Cambridge International Examinations
Cambridge Ordinary Level

CHEMISTRY **5070/12**

Paper 1 Multiple Choice **October/November 2015**

1 hour

Additional Materials: Multiple Choice Answer Sheet
Soft clean eraser
Soft pencil (type B or HB recommended)

READ THESE INSTRUCTIONS FIRST

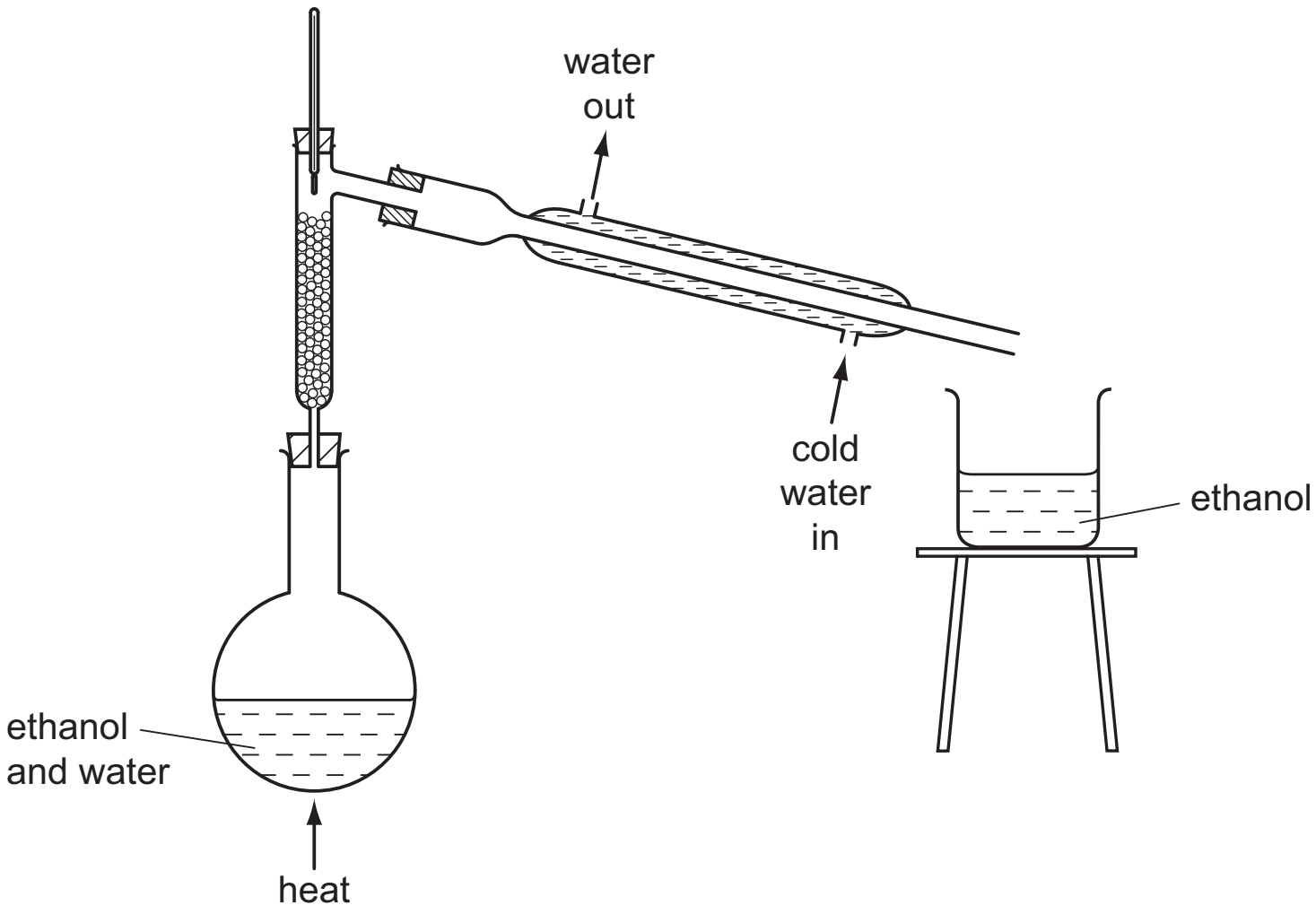
Write in soft pencil.
Do not use staples, paper clips, glue or correction fluid.
Write your name, Centre number and candidate number on the Answer Sheet in the spaces provided unless this has been done for you.
DO **NOT** WRITE IN ANY BARCODES.

There are **forty** questions on this paper. Answer **all** questions. For each question there are four possible answers **A**, **B**, **C** and **D**.
Choose the **one** you consider correct and record your choice in **soft pencil** on the separate Answer Sheet.

Read the instructions on the Answer Sheet very carefully.

Each correct answer will score one mark. A mark will not be deducted for a wrong answer.
Any rough working should be done in this booklet.
A copy of the Periodic Table is printed on page 16.
Electronic calculators may be used.

1 The diagram shows the fractional distillation of an aqueous solution of ethanol.



Which statement explains why ethanol is collected as the distillate?

A Ethanol has a higher boiling point than water.

B Ethanol has a higher melting point than water.

C Ethanol has a lower boiling point than water.

D Ethanol has a lower melting point than water.

2 In a titration between an acid (in the burette) and an alkali, you may need to re-use the same titration flask.

Which is the best procedure for rinsing the flask?

A Rinse with distilled water and then with the alkali.

B Rinse with tap water and then with distilled water.

C Rinse with tap water and then with the acid.

D Rinse with the alkali.

3 Which statements are correct?

1 The volume of a gas at constant pressure increases as the temperature increases.

2 The rate of diffusion of a gas increases as the temperature increases.

3 The pressure of a gas at constant volume decreases as the temperature increases.

A 1 and 2 only

B 1 and 3 only

C 2 and 3 only

D 1, 2 and 3

4 A colourless solution is known to contain a sodium salt.

Tests were carried out to determine the identity of the anion in the solution.

test	observation
dilute hydrochloric acid	no reaction
dilute nitric acid followed by aqueous silver nitrate	no precipitate
dilute nitric acid followed by aqueous barium nitrate	no precipitate

Which anion could the solution contain?

A carbonate

B chloride

C nitrate

D sulfate

5 Which physical changes are both exothermic?

A condensation and evaporation

B evaporation and melting

C freezing and condensation

D melting and freezing

6 The following data may refer to the atom or to the ion of the same element.

- electronic configuration 2,8,8
- nucleon number 40
- proton number 20

Which element is described by these data?

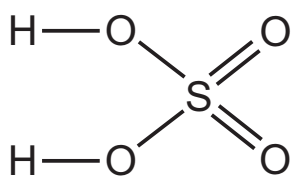
A argon

B calcium

C chlorine

D neon

7 A molecule of sulfuric acid has the structural formula shown.



How many electrons are involved in forming all the covalent bonds in one molecule?

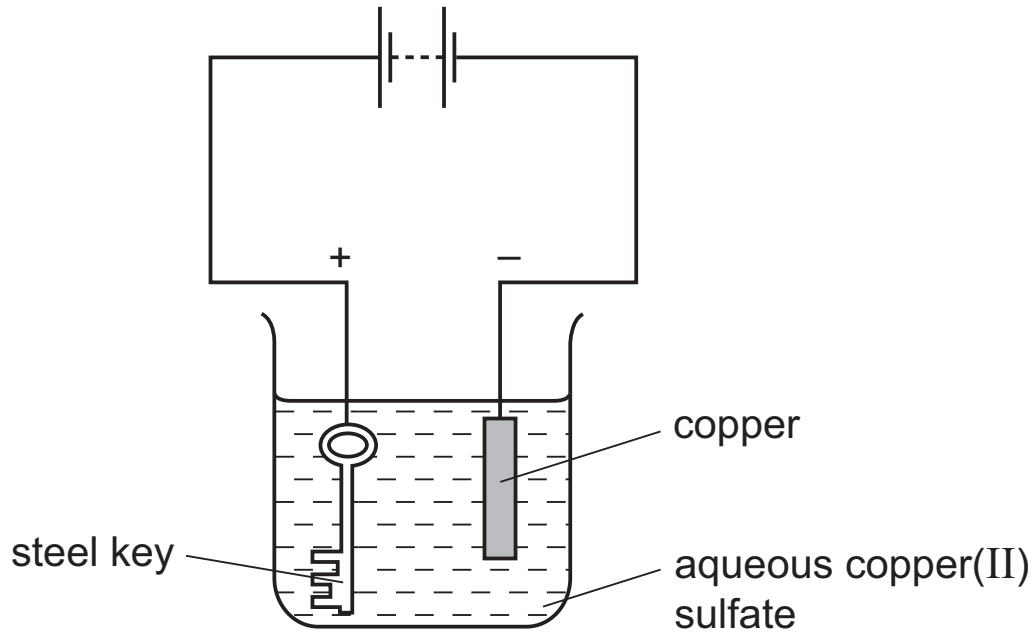
A 6 **B** 8 **C** 12 **D** 16

8 A metal consists of a lattice of positive ions in a 'sea of electrons'.

What happens to the electrons and positive ions in a metal wire when an electric current is passed through it?

	electrons	positive ions
A	replaced by new electrons	replaced by new ions
B	replaced by new electrons	unchanged
C	unchanged	replaced by new ions
D	unchanged	unchanged

9 The apparatus shown is set up to plate a steel key with copper.



The key does not get coated with copper.

Which change needs to be made to plate the key?

A Increase the concentration of the aqueous copper(II) sulfate.

B Increase the voltage.

C Replace the solution with dilute sulfuric acid.

D Reverse the electrical connections.

10 What is the number of moles of hydrogen atoms in 3.2 g of methane?

A 0.02 **B** 0.2 **C** 0.4 **D** 0.8

11 The formula of the gas ozone is O_3.

What is the volume of 48 g of ozone at r.t.p.?

A 16 dm^3 **B** 24 dm^3 **C** 36 dm^3 **D** 72 dm^3

12 Which substance, when added to pure water, will produce a solution which conducts electricity?

A calcium chloride

B graphite

C iron

D sugar

13 Two gases, X and Y, react together to form a gas Z, as shown.

$$X(g) + 3Y(g) \rightleftharpoons 2Z(g) \qquad \Delta H = -92\,kJ/mol$$

Which change in condition will both increase the rate of reaction and increase the equilibrium yield of Z?

A decrease concentration of X

B increase pressure

C increase temperature

D use a catalyst

14 A solution of sodium carbonate was added to tap water.

A white precipitate formed.

Which ion present in the tap water caused the precipitate to form?

A chloride

B magnesium

C potassium

D sulfate

15 In which reaction is nitric acid acting as an oxidising agent?

A $Cu + 4HNO_3 \rightarrow Cu(NO_3)_2 + 2H_2O + 2NO_2$

B $CuO + 2HNO_3 \rightarrow Cu(NO_3)_2 + H_2O$

C $Na_2CO_3 + 2HNO_3 \rightarrow 2NaNO_3 + H_2O + CO_2$

D $NaOH + HNO_3 \rightarrow NaNO_3 + H_2O$

16 Which reaction does **not** involve neutralisation?

A $H_2SO_4(aq) + 2NH_3(aq) \rightarrow (NH_4)_2SO_4(aq)$

B $H_2SO_4(aq) + BaCl_2(aq) \rightarrow BaSO_4(s) + 2HCl(aq)$

C $H_2SO_4(aq) + CuO(s) \rightarrow CuSO_4(aq) + H_2O(l)$

D $H_2SO_4(aq) + 2NaOH(aq) \rightarrow Na_2SO_4(aq) + 2H_2O(l)$

17 Which pair of substances reacts to form a salt and water only?

A aqueous sodium chloride and aqueous silver nitrate

B aqueous sodium hydroxide and dilute ethanoic acid

C aqueous sodium carbonate and dilute sulfuric acid

D zinc and dilute hydrochloric acid

18 Iron is obtained in the blast furnace from the ore haematite.

Which reaction takes place in the blast furnace?

A Calcium carbonate is used to remove acidic impurities.

B Coke is reduced to carbon dioxide.

C Haematite is oxidised by carbon monoxide.

D Haematite undergoes thermal decomposition.

19 Aluminium is manufactured from aluminium oxide by electrolysis. The compound cryolite is used in this process.

Which statement about cryolite is correct?

A It is the common name for aluminium oxide.

B It is used to dissolve the aluminium oxide.

C It is used to make the positive electrode.

D It is used to make the negative electrode.

20 An element is burned in an excess of oxygen.

Which statement about the oxide formed is always correct?

A The mass of oxide formed is greater than the mass of element burned.

B The oxide formed is a crystalline solid.

C The oxide formed is soluble in water.

D The oxide formed is white in colour.

21 Which statement about the Periodic Table is correct?

A Elements are arranged in order of decreasing proton number.

B Group number is the number of electron shells in atoms of the elements in the group.

C Group numbers can be used to predict the charges of ions.

D Metallic character increases left to right across a period.

[Turn over

22 Which negative ions are present in aqueous copper(II) sulfate?

A copper(II) ions and hydrogen ions

B copper(II) ions only

C sulfate ions and hydroxide ions

D sulfate ions only

23 The reaction shown for the Haber process can reach equilibrium.

$$N_2(g) + 3H_2(g) \rightleftharpoons 2NH_3(g)$$

Which row shows the gases present at equilibrium?

	nitrogen	hydrogen	ammonia
A	no	no	yes
B	no	yes	yes
C	yes	no	yes
D	yes	yes	yes

24 Which statement about graphite is **not** correct?

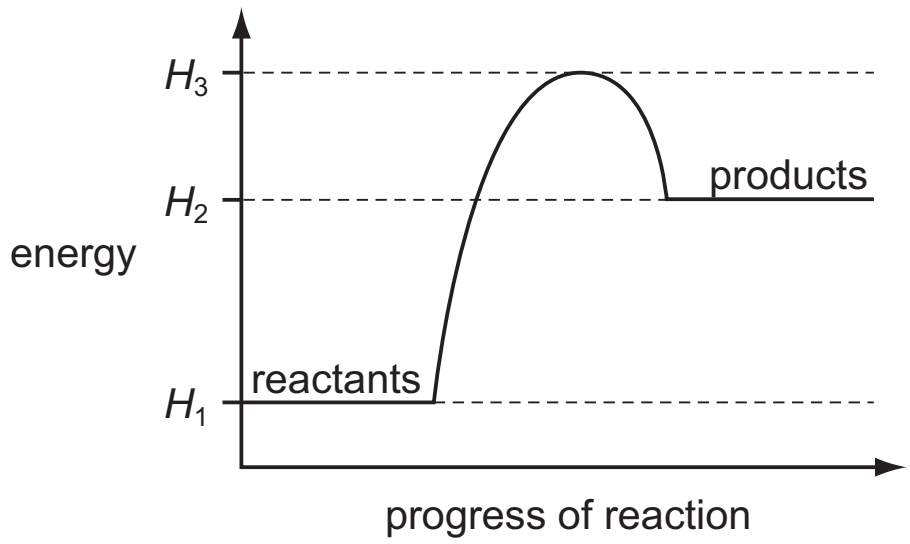
A It burns to form carbon dioxide.

B It is a carbon compound.

C It is a giant molecular substance.

D It is used as a lubricant.

25 The energy profile diagram for a reaction is shown.



Which statement is correct?

A The activation energy of the reaction is ($H_3 - H_1$).

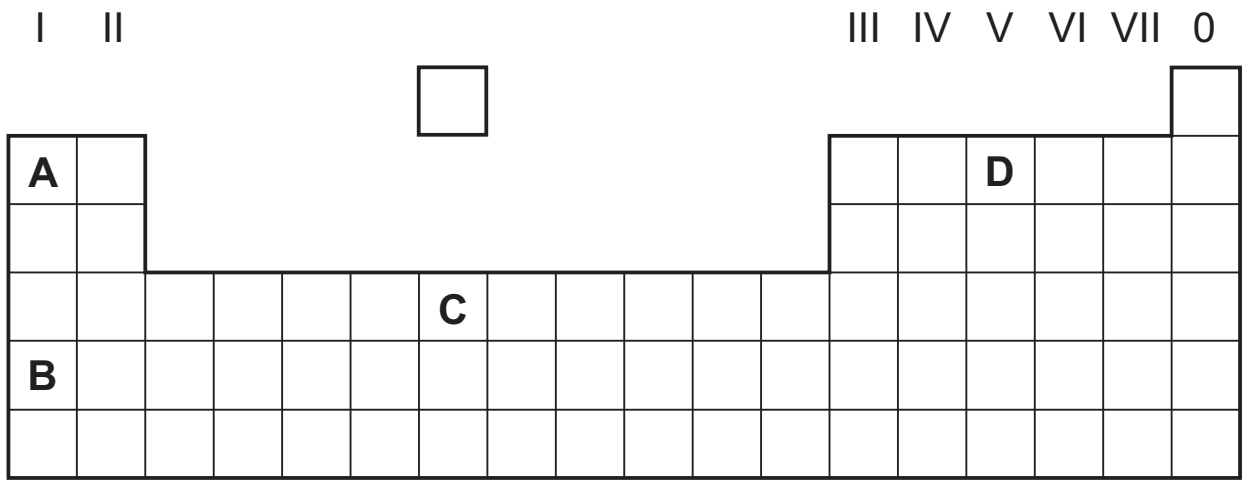
B The activation energy of the reaction is ($H_3 - H_2$).

C ΔH is ($H_1 - H_2$).

D ΔH is ($H_1 - H_3$).

26 The Periodic Table shows the positions of elements **A**, **B**, **C** and **D**. These are not the usual symbols of these elements.

Which element has a high melting point and can be used as a catalyst?



27 Which of the statements about iron and steel is **not** correct?

A Both iron and steel conduct electricity.

B Mild steel is used in car bodies.

C Pure iron is formed in the blast furnace.

D The addition of carbon to mild steel makes it stronger.

[Turn over

28 Some reactions are shown.

1 $2SO_2 + O_2 \rightarrow 2SO_3$

2 $C_3H_6 + H_2 \rightarrow C_3H_8$

3 $C_2H_4 + H_2O \rightarrow C_2H_5OH$

Which of these reactions use a catalyst when carried out industrially?

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

29 Which change is endothermic?

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

B $H(g) + Cl(g) \rightarrow HCl(g)$

C $H_2O(g) \rightarrow 2H(g) + O(g)$

D $H_2O(l) \rightarrow H_2O(s)$

30 Which two elements are the major constituents of brass?

A Br and As **B** Cu and Sn **C** Cu and Zn **D** Sn and Zn

31 Two statements about copper are given.

1 Copper is below hydrogen in the reactivity series.

2 Copper can be obtained by heating its oxide with carbon.

Which statements are correct?

A both 1 and 2

B 1 only

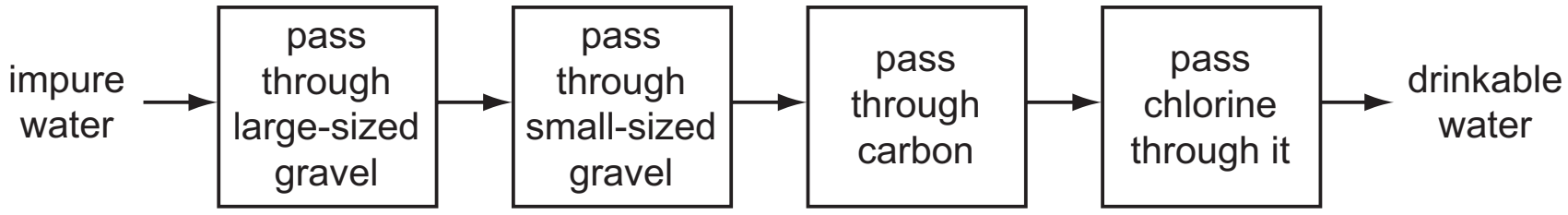
C 2 only

D neither 1 nor 2

32 What is the order of reactivity of the halogens?

	most reactive ⟶		least reactive
A	bromine	chlorine	iodine
B	chlorine	bromine	iodine
C	iodine	bromine	chlorine
D	iodine	chlorine	bromine

33 The flow chart shows how impure water can be treated to produce drinkable water.



What is **not** removed from the water by this process?

A clay particles

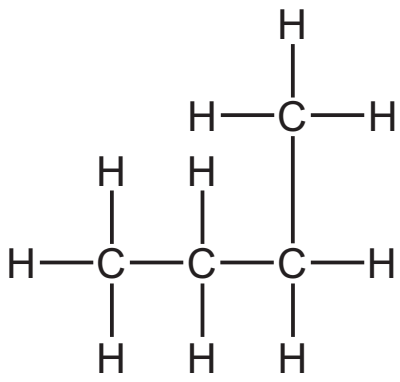
B microbes

C nitrates

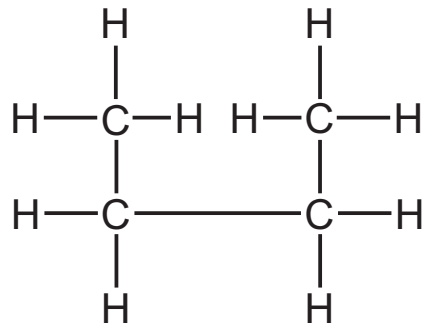
D odours

34 Which diagram shows the isomer of butane?

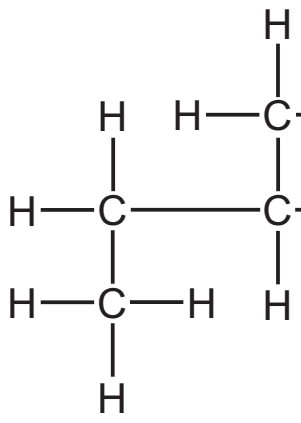
A



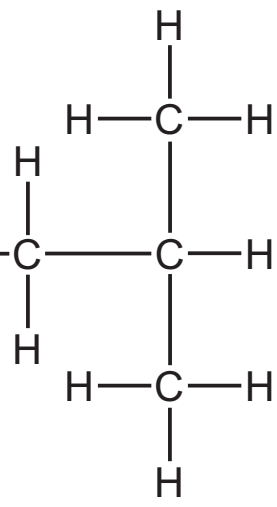
B



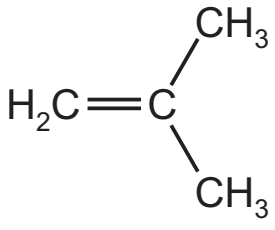
C



D

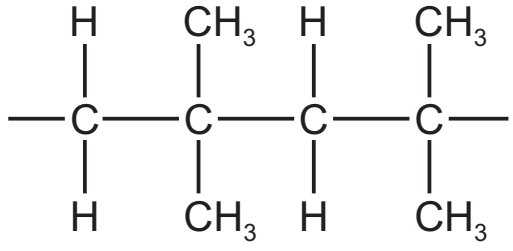


35 The diagram shows the structure of a monomer used to make a polymer.

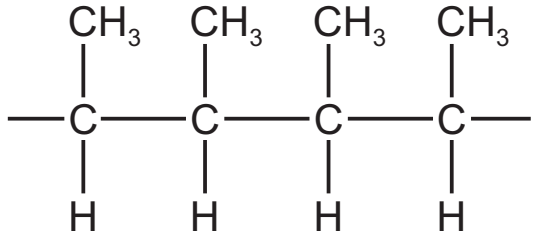


What is the structure of the polymer?

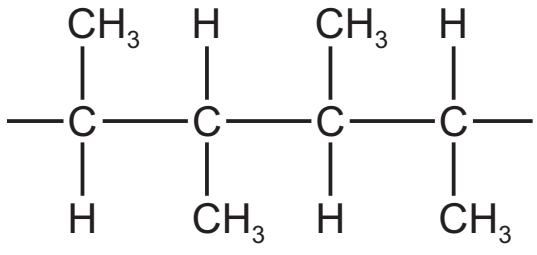
A



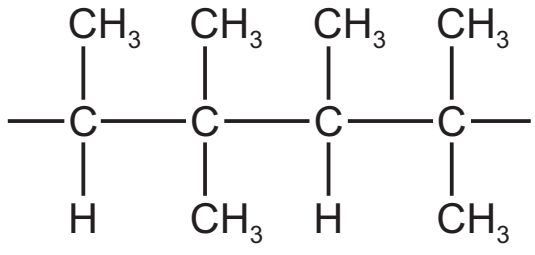
B



C



D



36 Which property of a liquid ester can be used to check its purity before use as a food flavouring?

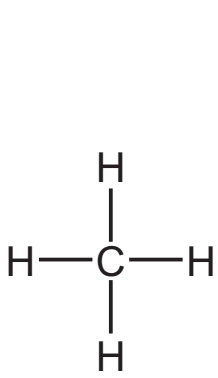
A boiling point

B colour

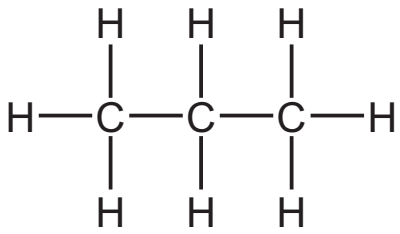
C smell

D solubility in water

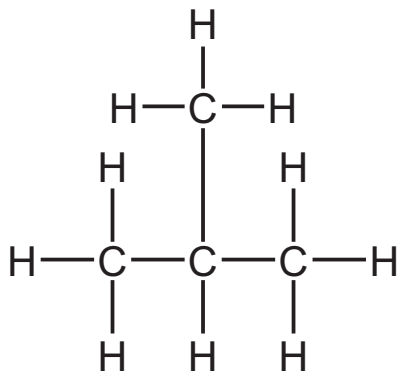
37 The structures of three hydrocarbons from the same homologous series are shown.



W



X



Y

Which statement is correct?

A All three molecules are unsaturated hydrocarbons.

B All three molecules have the same empirical formula.

C W has the lowest boiling point.

D X is an isomer of Y.

38 How many of the following statements about ethanol are correct?

1 molecular formula is C_2H_6O

2 manufactured from ethane and steam

3 oxidises to ethanoic acid

4 produced by the fermentation of glucose

5 used as a fuel

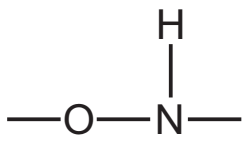
6 used as a solvent

A 3 **B** 4 **C** 5 **D** 6

39 Proteins and nylon both possess the same amide linkages.

Which arrangement of atoms represents an amide linkage?

A



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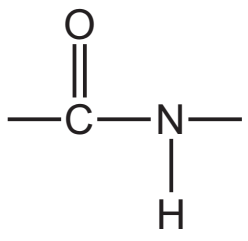

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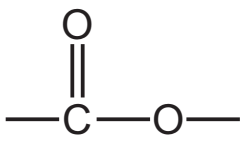

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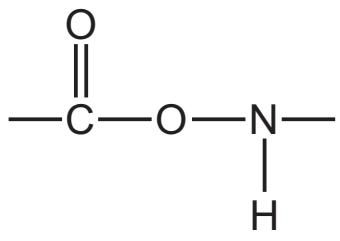
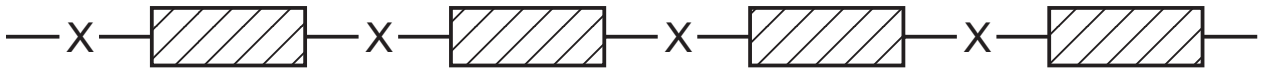


[Turn over

40 A carbohydrate such as starch can be represented as shown.



What is X?

A carbon

B hydrogen

C nitrogen

D oxygen

15

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DATA SHEET
The Periodic Table of the Elements

Group																	
I	II										III	IV	V	VI	VII	0
							1 H Hydrogen 1									4 He Helium 2
7 Li Lithium 3	9 Be Beryllium 4										11 B Boron 5	12 C Carbon 6	14 N Nitrogen 7	16 O Oxygen 8	19 F Fluorine 9	20 Ne Neon 10
23 Na Sodium 11	24 Mg Magnesium 12										27 Al Aluminium 13	28 Si Silicon 14	31 P Phosphorus 15	32 S Sulfur 16	35.5 Cl Chlorine 17	40 Ar Argon 18
39 K Potassium 19	40 Ca Calcium 20	45 Sc Scandium 21	48 Ti Titanium 22	51 V Vanadium 23	52 Cr Chromium 24	55 Mn Manganese 25	56 Fe Iron 26	59 Co Cobalt 27	59 Ni Nickel 28	64 Cu Copper 29	65 Zn Zinc 30	70 Ga Gallium 31	73 Ge Germanium 32	75 As Arsenic 33	79 Se Selenium 34	80 Br Bromine 35	84 Kr Krypton 36
85 Rb Rubidium 37	88 Sr Strontium 38	89 Y Yttrium 39	91 Zr Zirconium 40	93 Nb Niobium 41	96 Mo Molybdenum 42	Tc Technetium 43	101 Ru Ruthenium 44	103 Rh Rhodium 45	106 Pd Palladium 46	108 Ag Silver 47	112 Cd Cadmium 48	115 In Indium 49	119 Sn Tin 50	122 Sb Antimony 51	128 Te Tellurium 52	127 I Iodine 53	131 Xe Xenon 54
133 Cs Caesium 55	137 Ba Barium 56	139 La Lanthanum 57 *	178 Hf Hafnium 72	181 Ta Tantalum 73	184 W Tungsten 74	186 Re Rhenium 75	190 Os Osmium 76	192 Ir Iridium 77	195 Pt Platinum 78	197 Au Gold 79	201 Hg Mercury 80	204 Tl Thallium 81	207 Pb Lead 82	209 Bi Bismuth 83	Po Polonium 84	At Astatine 85	Rn Radon 86
Fr Francium 87	226 Ra Radium 88	227 Ac Actinium 89 †															

140 Ce Cerium 58	141 Pr Praseodymium 59	144 Nd Neodymium 60	Pm Promethium 61	150 Sm Samarium 62	152 Eu Europium 63	157 Gd Gadolinium 64	159 Tb Terbium 65	162 Dy Dysprosium 66	165 Ho Holmium 67	167 Er Erbium 68	169 Tm Thulium 69	173 Yb Ytterbium 70	175 Lu Lutetium 71
232 Th Thorium 90	Pa Protactinium 91	238 U Uranium 92	Np Neptunium 93	Pu Plutonium 94	Am Americium 95	Cm Curium 96	Bk Berkelium 97	Cf Californium 98	Es Einsteinium 99	Fm Fermium 100	Md Mendelevium 101	No Nobelium 102	Lr Lawrencium 103

*58-71 Lanthanoid series
†90-103 Actinoid series

Key: a = relative atomic mass; X = atomic symbol; b = proton (atomic) number

The volume of one mole of any gas is 24 dm^3 at room temperature and pressure (r.t.p.).