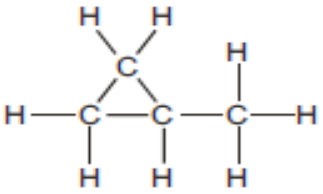
Organic Chemistry MCQS

1 How many of the molecules shown belong to the homologous series of alkanes?

C_2H_4 C_3H_8 C_4H_{10} C_5H_{10} C_6H_{14}

A 1 B 2 C 3 D 4

The diagram shows the structural formula of an organic compound.



2 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.

3 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.

4. Which group is found in alcohols?

A C=C B CO_2H C CONH D OH

5. 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

6. Which statement about the composition of polymers is correct?

A Nylon contains oxygen atoms but not nitrogen atoms.

B Proteins contain both nitrogen atoms and oxygen atoms.

C *Terylene* contains nitrogen atoms.

D The polymer used to make clingfilm contains oxygen atoms.

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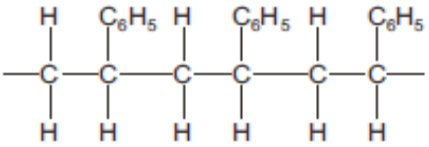
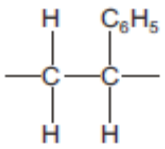
7 Poly(styrene) is an addition polymer.

The partial structure of poly(styrene) is shown.



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

A



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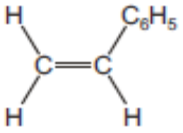
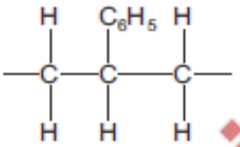
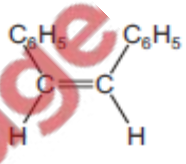


C



D



8 Which statement about the homologous series of alkanes is correct?

A Alkanes are unsaturated hydrocarbons.

B Alkanes all have the general formula C_nH_{2n}.

C The boiling points decrease as the number of carbon atoms per molecule increases.

D The liquid alkanes become more viscous as the mass of the molecules increases.

9 Which compound has the empirical formula with the greatest relative formula mass?

A C_2H_5 B C_4H_{10} C C_5H_{10} D C_6H_6

10 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.

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

A addition

B fermentation

C polymerisation

D reduction

12

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

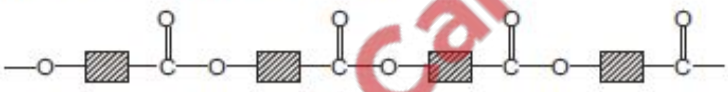
How does the number of carbon, hydrogen and oxygen atoms in an ester differ from the total number of these atoms in the carboxylic acid and alcohol from which the ester is formed?

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

13

Poly(lactic) acid is a polymer used to make biodegradable cups.

The partial structure of poly(lactic) acid is shown.



Which statements apply to poly(lactic) acid?

1 It is made by addition polymerisation.

2 It is made by condensation polymerisation.

3 It is a polyester.

4 The monomer used to make it is ethene.

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

14

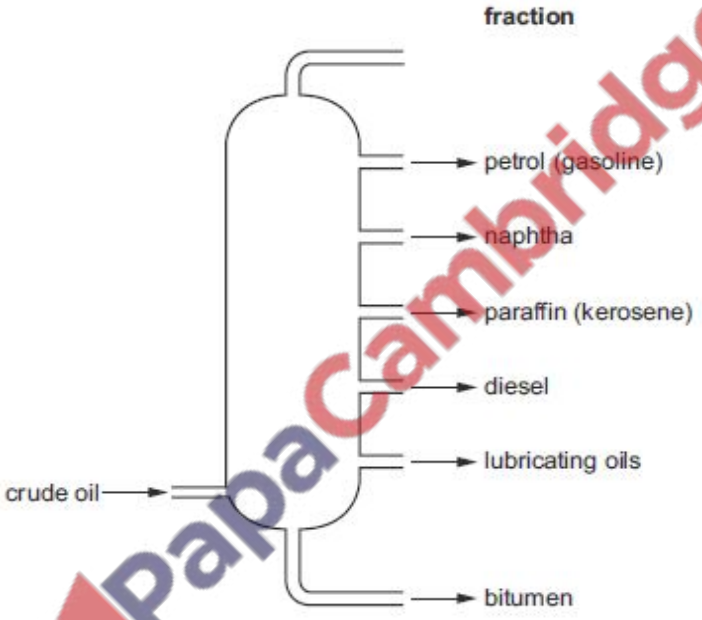
Two large molecules, P and Q, both contain the same linkage.

P occurs naturally but Q does not.

Which row could be P and Q?

	P	Q
A	fat	nylon
B	fat	*Terylene*
C	nylon	protein
D	protein	*Terylene*

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



16 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 (kerosene)	fuel for heating and cooking

Which compound is a constituent of petroleum (crude oil)?

A C_2H_5OH B CH_3CO_2H C C_8H_{18} D $C_6H_{12}O_6$

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17.

Which formula represents an alkane?

A $C_{31}H_{33}$ B $C_{31}H_{60}$ C $C_{31}H_{62}$ D $C_{31}H_{64}$

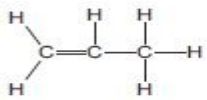
Z is a compound that:

- can be formed, as the only other product, when the alkane C_8H_{18} is cracked to produce butane
- decolourises bromine water
- has a branched chain structure.

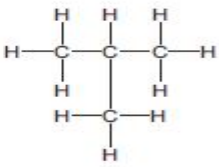
18.

What is the formula of Z?

A



B



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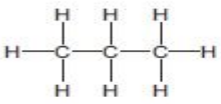

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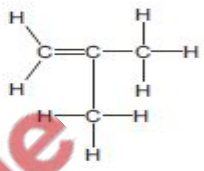
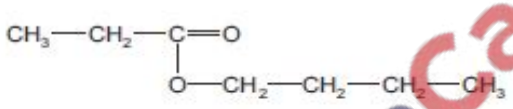


A carboxylic acid of molecular formula $C_4H_8O_2$ reacts with an alcohol of molecular formula C_3H_8O to form an ester.

What could be the formula of the ester formed?

19.

A



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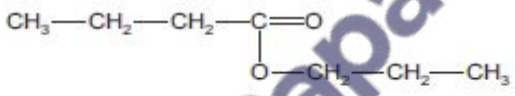

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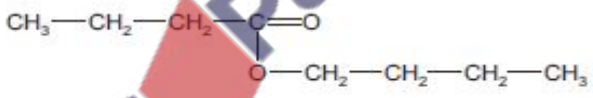
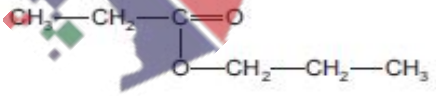


D



20.

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?

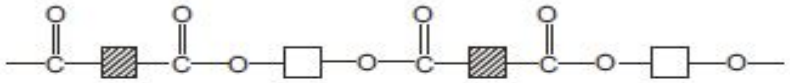
A ethanoic acid

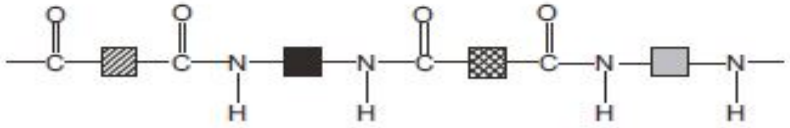
B ethanol

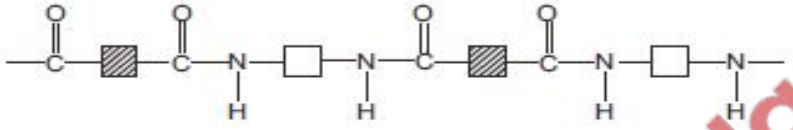
C ethyl ethanoate

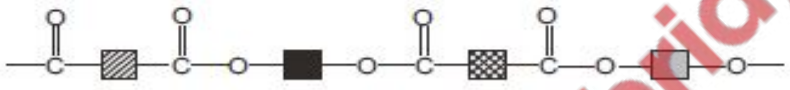
D ethyl methanoate

21. Which partial structure represents nylon?

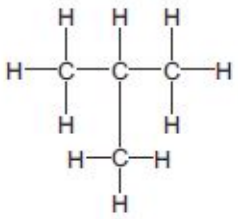
A 

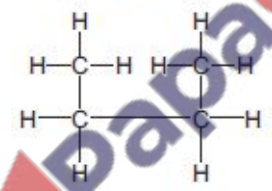
B 

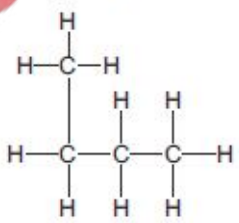
C 

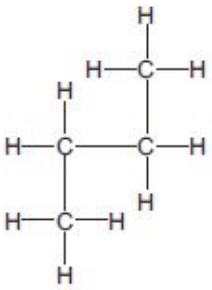
D 

22 Which diagram shows a branched-chain isomer of butane?

A 

B 

C 

D 

23 A straight-chain alkene, C_4H_8, undergoes an addition reaction with bromine.

What is the possible structure of the product?

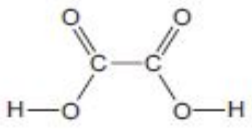
A $CH_3CHBrCH_2CH_2Br$

B $CH_3CHBrCHBrCH_3$

C $CH_2BrCH_2CH_2CH_2Br$

D $CH_3CH_2CH_2CH_2Br$

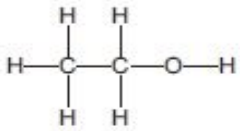
24 The diagram shows the structure of oxalic acid.



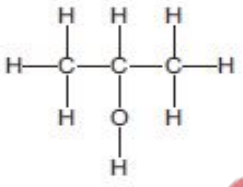
oxalic acid

Which alcohol is oxidised to form oxalic acid?

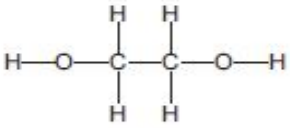
A



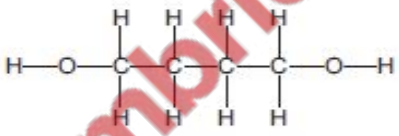
B



C



D



25 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?

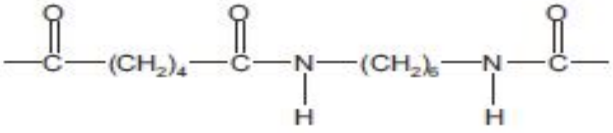
A ethanoic acid

B ethanol

C ethyl ethanoate

D ethyl methanoate

26 The diagram shows the formula of nylon.



From which compounds could nylon be made?

A $HO_2C–(CH_2)_6–CO_2H$ and $H_2N–(CH_2)_6–NH_2$

B $HO_2C–(CH_2)_4–CO_2H$ and $H_2N–(CH_2)_4–NH_2$

C $HO_2C–(CH_2)_4–CO_2H$ and $H_2N–(CH_2)_6–NH_2$

D $HO_2C–(CH_2)_6–CO_2H$ and $H_2N–(CH_2)_4–NH_2$

27 Octane, C_8H_{18}, is a hydrocarbon that undergoes combustion in a petrol engine.

$$...W...C_8H_{18} + ...X...O_2 \rightarrow ...Y...CO_2 + ...Z...H_2O$$

Which row shows the figures needed to balance the equation?

	W	*X*	*Y*	*Z*
A	1	8	8	9
B	1	17	8	9
C	2	16	8	9
D	2	25	16	18

28 Compounds **S** and **T** both contain two elements only. The compounds have the following properties.

- They both burn in air to form carbon dioxide and water only.
- They both react with chlorine by substitution.
- **S** has a higher boiling point than **T**.

What could compounds **S** and **T** be?

	S	**T**
A	ethane	propane
B	ethene	propene
C	propane	ethane
D	propene	ethene

29 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

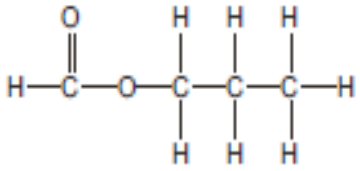
30 The table contains statements about processes by which ethanol is produced on a large scale from ethene and from glucose.

	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 only

31 The structure of an ester is shown.



What is the name of this ester?

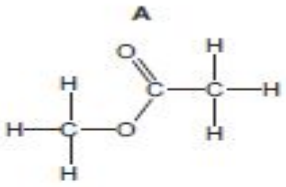
A ethyl propanoate

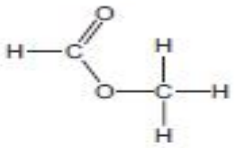
B methyl propanoate

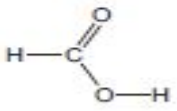
C propyl ethanoate

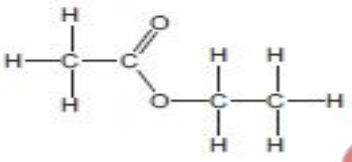
D propyl methanoate

32 Which compound has a pH of less than 7 in aqueous solution?

A 

B 

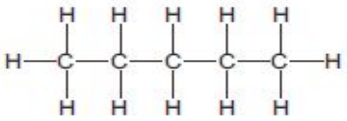
C 

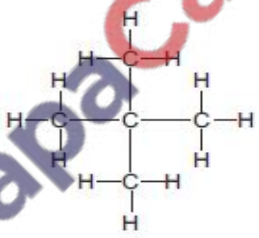
D 

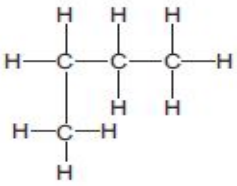
33 When the alcohol of molecular formula $C_4H_{10}O$ is oxidised, what is the molecular formula of the acid formed?

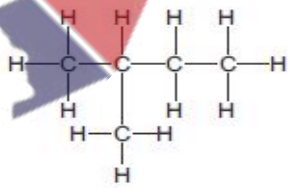
A $C_4H_{12}O_2$ B $C_4H_{10}O_2$ C $C_4H_8O_2$ D $C_4H_6O_2$

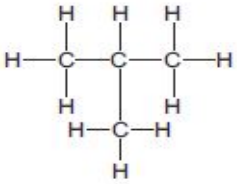
34 The diagrams show the structures of five hydrocarbons.

1 

2 

3 

4 

5 

Which three hydrocarbons are isomers of each other?

A 1, 2 and 4 B 2, 3 and 5 C 2, 3 and 4 D 3, 4 and 5

35 Which alcohol and acid will react together to make the ester $CH_3COOC_2H_5$?

A CH_3OH and CH_3COOH

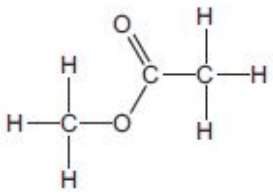
B CH_3OH and C_2H_5COOH

C C_2H_5OH and CH_3COOH

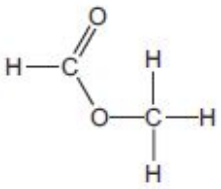
D C_2H_5OH and C_2H_5COOH

36 Which compound has a pH of less than 7 in aqueous solution?

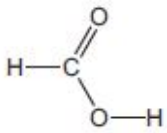
A



B



C



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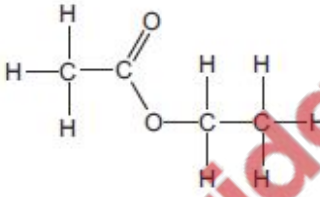


37 Which statement about polymers is correct?

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

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

C Simple sugars can be produced by hydrolysing proteins.

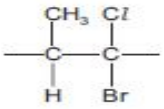
D Starch contains the elements carbon, hydrogen and oxygen.

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

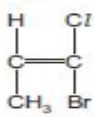
What is the name and structure of this ester?

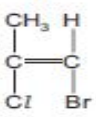
	name	structure
A	methyl propanoate	$CH_3CH_2CO_2CH_3$
B	methyl propanoate	$HCO_2CH_2CH_2CH_3$
C	propyl methanoate	$CH_3CH_2CO_2CH_3$
D	propyl methanoate	$HCO_2CH_2CH_2CH_3$

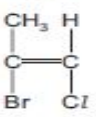
39 The repeat unit of a polymer is shown.

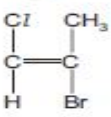


Which monomer would produce this polymer?

A 

B 

C 

D 

40 Each of compounds 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

41 One mole of each alkane undergoes complete combustion.

Which alkane will produce seven moles of products?

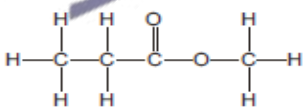
A CH_4 B C_2H_6 C C_3H_8 D C_4H_{10}

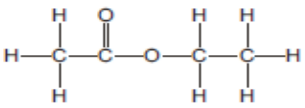
42 Which statement about macromolecules is correct?

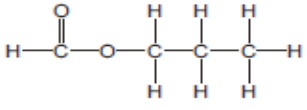
A Nylon and *Terylene* are both polyesters.
B Proteins and nylon have the same monomer units.
C Proteins have the same amide linkages as nylon.
D *Terylene* and fats are esters but with different linkages.

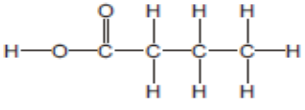
43 An organic compound, X, has a molecular formula $C_4H_8O_2$ and turns damp, blue litmus paper red.

What is the structure of X?

A 

B 

C 

D 

44 Which polymer contains only three different elements?

A protein
B poly(ethene)
C poly(propene)
D starch

45 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}

46 Ethanoic acid is formed when ethanol is reacted with acidified potassium manganate(VII).

What is the name of this process?

A combustion

B condensation

C oxidation

D polymerisation

47 The structure of compound X is shown.

$CH_3–CH_2–CH_2–CH_2–OH$

Which statement is not correct?

A X is an alcohol because it contains an –OH group.

B X is an isomer of propanol.

C X would burn in air to form carbon dioxide and water.

D X would have a higher boiling point than ethanol.

48 After which conversion does the product contain more carbon atoms than the reactant?

A ethanol to ethanoic acid

B ethanol to ethyl ethanoate

C ethene to ethane

D ethene to ethanol

49 Molecules 1–4 are unbranched hydrocarbons.

1 $C_{10}H_{22}$

2 $C_{10}H_{20}$

3 C_9H_{20}

4 C_8H_{16}

Which row correctly identifies these hydrocarbons as alkanes or alkenes?

	alkane	alkene
A	1 and 2	3 and 4
B	1 and 3	2 and 4
C	1 and 4	2 and 3
D	2 and 3	1 and 4

50 Which polymer contains only three different elements?

A protein

B poly(ethene)

C poly(propene)

D starch

51 Which statement about macromolecules is correct?

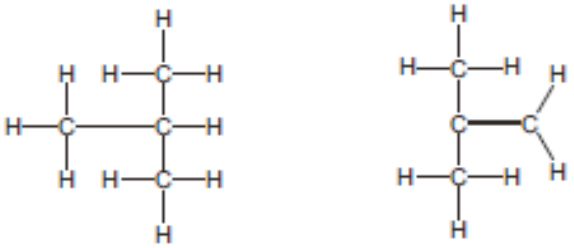
A Nylon and *Terylene* are both polyesters.

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.

52 The diagram shows the structures of two hydrocarbons, X and Y.



X Y

Two students make the following statements.

Student 1	Hydrocarbon X is an isomer of Y.
Student 2	Hydrocarbon X is unsaturated but Y is saturated.

Which students are correct?

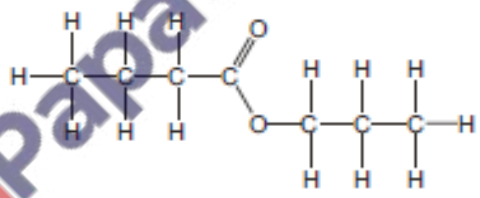
A both 1 and 2

B 1 only

C 2 only

D neither 1 nor 2

53 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

54 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}

55 Compound Q has the formula C_4H_{10}.

Which statement about compound Q is correct?

A It undergoes addition reactions with chlorine.

B It has a lower boiling point than methane.

C It has the same general formula as methane.

D There are four C–C bonds in the molecule.

56 Hydrolysis of **R**, a macromolecule, gives a mixture of amino acids.

What is **R**?

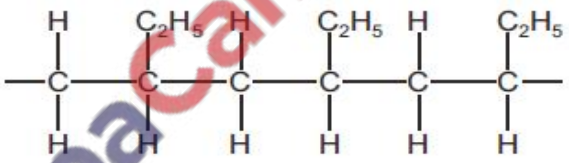
A a fat

B a nylon

C a polyester

D a protein

57 The diagram shows a section of a polymer.



Which alkene is used to make this polymer?

A $CH_3CH=CH_2$

B $CH_3CH_2CH=CH_2$

C $CH_3CH_2CH=CHCH_3$

D $CH_3CH=CHCH_3$

58 The table shows some atmospheric pollutants and their possible effects.

Which row is **not** correct?

	pollutant	effect
A	CFCs	cause depletion of the ozone layer
B	CO_2	forms photochemical smog
C	CO	is poisonous to humans
D	NO_2	forms acid rain

59 Which compound is the most viscous and the least flammable?

A C_6H_{14} **B** C_8H_{18} **C** $C_{10}H_{22}$ **D** $C_{12}H_{26}$

60 How many moles of ethanoic acid, CH_3CO_2H, react with one mole of magnesium?

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

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

A argon

B hydrogen

C oxygen

D steam

62 Which statement about isomers of a compound is always correct?

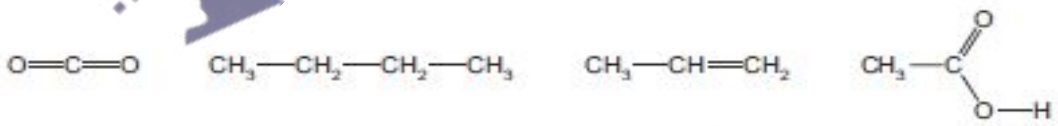
A They have different empirical formulae.

B They have different relative molecular masses.

C They have only carbon and hydrogen in their molecules.

D They have the same molecular formula.

63 How many of the structures show an unsaturated hydrocarbon molecule?



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

64 Which type of polymer is made by reacting amino acids together?

A an addition polymer

B a carbohydrate

C a polyamide

D a polyester

65 Which statements about alcohols are correct?

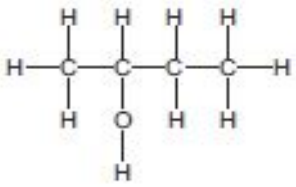
1 All alcohols contain the hydroxide ion, OH^-.

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

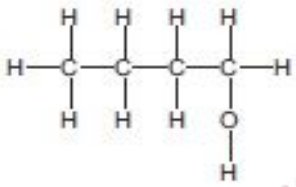
3 Methanol can be oxidised to methanoic acid.

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

66 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

67 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.

68 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

69 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}.

70 Which statement about ethanoic acid is correct?

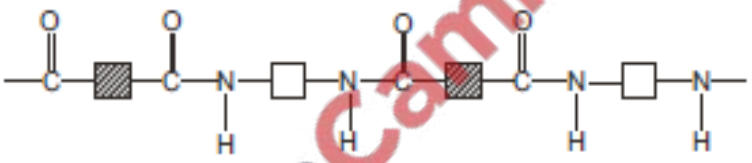
A Ethanoic acid can be made by the catalysed addition of steam to ethene.

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.

71 Polymer Z has the structure shown.



These four terms can be used to describe polymers.

1 addition polymer

2 condensation polymer

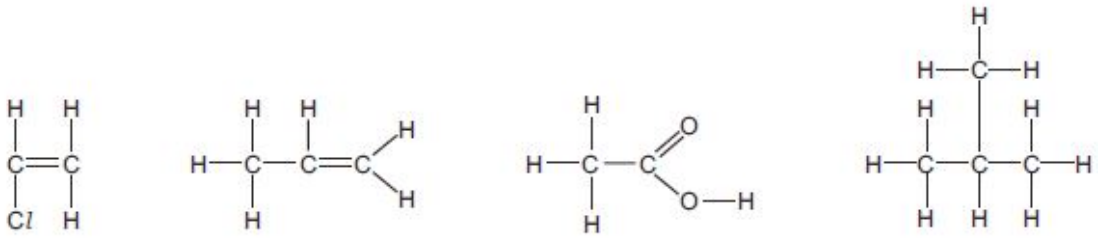
3 polyamide

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

72 How many of the structures show an unsaturated hydrocarbon molecule?



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

73 Which statements are correct for alkenes but **not** for alkanes?

1 They turn aqueous bromine from brown to colourless.

2 Their general formula is C_nH_{2n}.

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

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

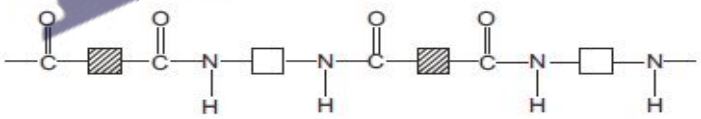
74 Wine is an alcoholic drink that contains ethanol. If wine is left exposed to the air for too long, it can become acidic.

This is because the ethanol is .....1..... to the acid .....2..... .

Which word and formula correctly complete gaps 1 and 2?

	1	2
A	oxidised	CH_3COOH
B	oxidised	CH_3CH_2COOH
C	reduced	CH_3COOH
D	reduced	CH_3CH_2COOH

75 Polymer Z has the structure shown.



These four terms can be used to describe polymers.

1 addition polymer

2 condensation polymer

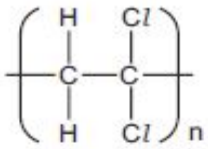
3 polyamide

4 polyester

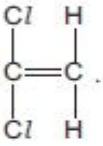
Which two terms can be applied to polymer Z?

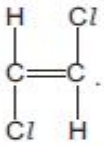
A 1 and 3 **B** 1 and 4 **C** 2 and 3 **D** 2 and 4

76 The diagram shows the structure of poly(dichloroethene).



Which statement about this polymer is correct?

A The monomer is  .

B The monomer is  .

C The polymer is formed by a condensation reaction.

D The polymer has a lower melting point than the monomer.

77 How can the following reaction be described?

$$C_8H_{18} \rightarrow C_4H_{10} + 2C_2H_4$$

A combustion

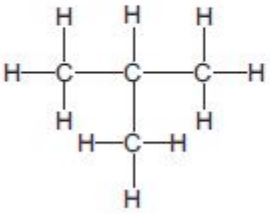
B cracking

C oxidation

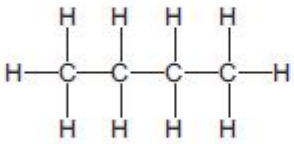
D reduction

78 The structures of four hydrocarbons, W, X, Y and Z, are shown.

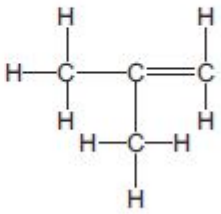
W



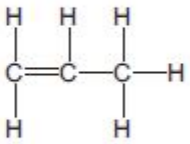
X



Y



Z



Which row is correct?

	isomers of each other	decolourise bromine	branched structures
A	W and X	Y and Z	W and Y
B	W and X	Y and Z	X and Z
C	Y and Z	W and Y	X and Z
D	Y and Z	W and Z	W and Y

Organic Chemistry MCQS

MarkingKey

1.C	24.C	47.B	70.D
2.A	25.A	48. B	71.C
3. C	26.C	49.B	72.A
4. D	27.D	50.D	73.B
5.C	28.C	51.C	74.A
6.B	29.D	52.D	75.C
7.B	30.C	53.C	76.A
8.D	31.D	54.C	77.B
9.B	32..A	55.C	78.A
10.C	33. C	56.D	
11.A	34.A	57.B	
12.C	35.C	58. **B**	
13.C	36.C	59.D	
14.A	37.D	60.B	
15.D	38.D	61.C	
16.C	39.A	62.D	
17.D	40.A	63.A	
18.D	41.C	64.C	
19.B	42.C	65.D	
20.A	43.D	66.C	
21.C	44.D	67.A	
22.A	45. C	68.D	
23.B	46.C	69.C	