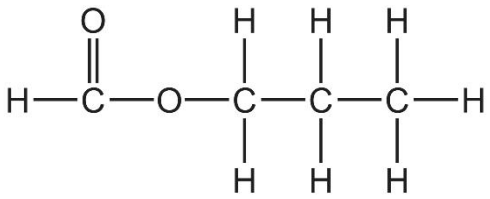
28. The table contains statements about processes by which ethanol is produced on a large scale from ethene and from glucose.

	from ethene	from glucose
1	reaction is faster at 300 °C than at 200 °C	reaction is faster at 100 °C than at 30 °C
2	produces pure ethanol	produces a dilute aqueous solution of ethanol
3	uses a catalyst	uses a catalyst
4	uses steam	produces carbon dioxide

Which rows are correct?

A 1, 2 and 3 **B** 1 and 4 **C** 2, 3 and 4 **D** 2 and 3

29. The structure of an ester is shown.



What is the name of this ester?

A Ethyl propanoate **B** Methyl propanoate

C Propyl ethanoate **D** Propyl methanoate

30. Which statement about alkanes is correct?

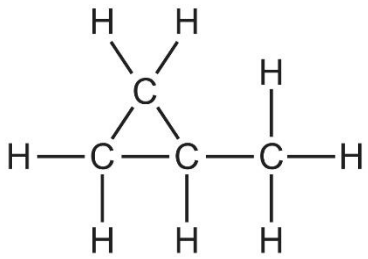
A Alkanes are described as being saturated because they are insoluble in water.

B Alkanes react with chlorine in an addition reaction.

C The alkane containing 10 carbon atoms in each molecule has a higher viscosity than the alkane containing 20 carbon atoms.

D The formula of an alkane with 35 carbon atoms in each molecule is $C_{35}H_{72}$.

31. The diagram shows the structural formula of an organic compound.



Which statement about this compound is correct?

A It is a saturated hydrocarbon.

B It is an alkene.

C It is an isomer of butane.

D It will undergo addition with hydrogen.

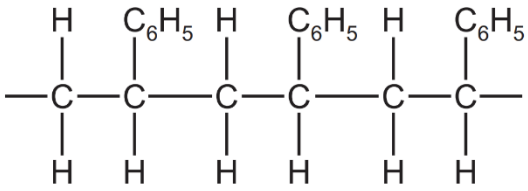
32. An ester is formed from a carboxylic acid and an alcohol.

How does the number of carbon, hydrogen and oxygen atoms in an ester differ from the total number of these atoms in the carboxylic acid and alcohol from which the ester is formed?

	carbon atoms	hydrogen atoms	oxygen atoms
A	fewer	fewer	fewer
B	fewer	same	fewer
C	same	fewer	fewer
D	same	same	same

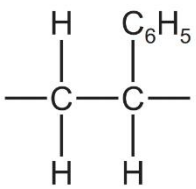
33. Poly(styrene) is an addition polymer.

The partial structure of poly(styrene) is shown.

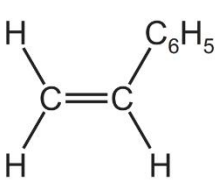


What is the formula of the monomer from which poly(styrene) is made?

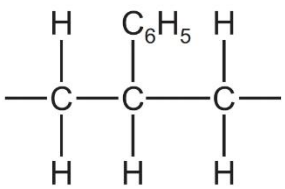
A



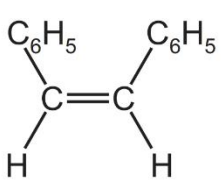
B



C



D



34. Which statements are true for homologous series?

1 Each series contains saturated compounds.

2 The compounds in each series are unreactive.

3 Each series has a general formula.

4 Each series has a gradation in physical properties.

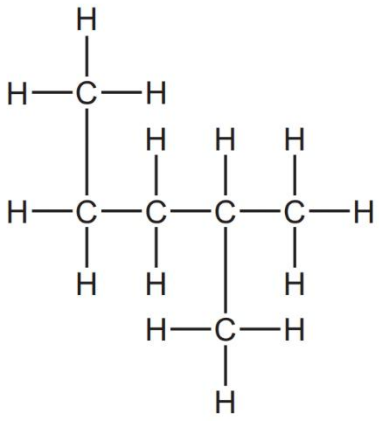
A 1, 2, 3 and 4 **B** 1, 2, and 3 only

C 1 and 4 only **D** 3 and 4 only

35. Alkanes are saturated compounds containing carbon and hydrogen only.

Structures 1, 2, 3 and 4 are saturated hydrocarbons.

1



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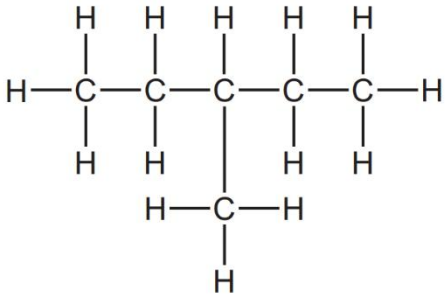

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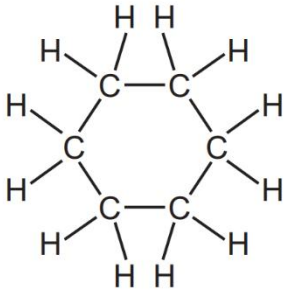
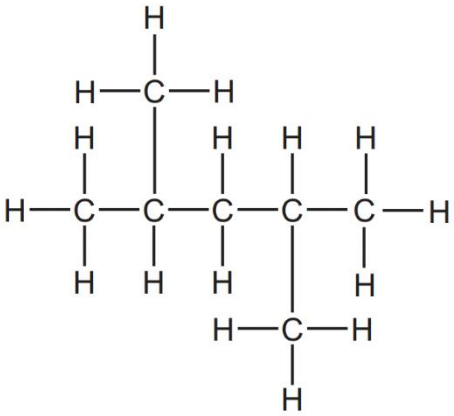


4



Which pair of structures are isomers?

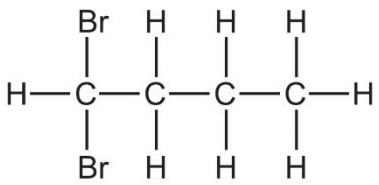
A 1 and 2 **B** 1 and 4 **C** 2 and 3 **D** 2 and 4

36. How many structural isomers with the formula $C_4H_{10}O$ are alcohols?

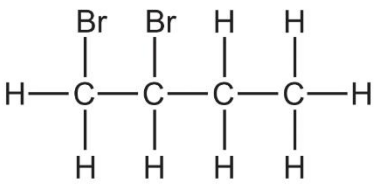
A 2 **B** 3 **C** 4 **D** 5

37. When butene reacts with bromine, which compound could be made?

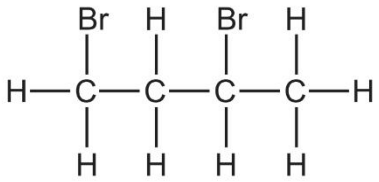
A



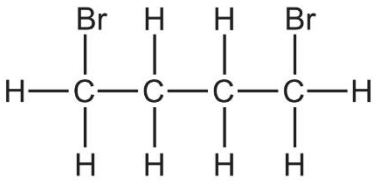
B



C



D



38. Which statements about the alcohol $CH_3CH_2CH_2OH$ are correct?

1 When $CH_3CH_2CH_2OH$ is oxidised, it forms propanoic acid.

2 $CH_3CH_2CH_2OH$ burns in the air to form carbon dioxide and water.

3 $CH_3CH_2CH_2OH$ can be formed by the addition reaction between ethene and steam.

A 1 and 2 only **B** 1 and 3 only

C 2 and 3 only **D** 1, 2 and 3

39. Propanoic acid reacts with calcium carbonate. The products of this reaction are calcium propanoate, carbon dioxide and water.

What is the equation for this reaction?

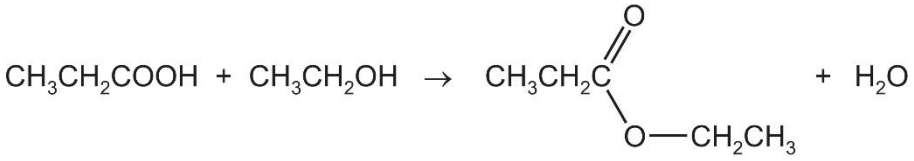
A $2C_2H_5COOH + Ca_2CO_3 \rightarrow 2C_2H_5COOCa + CO_2 + H_2O$

B $2C_2H_5COOH + CaCO_3 \rightarrow (C_2H_5COO)_2Ca + CO_2 + H_2O$

C $2C_3H_7COOH + Ca_2CO_3 \rightarrow 2C_3H_7COOCa + CO_2 + H_2O$

D $2C_3H_7COOH + CaCO_3 \rightarrow (C_3H_7COO)_2Ca + CO_2 + H_2O$

40. An acid reacts with an alcohol to form an ester and water.

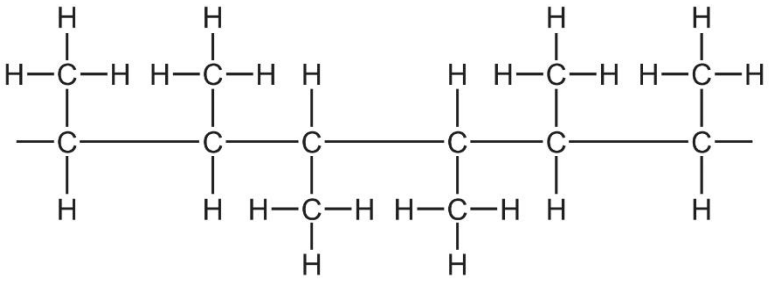


What is the name of the ester formed in this reaction?

A Ethyl ethanoate **B** Ethyl propanoate

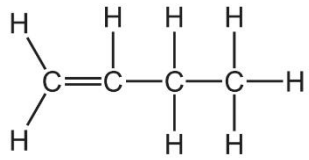
C Propyl ethanoate **D** Propyl propanoate

41. Part of a polymer chain is shown.

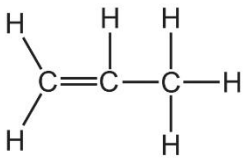


Which monomer was used to produce this polymer?

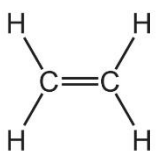
A



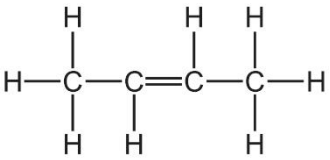
B



C



D



42. Which statements about alkenes are correct?

1 They have the general formula of C_nH_{2n}.

2 They undergo addition reactions with steam.

3 They burn in air to form carbon dioxide and water.

A 1 and 2 only

B 1 and 3 only

C 2 and 3 only

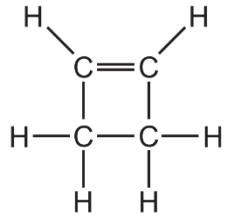
D 1, 2 and 3

43. **X** is a branched hydrocarbon with the ratio of carbon atoms to hydrogen atoms being 1 : 2.

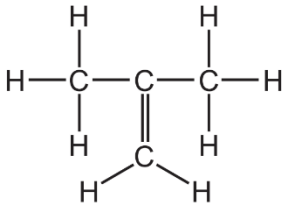
X has a relative molecular mass of 56.

What is the identity of **X**?

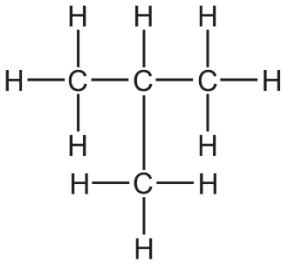
A



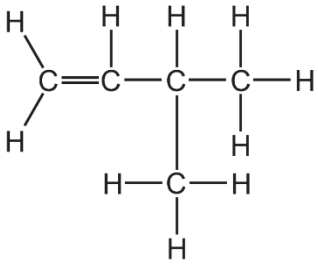
B



C



D



44. The reactions listed all involve ethanol.

1 $C_2H_5OH + O_2 \rightarrow CH_3COOH + H_2O$

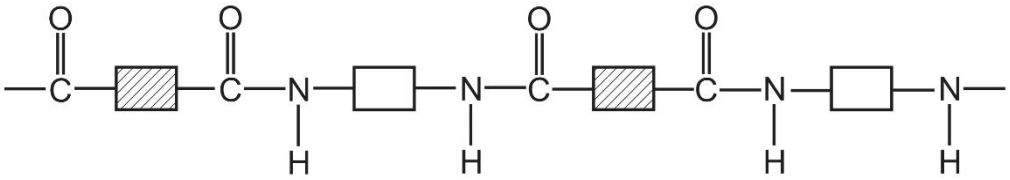
2 $C_2H_5OH + CH_3COOH \rightarrow CH_3COOC_2H_5 + H_2O$

3 $C_6H_{12}O_6 \rightarrow 2C_2H_5OH + 2CO_2$

Which row correctly describes each reaction?

	1	2	3
A	combustion	acidification	fermentation
B	combustion	esterification	addition
C	oxidation	acidification	addition
D	oxidation	esterification	fermentation

45. The diagram shows the partial structure of a polymer.



Which type of polymer does it represent?

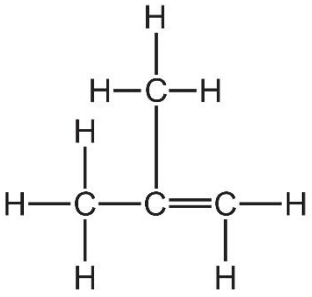
A Polyamide

B Polyester

C Poly(ethene)

D Polysaccharide

46. The structure of compound **X** is shown.



Four statements are made about compound **X**.

1 **X** burns in air to form carbon dioxide and water.

2 **X** turns bromine water from colourless to brown.

3 **X** is propene.

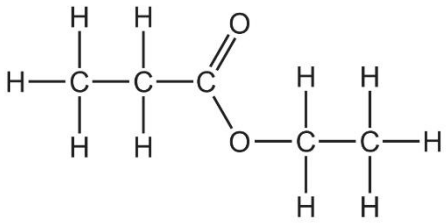
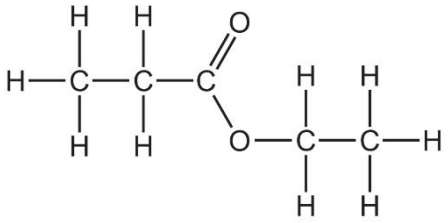
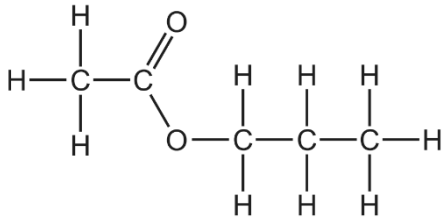
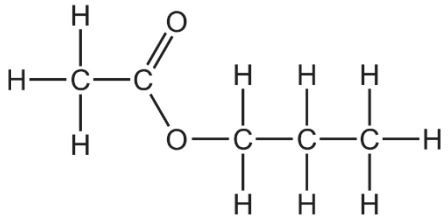
4 The number of C – C single bonds is increased by reacting **X** with hydrogen.

Which statements are correct?

A 1 and 2 **B** 1 and 4 **C** 2 and 3 **D** 3 and 4

47. Ethanoic acid is reacted with propanol.

What is the name and what is the structure of the ester produced?

	name	structure
A	propyl ethanoate	
B	ethyl propanoate	
C	propyl ethanoate	
D	ethyl propanoate	

48. When ethene reacts with steam to form ethanol, which type of reaction takes place?

A Addition

B Fermentation

C Polymerisation

D Reduction

49. Which compound could be a flavouring in a non-alcoholic fruit drink?

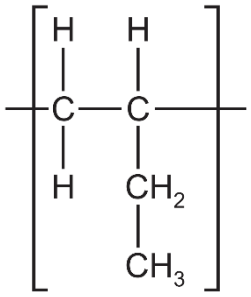
A CH_3CH_2OH

B $CH_3CH_2CH_2CH_2COOH$

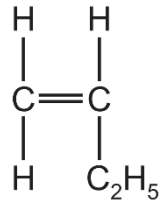
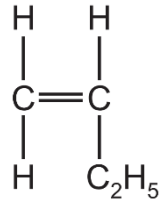
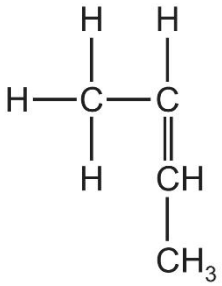
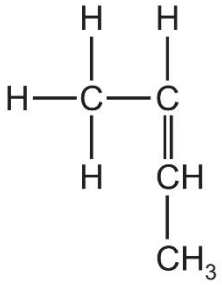
C $CH_3COOCH_2CH_2CH_2CH_2CH_3$

D $CH_3CH_2CH_2CH_2CH_2OH$

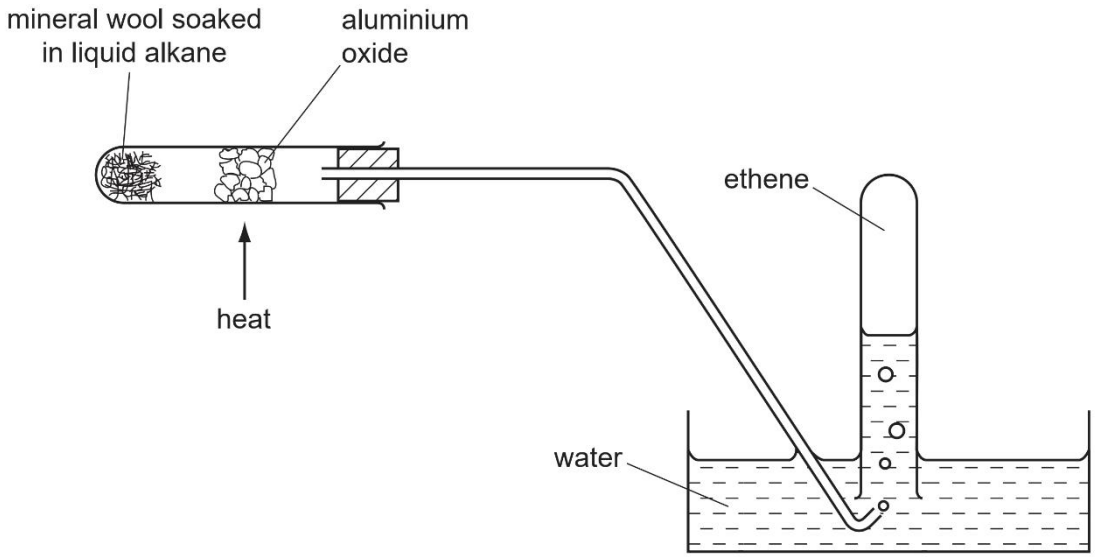
50. The diagram shows the repeat unit of a polymer.



Which row correctly identifies the monomer and type of polymerisation involved in making this polymer?

	monomer	type of polymerisation
A		addition
B		condensation
C		addition
D		condensation

51. The diagram shows the breakdown of an alkane to ethene.

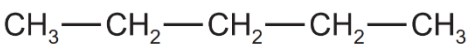


The ethene is then tested with aqueous bromine.

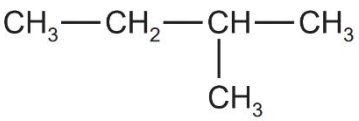
Which information about ethene is correct?

	solubility in water	action on aqueous bromine
A	insoluble	decolourised
B	insoluble	no reaction
C	soluble	decolourised
D	soluble	no reaction

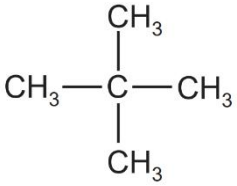
52. Which structure is **not** an isomer of the structure shown?



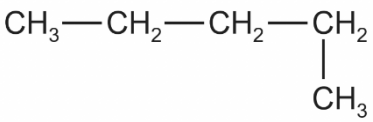
A



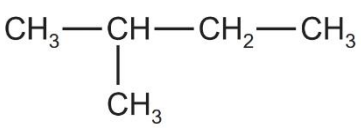
B



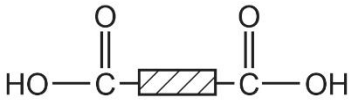
C



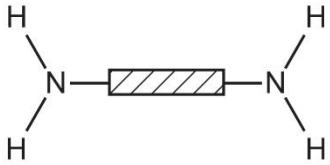
D



53. A polymer **X** is hydrolysed and the two products are:



and



What can be deduced about **X**?

A It is a condensation polymer.

B It is made by addition polymerisation.

C It is starch.

D It is Terylene.

54. Two different hydrocarbons each contain the same percentage by mass of hydrogen.

It follows that they have the same:

A Empirical formula

B Number of isomers

C Relative molecular mass

D Structural formula

55. The list shows three chemical reactions.

1 Combustion of ethanol.

2 Fermentation of glucose.

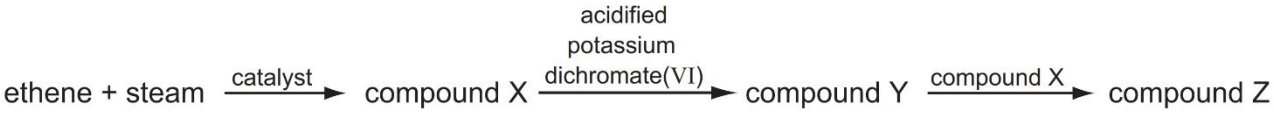
3 Reaction of ethanol with ethanoic acid to give an ester.

In which reactions is water a product?

A 1 and 2 only **B** 1 and 3 only

C 2 and 3 only **D** 1, 2 and 3

56. The diagram shows a reaction scheme.



What is the final compound, Z?

A A carboxylic acid **B** An alcohol

C An alkene **D** An ester

57. The two statements are about the fractional distillation of crude oil. The statements may or may not be correct. They may or may not be linked.

Statement 1 Fractional distillation is used to separate crude oil into useful fractions.

Statement 2 The fractions with lower boiling points are found at the top of the fractionating column.

What is correct about these two statements?

A Both statements are correct and statement 2 explains statement 1.

B Both statements are correct but statement 2 does not explain statement 1.

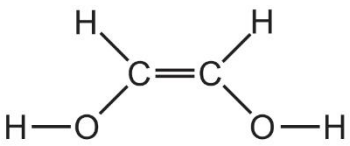
C Statement 1 is correct but statement 2 is incorrect.

D Statement 1 is incorrect but statement 2 is correct.

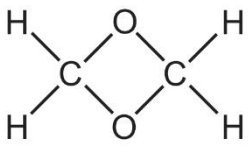
58. An aqueous solution of a compound of formula $C_2H_4O_2$ reacts with sodium carbonate, liberating carbon dioxide.

What is the structural formula of the compound?

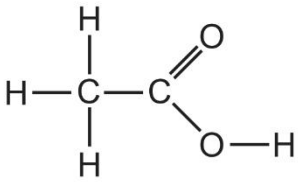
A



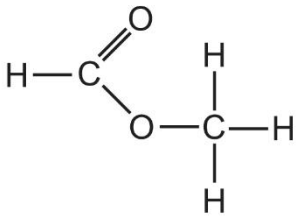
B



C



D



59. When butanol, represented by C_4H_wOH, burns in air, carbon dioxide and water are formed.

$$C_4H_wOH + xO_2 \rightarrow 4CO_2 + yH_2O$$

Which values of w, x and y balance the equation?

	w	x	y
A	8	6	4
B	9	6	4
C	9	6	5
D	10	7	5

60. The macromolecules of proteins, fats and carbohydrates can all be broken down into their simple units by a similar process.

What is the process called?

A Esterification **B** Hydrolysis

C Oxidation **D** Reduction

61. Compound **X** is a hydrocarbon. It reacts with steam to form an alcohol.

Which type of compound is **X** and what would be its effect on bromine water?

	type of compound	effect on bromine water
A	alkane	turns from brown to colourless
B	alkane	turns from colourless to brown
C	alkene	turns from brown to colourless
D	alkene	turns from colourless to brown

62. Compounds **X** and **Y** are both alkanes. Compound **X** has a higher boiling point than compound **Y**. What could be the formulae of compounds **X** and **Y**?

	compound **X**	compound **Y**
A	C_8H_{16}	C_9H_{18}
B	C_8H_{18}	C_9H_{20}
C	C_9H_{18}	C_8H_{16}
D	C_9H_{20}	C_8H_{18}

63. With which substance will ethene react to form more than one product?

A Bromine **B** Hydrogen

C Oxygen **D** Steam

64. A 10 cm^3 sample of a gaseous hydrocarbon is completely burnt in oxygen. The total volume of the products is 70 cm^3. All gas volumes are measured at room temperature and pressure.

Which equation represents the combustion of the hydrocarbon?

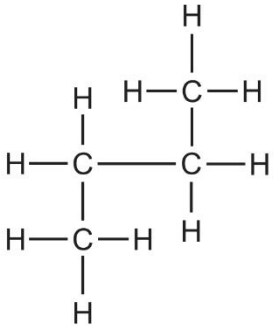
A $CH_4(g) + 2O_2(g) \rightarrow CO_2(g) + 2H_2O(g)$

B $C_2H_4(g) + 3O_2(g) \rightarrow 2CO_2(g) + 2H_2O(g)$

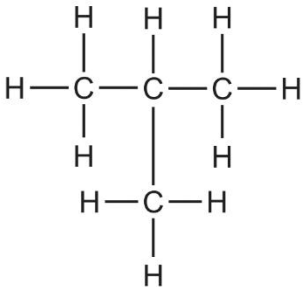
C $C_3H_8(g) + 5O_2(g) \rightarrow 3CO_2(g) + 4H_2O(g)$

D $2C_2H_6(g) + 7O_2(g) \rightarrow 4CO_2(g) + 6H_2O(g)$

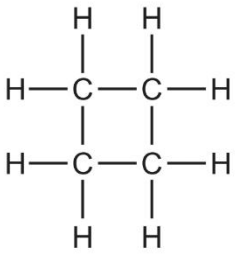
65. Four hydrocarbon structures are shown.



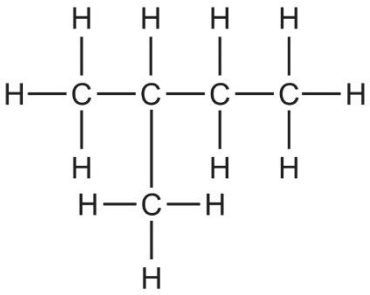
1



2



3



4

Which hydrocarbons are isomers of each other?

A 1, 2 and 3 **B** 1, 2 and 4

C 1 and 2 only **D** 3 and 4 only

66. The diagram below shows four monomers.

How many of these monomers would react with the molecule below to form a polymer?

A 1 **B** 2 **C** 3 **D** 4

67. For which molecules are the empirical and molecular formulae the same?

1 Methanoic acid, HCO_2H

2 Ethanoic acid, CH_3CO_2H

3 Propanoic acid, $C_2H_5CO_2H$

4 Butanoic acid, $C_3H_7CO_2H$

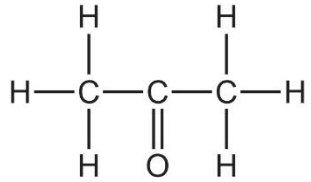
A 1, 2 and 3 only **B** 1 and 3 only

C 2 and 3 only **D** 2, 3 and 4 only

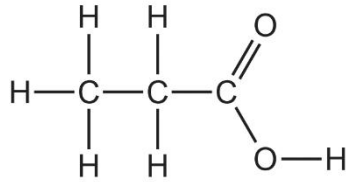
68. Alcohols can be oxidised to form another homologous series of compounds.

What would be the product of the oxidation of propanol?

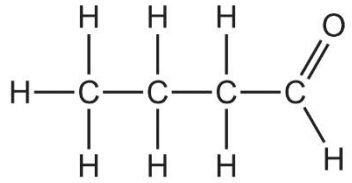
A



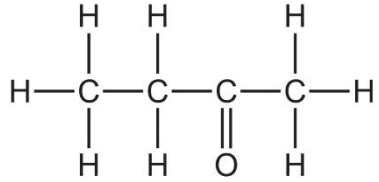
B



C



D



69. A compound Y is thought to be an organic acid.

Which reaction shows that Y is an **organic** acid?

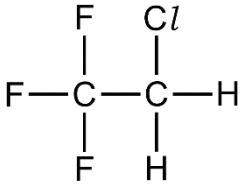
A It reacts with an alcohol to form an ester.

B It reacts with magnesium to form hydrogen.

C It reacts with sodium carbonate to form carbon dioxide.

D It turns litmus red.

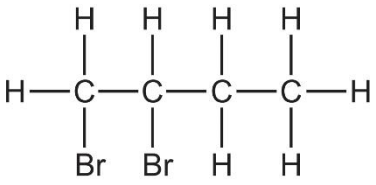
70. CFC compounds were commonly used as aerosol propellants. The structure of one CFC compound is shown.



Which element in this compound causes a depletion of ozone in the atmosphere?

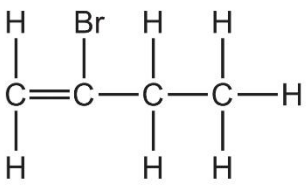
A Carbon **B** Chlorine **C** Fluorine **D** Hydrogen

71. Compound Q reacts with bromine to form the compound shown.



Which is compound Q?

A



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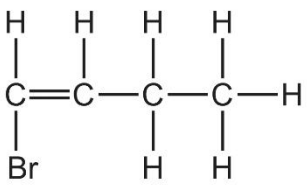
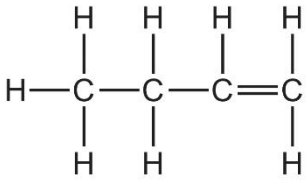
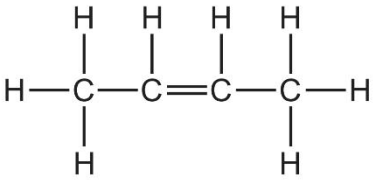


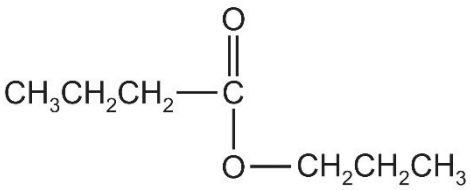
C



D



72. The diagram shows the structure of an ester.



What are the starting materials for making this compound?

A Butanol and butanoic acid.

B Butanol and propanoic acid.

C Propanol and butanoic acid.

D Propanol and propanoic acid.

73. Nylon, poly(ethene) and Terylene are macromolecules.

In which of these macromolecules is the C=O group present in the linkage?

A Nylon and Terylene only.

B Nylon only.

C Poly(ethene) and Terylene only.

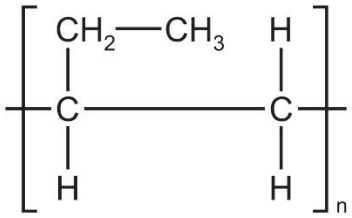
D Terylene only.

74. Which information is correct regarding the formation of ethanol by the process of fermentation?

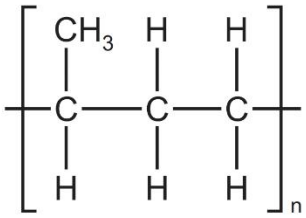
	substances fermented	gas evolved during fermentation
A	carbohydrates	carbon dioxide
B	carbohydrates	carbon monoxide
C	hydrocarbons	carbon dioxide
D	hydrocarbons	carbon monoxide

75. Which partial structure is correct for the product of polymerisation of butene, $CH_2=CHCH_2CH_3$?

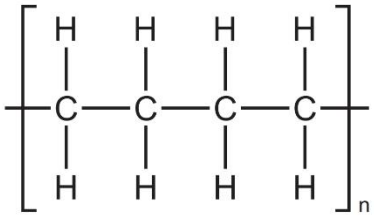
A



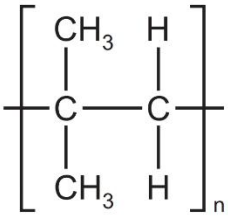
B



C

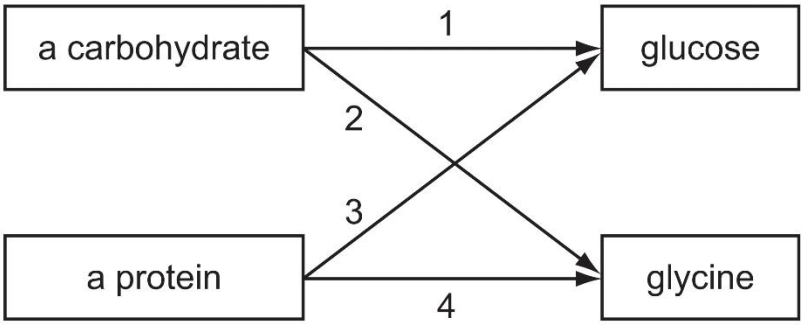


D



76. Glucose is a simple sugar. Glycine is an amino acid.

In the diagram, which two arrows correctly show the hydrolysis products of a carbohydrate and of a protein?



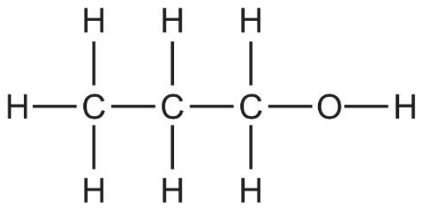
A 1 and 3 **B** 1 and 4 **C** 2 and 3 **D** 2 and 4

77. When crude oil is distilled several products are obtained.

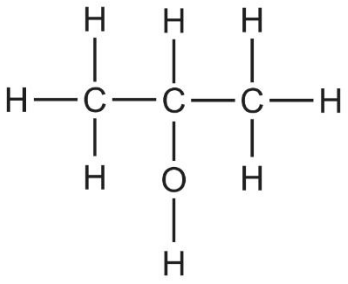
What is the correct order of their boiling points?

	highest boiling point	→ → → → →		lowest boiling point
A	diesel	paraffin (kerosene)	petrol (gasoline)	lubricating oil
B	lubricating oil	diesel	paraffin (kerosene)	petrol (gasoline)
C	paraffin (kerosene)	petrol (gasoline)	lubricating oil	diesel
D	petrol (gasoline)	paraffin (kerosene)	diesel	lubricating oil

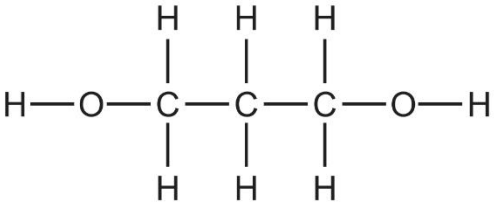
78. The structural formulae of some organic compounds are shown below.



1



2



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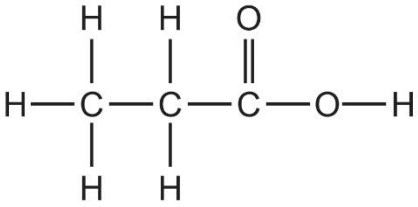


4

Which compounds are alcohols?

A 1 only **B** 1 and 2 only **C** 1, 2 and 3 **D** 4 only

79. Which compound, on combustion, never forms carbon?

A Carbon monoxide **B** Ethanol

C Ethene **D** Methane

80. Which of the following is **not** a condensation polymer?

A Nylon **B** poly(ethene)

C Protein **D** Terylene

81. Which statement about the properties of propane and hexane is correct?

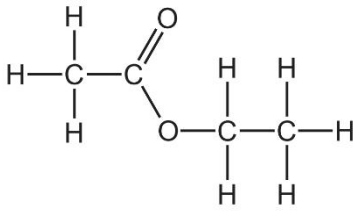
A Propane has a higher boiling point than hexane.

B Propane has a higher relative molecular mass than hexane.

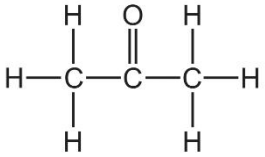
C Propane has more isomers than hexane.

D Propane is more flammable than hexane.

82. Four compounds are shown.



1



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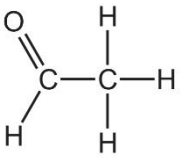
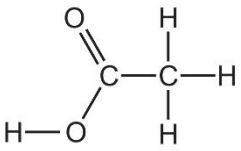


3



4

Which pair of compounds have the same empirical formula?

A 1 and 2 **B** 1 and 3 **C** 2 and 3 **D** 2 and 4

83. Fats, carbohydrates and proteins all contain which chemical elements?

A Carbon, hydrogen and oxygen

B Carbon, hydrogen and nitrogen

C Carbon, hydrogen and sulfur

D Carbon, nitrogen and oxygen

84. Two esters have the same molecular formula, $C_3H_6O_2$.

What are the names of these two esters?

1 methyl ethanoate

2 ethyl propanoate

3 ethyl methanoate

4 propyl methanoate

A 1 and 2 **B** 1 and 3 **C** 2 and 4 **D** 3 and 4

85. When cracked, one mole of a compound, **X**, produces one mole of propene and one mole of hydrogen.

$$\mathbf{X} \rightarrow C_3H_6 + H_2$$

What type of compound is **X**?

A An alcohol **B** An alkane

C An alkene **D** A carboxylic acid

86. Which is a correct definition of isomers?

A Atoms with the same relative atomic mass and different structures.

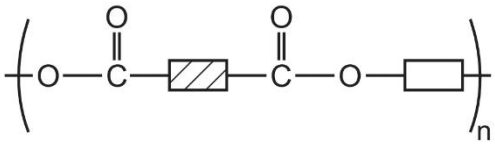
B Compounds with the same molecular formula and different structures.

C Compounds with the same molecular mass and different structures.

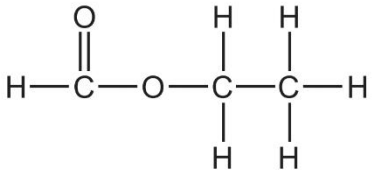
D Elements with the same molecular mass and the same structures.

87. Which of the following has **not** been prepared by reacting a carboxylic acid with an alcohol?

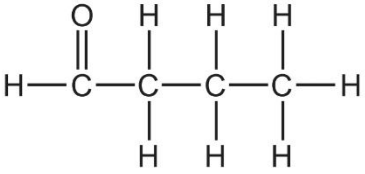
A



B



C



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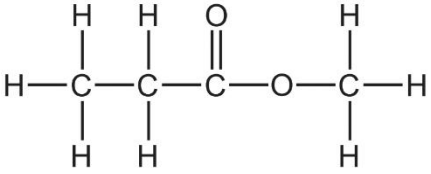


88. Which of these polymers is a protein?

A $(C_2H_3Cl)_n$ **B** $(C_5H_8O_2)_n$ **C** $(C_6H_{10}O_5)_n$ **D** $(C_2H_3NO)_n$

89. In the addition polymer poly(propene), what is the simplest ratio of carbon atoms to hydrogen atoms?

	carbon atoms	hydrogen atoms
A	1	2
B	2	1
C	2	4
D	3	6

90. How many moles of hydrogen chloride are formed when one mole of methane reacts with a large excess of chlorine in sunlight (ultraviolet light)?

A 1 **B** 2 **C** 3 **D** 4

91. Which statement about vegetable oil and the margarine made from it is correct?

A Both are liquids at room temperature.

B Both occur naturally.

C Margarine has the higher melting point.

D Vegetable oil has fewer carbon-carbon double bonds than margarine.

92. Which two statements about alcohols are correct?

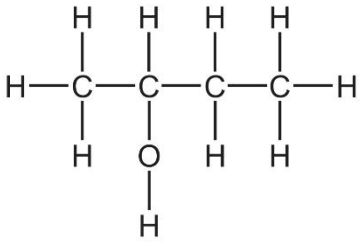
1 All alcohols contain the hydroxide ion, OH^-.

2 Ethanol can be formed from ethene using a reaction catalysed by yeast.

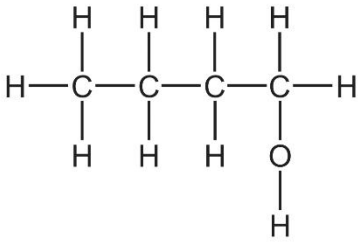
3 Methanol can be oxidised to methanoic acid.

4 The alcohols X and Y shown are isomers.

X



Y



A 1 and 2 **B** 1 and 3 **C** 2 and 4 **D** 3 and 4

93. Amino acids are essential building blocks in the human body. Macromolecules in food are hydrolysed to form amino acids.

Which macromolecules provide the body with amino acids?

A Carbohydrates **B** Fats

C Proteins **D** Sugars

94. Ethanol, C_2H_6O, was reacted with propanoic acid, $C_3H_6O_2$, in the presence of concentrated sulfuric acid.

Which statement about the organic product of this reaction is correct?

A It has the formula $C_5H_{10}O_2$.

B It has the formula $C_5H_{12}O_3$.

C It is formed by an addition reaction.

D It is propyl ethanoate.

95. How can alkenes be manufactured?

A By polymerisation reactions.

B By the addition of hydrogen to unsaturated vegetable oils.

C By the combustion of alkanes.

D By the cracking of hydrocarbons.

96. Which statement about alkanes is correct?

A Ethane reacts with chlorine in an addition reaction.

B Propane has a higher boiling point than butane.

C The molecule of the alkane that contains 99 carbon atoms has 200 hydrogen atoms.

D There are three isomers with the formula C_4H_{10}.

97. Which statement about ethanoic acid is correct?

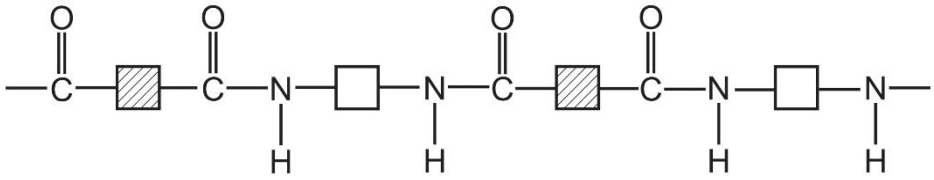
A Ethanoic acid can be made by the catalysed addition of steam to ethene.

B Propanoic acid can react with ethanoic acid to produce an ester.

C Solutions of 1.0 mol / dm^3 ethanoic acid and 1.0 mol / dm^3 hydrochloric acid will react with magnesium at equal rates.

D The formula of ethanoic acid is CH_3CO_2H.

98. Polymer Z has the structure shown.



These four terms can be used to describe polymers.

1 Addition polymer

2 Condensation polymer

3 Polyamide

4 Polyester

Which two terms can be applied to polymer Z?

A 1 and 3 **B** 1 and 4 **C** 2 and 3 **D** 2 and 4

99. Which statement about macromolecules is correct?

A Nylon and *Terylene* are both polyesters.

B Proteins and nylon have the same monomer units.

C Proteins have the same amide linkages as nylon.

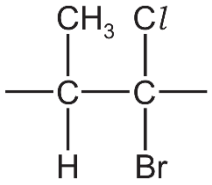
D *Terylene* and fats are esters but with different linkages.

100. An ester is produced by reacting together the carboxylic acid HCO_2H and the alcohol $CH_3CH_2CH_2OH$.

What is the name and structure of this ester?

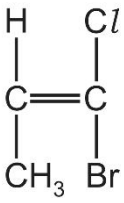
	name	structure
A	methyl propanoate	$CH_3CH_2CO_2CH_3$
B	methyl propanoate	$HCO_2CH_2CH_2CH_3$
C	propyl methanoate	$CH_3CH_2CO_2CH_3$
D	propyl methanoate	$HCO_2CH_2CH_2CH_3$

101. The repeat unit of a polymer is shown.

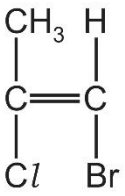


Which monomer would produce this polymer?

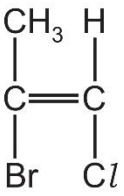
A



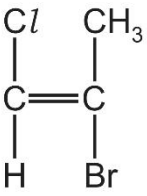
B



C



D



102. Each compound, W, X, Y and Z is either an unbranched alkane or an unbranched alkene.

W C_9H_{18}

X C_9H_{20}

Y $C_{10}H_{20}$

Z $C_{10}H_{22}$

Which two compounds undergo an addition reaction with bromine?

A W and Y **B** W and Z **C** X and Y **D** X and Z

103. One mole of each alkane undergoes complete combustion.

Which alkane will produce seven moles of products?

A CH_4 **B** C_2H_6 **C** C_3H_8 **D** C_4H_{10}

104. Which polymer contains only three different elements?

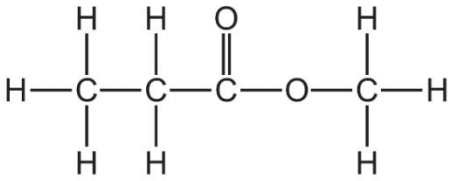
A Protein **B** Poly(ethene)

C Poly(propene) **D** Starch

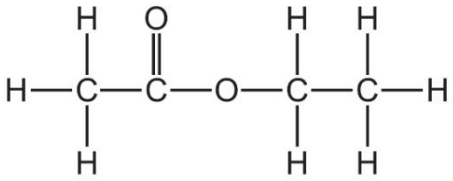
105. An organic compound, X, has a molecular formula $C_4H_8O_2$ and turns damp, blue litmus paper red.

What is the structure of X?

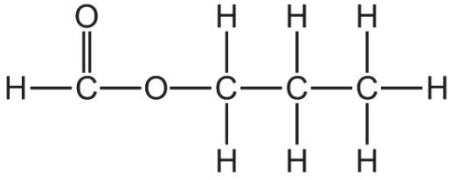
A



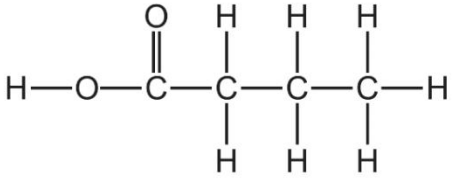
B



C



D

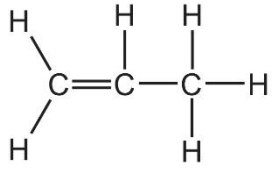


106. **Z** is a compound that:

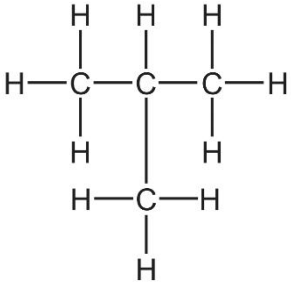
- Can be formed, as the only product, when the alkane C_8H_{18} is cracked to produce butane.
- Decolourises bromine water.
- Has a branched chain structure.

What is the formula of **Z**?

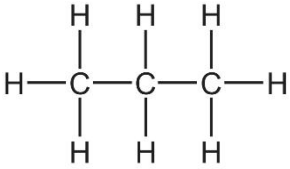
A



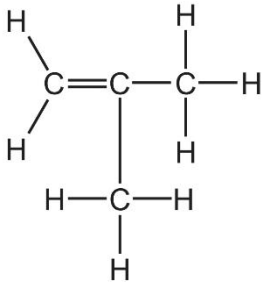
B



C



D



107. Some properties of compound **J** are listed.

- It reacts with potassium carbonate to produce carbon dioxide.
- It reacts with ethanol to produce a sweet-smelling liquid.
- It reacts with sodium hydroxide to produce a salt.

What is a possible identity of **J**?

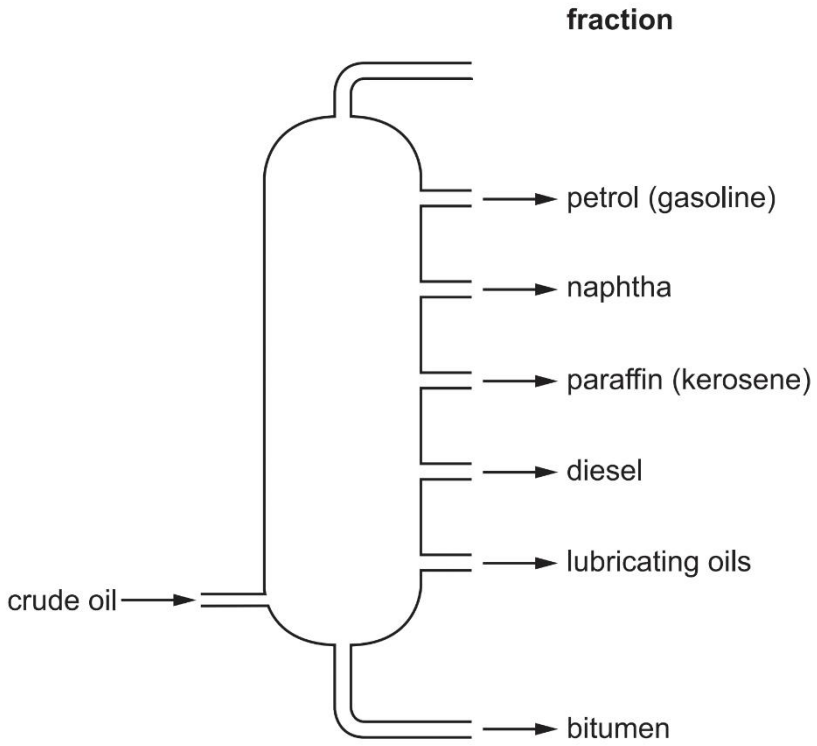
A Ethanoic acid

B Ethanol

C Ethyl ethanoate

D Ethyl methanoate

108. The diagram shows the fractionation of petroleum (crude oil).



Which row shows the correct use for the fraction?

	fraction	use
A	bitumen	as a lubricant
B	diesel	for aircraft engines
C	naphtha	making road surfaces
D	paraffin	fuel for heating and cooking

109. Compound **Q** is a hydrocarbon that has no isomers. Compound **Q** does not decolourise bromine in the dark. Which compound could be **Q**?

A C_3H_6 **B** C_3H_8 **C** C_4H_8 **D** C_4H_{10}

110. Which organic compound requires the least number of moles of oxygen for the complete combustion of one mole of the compound?

A C_3H_7OH **B** C_3H_7COOH **C** C_3H_8 **D** C_4H_8

111. What is the structure of propyl methanoate?

A $CH_3CH_2COOCH_2CH_3$

B $CH_3COOCH_2CH_2CH_3$

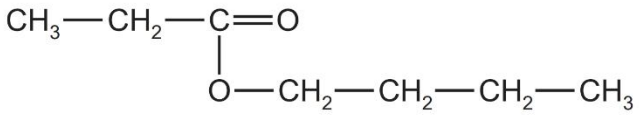
C $CH_3CH_2COOCH_3$

D $CH_3CH_2CH_2OOCH$

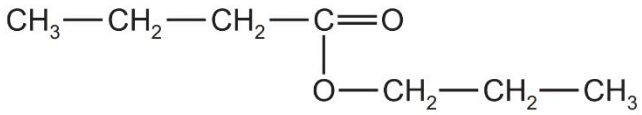
112. A carboxylic acid of molecular formula $C_4H_8O_2$ reacts with an alcohol of molecular formula C_3H_8O to form an ester.

What could be the formula of the ester formed?

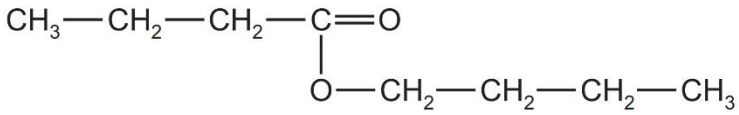
A



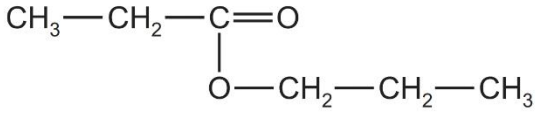
B



C

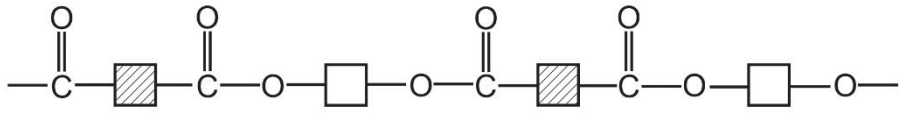


D

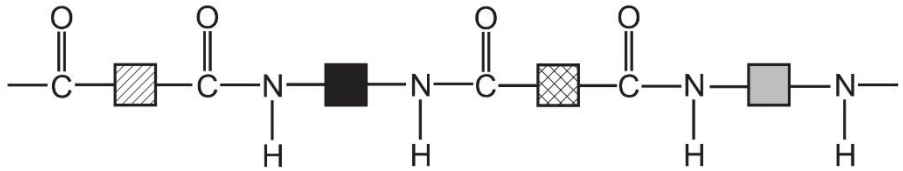


113. Which partial structure represents nylon?

A



B



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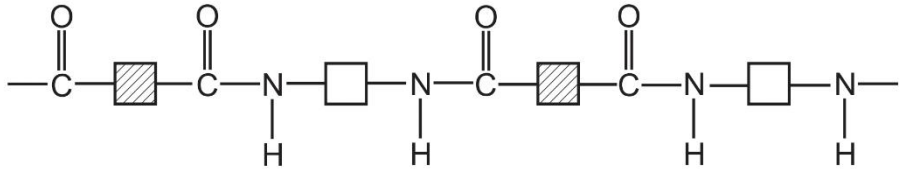

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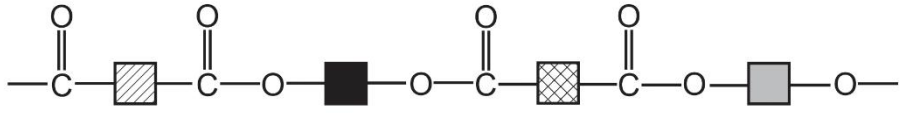


114. When a molecule of a saturated hydrocarbon is cracked, it forms two molecules X and Y.

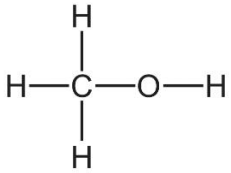
Which row is correct?

	X	Y
A	H_2	C_nH_{2n}
B	H_2	C_nH_{2n+2}
C	H_2O	C_nH_{2n}
D	H_2O	C_nH_{2n+2}

115. The structures and names of three alcohols, P, Q and R are shown.

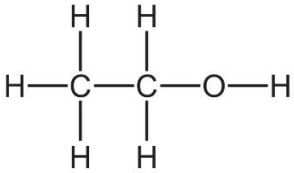
The structures may or may not be named correctly.

P



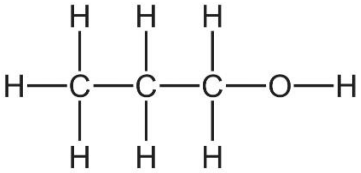
propanol

Q



ethanol

R

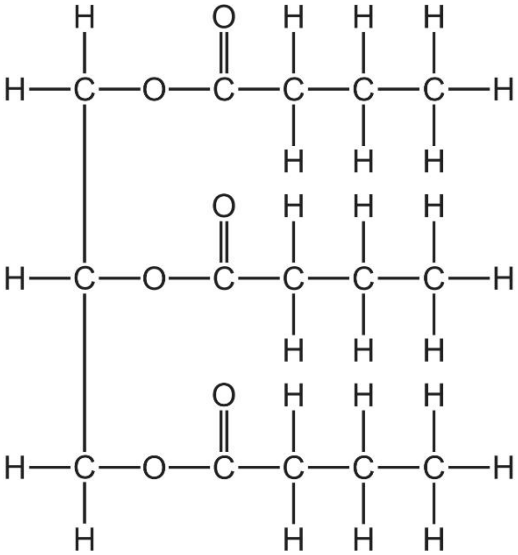


methanol

Which structure(s) are named correctly?

A P, Q and R **B** P only **C** Q only **D** R only

116. Fats are essential components of the human diet. The diagram shows a fat molecule.



Which description of this fat molecule is correct?

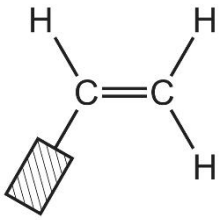
A A saturated carboxylic acid.

B A saturated ester.

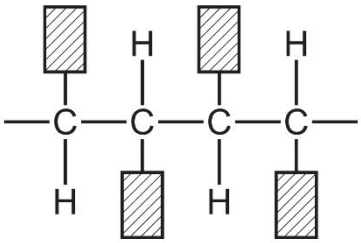
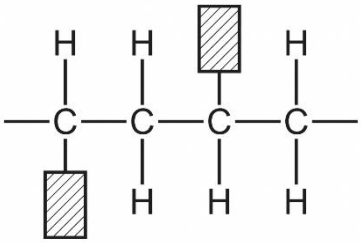
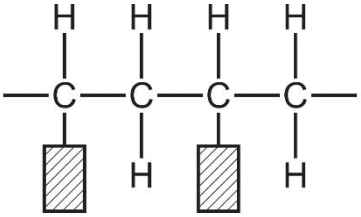
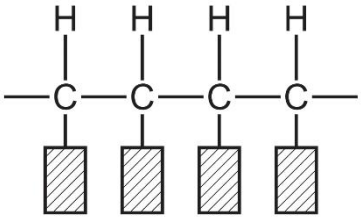
C An unsaturated carboxylic acid.

D An unsaturated ester.

117. The monomer used to manufacture polystyrene is shown.



By which type of polymerisation is polystyrene formed and what is a possible partial structure of the polymer?

	type of polymerisation	possible partial structure of polymer
A	addition	
B	addition	
C	condensation	
D	condensation	

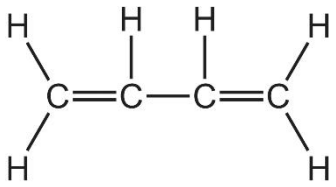
118. One mole of each of the compounds shown is completely combusted.

$C_5H_{12}O$ C_6H_{12} C_6H_{14} $C_6H_{14}O$

How many of the compounds need exactly nine moles of oxygen for complete combustion?

A 1 **B** 2 **C** 3 **D** 4

119. A molecule of the compound C_4H_6 is shown.



This molecule undergoes an addition reaction with excess bromine and an addition reaction with steam.

One molecule of C_4H_6 reacts with ……1…… of bromine.

When C_4H_6 reacts with steam, ……2…… is formed.

Which words complete gaps 1 and 2?

	1	2
A	one molecule	an alcohol
B	one molecule	a carboxylic acid
C	two molecules	an alcohol
D	two molecules	a carboxylic acid

120. The molecules of two hydrocarbon compounds X and Y each contain only four carbon atoms. X is saturated and Y is unsaturated.

Which statements are correct?

1 Under suitable conditions Y polymerises.

2 The complete combustion of 1 mole of Y produces more carbon dioxide than the complete combustion of 1 mole of X.

3 One molecule of Y contains more hydrogen atoms than one molecule of X.

A 1 only **B** 3 only **C** 1 and 2 only **D** 1 and 3 only

121. Which conversions involve oxidation?

1 ethanol $\rightarrow$ carbon dioxide + water

2 ethanol $\rightarrow$ ethanoic acid

3 ethene $\rightarrow$ poly(ethene)

A 1 only **B** 2 only **C** 1 and 2 only **D** 1, 2 and 3

122. Which type of reaction could be used in the polymerisation of ethene?

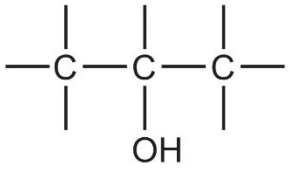
A Addition **B** Condensation

C Cracking **D** Esterification

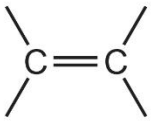
123. Compound T reacts with magnesium, aqueous sodium hydroxide and ethanol.

Which group does T contain?

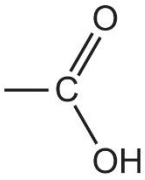
A



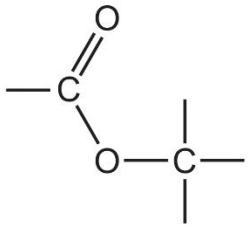
B



C



D



124. Insulin is a protein made in the human body.

Which statements about insulin are correct?

1 It is a condensation polymer.

2 It is a synthetic polymer.

3 When hydrolysed it produces only one monomer.

4 It contains amide linkages.

A 1, 2 and 3 **B** 1 and 3 only **C** 1 and 4 only **D** 2, 3 and 4

125. Which statement about polymers is correct?

A Nylon and *Terylene* are produced by addition polymerisation.

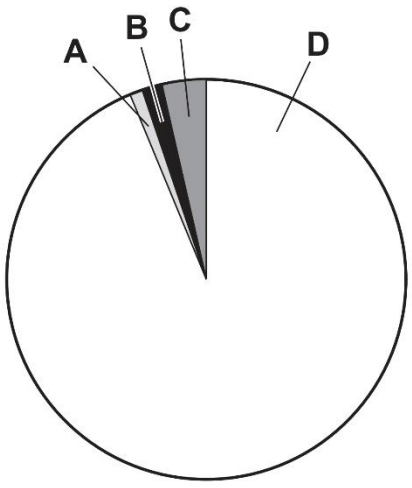
B Nylon and *Terylene* both contain the amide linkages.

C Simple sugars are produced by hydrolysing proteins.

D Starch contains the elements carbon, hydrogen and oxygen.

126. The pie chart represents the composition of natural gas.

Which sector represents methane?



127. The formula of a hydrocarbon is C_xH_y.

The equation for its complete combustion is shown.

$$C_xH_y + 8O_2 \rightarrow 5CO_2 + 6H_2O$$

What are the values of x and y?

	x	y
A	5	6
B	5	12
C	6	5
D	12	5

128. Molecule 1 undergoes a process to make molecule 2.

$$\text{molecule 1} \xrightarrow{\text{process}} \text{molecule 2}$$

Which row describes the molecules and the process?

	molecule 1	process	molecule 2
A	monomer	cracking	polymer
B	monomer	polymerisation	polymer
C	small molecule	polymerisation	monomer
D	small molecule	cracking	monomer

129. Two statements are given.

Statement 1 The percentage of carbon by mass is greater in methane than in butane.

Statement 2 Butane is one of two isomers with the molecular formula C_4H_{10}.

Which statements are correct?

A Both statement 1 and statement 2

B Statement 1 only

C Statement 2 only

D Neither statement 1 nor statement 2

130. The reactants and products of two reactions are shown.

Reaction 1 $C_3H_6 + H_2O \rightarrow X$

Reaction 2 $X + O_2 \rightarrow CO_2 + H_2O$

Which row correctly describes these two reactions?

	identity of compound X	conditions for reaction 1	reaction 2
A	butanol	high pressure and catalyst	combustion
B	butanol	heat and a catalyst	decomposition
C	propanol	heat and a catalyst	decomposition
D	propanol	heat and a catalyst	combustion

131. Poly(ethene) is formed by .....1..... polymerisation of ethene.

The formation of nylon and *Terylene* are examples of .....2..... polymerisation.

Proteins contain the same .....3..... linkage as nylon.

Fats contain the same .....4..... linkage as *Terylene*.

On hydrolysis, proteins form .....5..... .

Which words correctly complete gaps 1–5?

	1	2	3	4	5
A	addition	condensation	amide	ester	amino acids
B	addition	condensation	amide	ester	simple sugars
C	addition	condensation	ester	amide	amino acids
D	condensation	addition	ester	amide	simple sugars

- Scan the QR Code below to view the answers to this assignment.

http://www.chemist.sg/organic_chem/assignments/organic_chem_mcq_2_ans.pdf