Cambridge International Examinations
Cambridge International General Certificate of Secondary Education

CHEMISTRY **0620/11**

Paper 1 Multiple Choice (Core) **October/November 2016**

45 minutes

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

* 6 2 7 5 5 5 9 0 1 0 *

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 20.
Electronic calculators may be used.

The syllabus is approved for use in England, Wales and Northern Ireland as a Cambridge International Level 1/Level 2 Certificate.

This document consists of **17** printed pages and **3** blank pages.

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1 ‘Particles moving **very slowly** from an area of higher concentration to an area of lower concentration.’

Which process is being described?

A a liquid being frozen

B a solid melting

C a substance diffusing through a liquid

D a substance diffusing through the air

2 A student mixes 25 cm^3 samples of dilute hydrochloric acid with different volumes of aqueous sodium hydroxide.

In each case, the student measures the change in temperature to test if the reaction is exothermic.

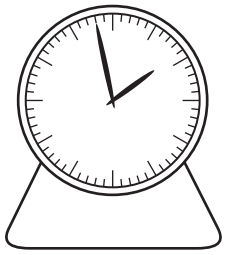
Which piece of apparatus is **not** needed?

A



burette

B



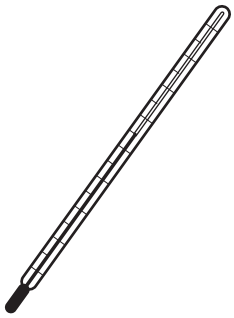
clock

C



pipette

D



thermometer

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3 Information about the solubility of four solids, P, Q, R and S, is given in the table.

	P	Q	R	S
solubility in water	dissolves	insoluble	insoluble	dissolves

A student attempted to separate mixtures of these solids using the following method.

1 Add the mixture to a beaker of water and stir.

2 Filter the mixture.

3 Crystallise one of the solids from the filtrate.

Which of the following mixtures could **not** be separated by this method?

A a mixture of P and R

B a mixture of Q and P

C a mixture of Q and R

D a mixture of R and S

4 The table shows information about atoms of three different elements.

element	proton number	nucleon number	number of protons	number of neutrons	number of electrons
chlorine	17	35	17	W	17
chlorine	17	X	17	19	17
argon	Y	40	18	22	18
potassium	19	39	19	20	Z

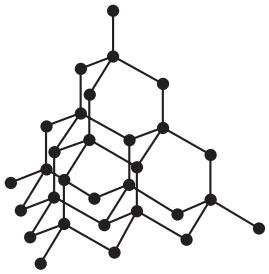
What are the values of W, X, Y and Z?

	W	X	Y	Z
A	18	35	18	19
B	18	36	18	19
C	19	35	19	18
D	19	36	19	18

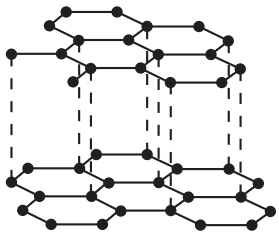
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[Turn over

5 The diagrams show the structures of two forms of the same element.



T



U

What are the reasons for using T in cutting tools and U as a lubricant?

	T	U
A	It is very hard because each atom is held in place by strong covalent bonds.	The layers can slide over each other because the covalent bonds are weak.
B	It is very hard because each atom is held in place by strong covalent bonds.	The layers can slide over each other due to weak forces between the layers.
C	It is very hard because there are no electrons able to move.	The layers can slide over each other because the covalent bonds are weak.
D	It is very hard because there are no electrons able to move.	The layers can slide over each other due to weak forces between the layers.

6 Ions are formed by elements losing or gaining electrons.

Which statement is correct?

A Metal atoms gain electrons to form positive ions.

B Non-metal atoms lose electrons to form positive ions.

C The charge on an ion is always either +1 or –1.

D Group I ions have the same electronic structure as noble gases.

7 A molecule of X contains two carbon atoms, four hydrogen atoms and two oxygen atoms.

What is the formula of X?

A CH_2CO_2H **B** CH_3COH **C** CH_3COOH **D** C_2H_3COOH

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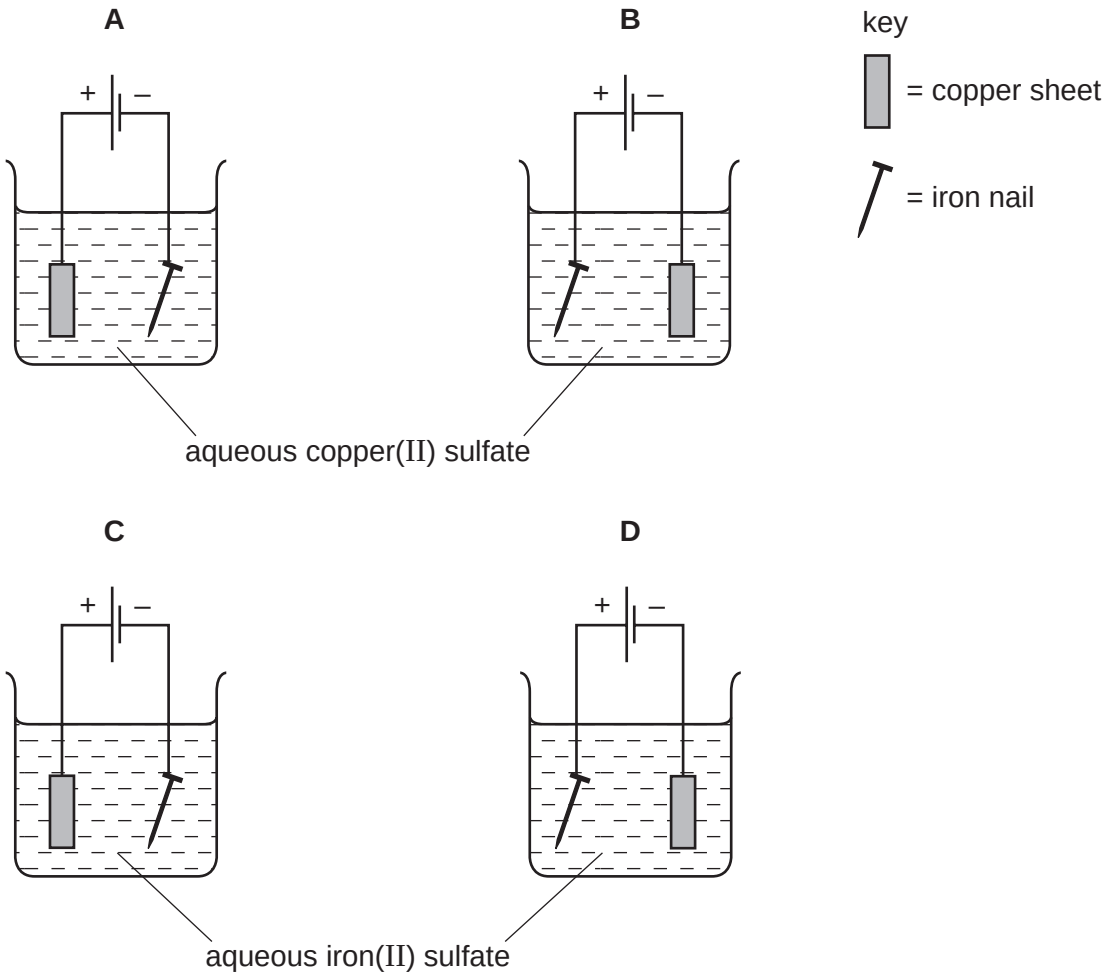
8 Concentrated aqueous potassium chloride is electrolysed using platinum electrodes.

The solution contains the ions K^+, Cl^-, H^+ and OH^-.

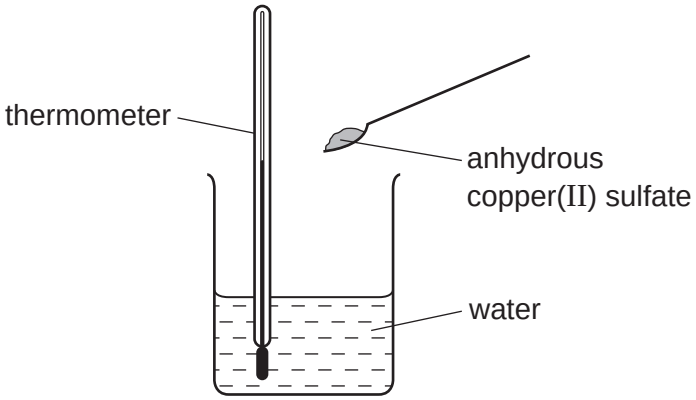
Which electrodes are the ions attracted to during this electrolysis?

	anode	cathode
A	Cl^- and K^+	H^+ and OH^-
B	Cl^- and OH^-	H^+ and K^+
C	H^+ and K^+	Cl^- and OH^-
D	H^+ and OH^-	Cl^- and K^+

9 Which apparatus could be used to electroplate an iron nail with copper?



10 When anhydrous copper(II) sulfate is added to water a solution is formed and heat is given out.



Which row shows the temperature change and the type of reaction taking place?

	temperature change	type of reaction
A	decrease	endothermic
B	decrease	exothermic
C	increase	endothermic
D	increase	exothermic

11 The combustion of element X releases large amounts of energy.

What is X?

A ethanol

B hydrogen

C methane

D uranium

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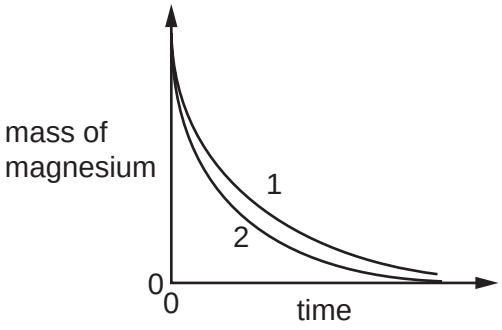
12 The rate of reaction between magnesium and excess dilute hydrochloric acid was followed by measuring the mass of magnesium present at regular time intervals.

Two experiments were performed.

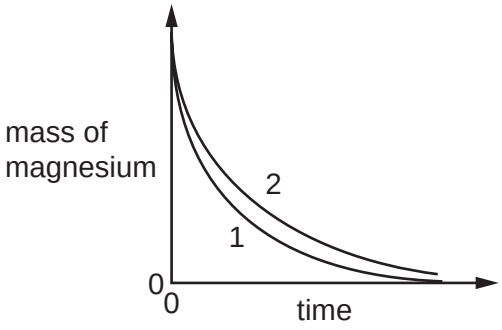
Both experiments used 0.1 g of magnesium ribbon. The acid in experiment 1 was less concentrated than in experiment 2.

Which graph shows the results of the experiments?

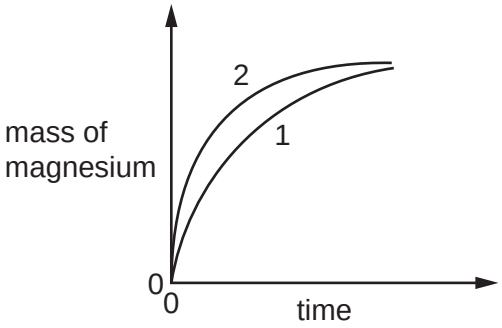
A



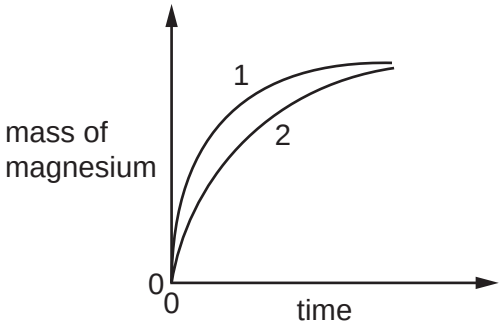
B



C



D



13 Which reaction is reversible?

A $CuCO_3 + 2HCl \rightarrow CuCl_2 + CO_2 + H_2O$

B $CuSO_4.5H_2O \rightarrow CuSO_4 + 5H_2O$

C $2Na + 2H_2O \rightarrow 2NaOH + H_2$

D $NaOH + HCl \rightarrow NaCl + H_2O$

14 Tin is formed when tin(II) oxide is heated with carbon.

What happens to the tin in the tin(II) oxide in this reaction?

A It is burnt.

B It is electrolysed.

C It is oxidised.

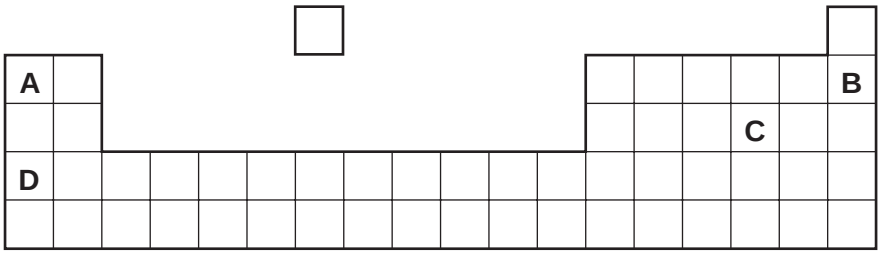
D It is reduced.

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[Turn over

15 Part of the Periodic Table is shown.

Which element forms an acidic oxide?



16 Four substances, P, Q, R and S, are tested as shown.

test	substance			
	P	Q	R	S
dilute hydrochloric acid added	gas given off which 'pops' with a lighted splint	gas given off which turns limewater milky	no reaction	no reaction
dilute aqueous sodium hydroxide added and warmed gently	no reaction	no reaction	gas given off which turns damp, red litmus paper blue	no reaction

What are P, Q, R and S?

	P	Q	R	S
A	Mg	Na_2CO_3	NH_4Cl	$NaCl$
B	Mg	NH_4Cl	Na_2CO_3	$NaCl$
C	Mg	Na_2CO_3	$NaCl$	NH_4Cl
D	Na_2CO_3	Mg	$NaCl$	NH_4Cl

17 Acids can react with metal oxides, carbonates and metals.

Which reactions produce a gas?

	acid with metal oxide	acid with carbonate	acid with metal
A	✓	✓	✓
B	✓	✗	✗
C	✗	✓	✓
D	✗	✓	✗

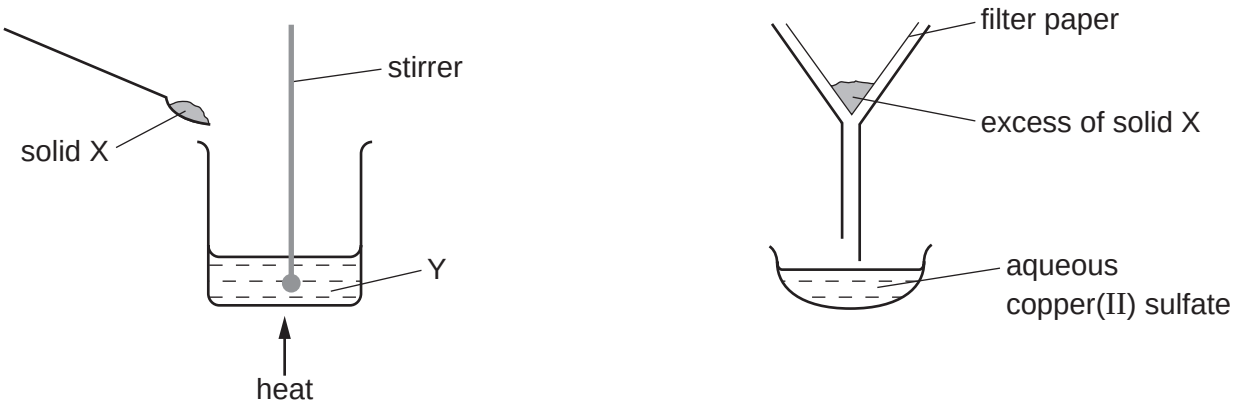
key

✓ = gas is produced

✗ = no gas is produced

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18 The apparatus shown is used to prepare aqueous copper(II) sulfate.



What are X and Y?

	X	Y
A	copper	aqueous iron(II) sulfate
B	copper(II) chloride	sulfuric acid
C	copper(II) oxide	sulfuric acid
D	sulfur	aqueous copper(II) chloride

19 Which statement about trends in the Periodic Table is **not** correct?

A Elements in the same period have the same number of electron shells.

B The elements change from metals to non-metals from left to right.

C The number of protons in an atom of an element increases from left to right.

D The oxides of the elements change from acidic to basic from left to right.

20 What is **not** a property of Group I metals?

A They are soft and can be cut with a knife.

B They react when exposed to oxygen in the air.

C They produce an acidic solution when they react with water.

D They react rapidly with water producing hydrogen gas.

21 Which statement about the element with proton number 54 is correct?

A It burns in the air to form an oxide.

B It could be used in balloons because it has a very low density.

C It is a gas at room temperature.

D It is reactive because it has a full outer shell of electrons.

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22 Which element is a transition element?

	colour of chloride	melting point of element / °C
A	orange	113
B	orange	1535
C	white	113
D	white	1535

23 Which row describes the trends in the properties of the Group VII elements as the group is descended?

	colour	density	reactivity with halide ions
A	darkens	decreases	increases
B	darkens	increases	decreases
C	lightens	decreases	increases
D	lightens	increases	decreases

24 Four metals are listed in decreasing order of reactivity.

magnesium

zinc

iron

copper

Titanium reacts with acid and cannot be extracted from its ore by heating with carbon.

Where should titanium be placed in the list?

A below copper

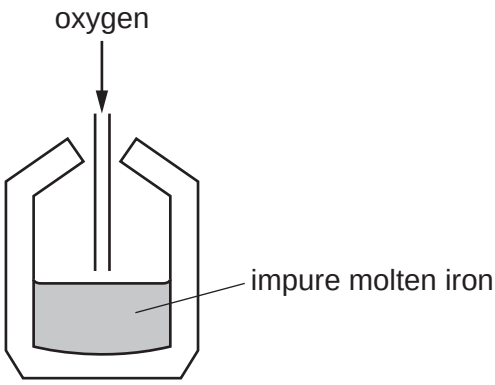
B between iron and copper

C between magnesium and zinc

D between zinc and iron

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25 Impure iron from the blast furnace is converted to steel as shown.



Which statement about the process is correct?

A Acidic oxides are added to remove alkaline impurities.

B Coke is added as a reducing agent.

C Oxygen is blown in to oxidise the impure iron.

D The steel produced contains less carbon than the impure iron.

26 A student added dilute hydrochloric acid to four metals and recorded the results.

Some of the results are **not** correct.

	results	
	metal	gas given off
1	copper	yes
2	iron	yes
3	magnesium	no
4	zinc	yes

Which **two** results are correct?

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

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[Turn over

27 Some properties of three metals, P, Q and R, are shown.

metal	density	resistance to corrosion	electrical conductivity
P	low	high	very good
Q	high	high	very good
R	low	low	good

Which metals would be suitable for use in electrical wiring and aircraft manufacture?

	electrical wiring	aircraft manufacture
A	P	Q
B	Q	P
C	Q	R
D	R	P

28 One sample of sea-water is distilled while another sample of sea-water is filtered.

Which statement about the samples is correct?

A The distilled sample boils at exactly 100 °C and contains dissolved salts.

B The distilled sample boils at 103 °C and does **not** contain dissolved salts.

C The filtered sample boils at 103 °C and contains dissolved salts.

D The filtered sample boils at exactly 100 °C and does **not** contain dissolved salts.

29 Air is a mixture of gases.

Which gas is present in the largest amount?

A argon

B carbon dioxide

C nitrogen

D oxygen

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30 Which information about carbon dioxide and methane is correct?

		carbon dioxide	methane
A	formed when vegetation decomposes	✓	✗
B	greenhouse gas	✓	✓
C	present in unpolluted air	✗	✗
D	produced during respiration	✗	✓

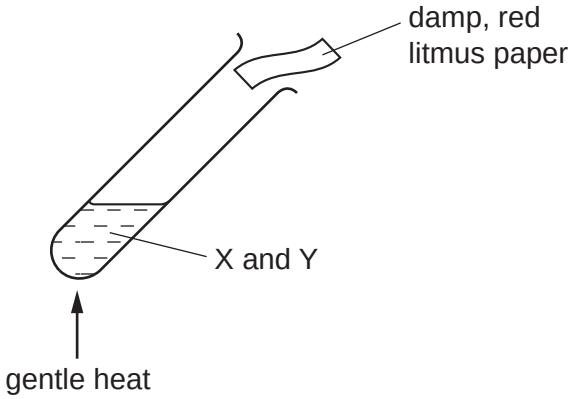
key

✓ = true

✗ = false

31 A mixture of two substances, X and Y, is heated.

The damp, red litmus paper turns blue.



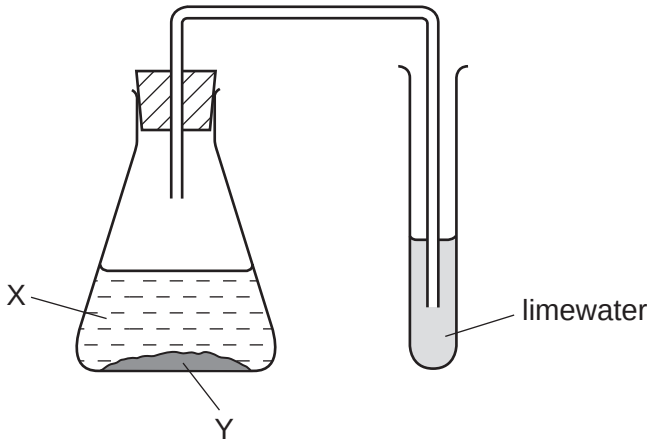
What are X and Y?

	X	Y
A	aluminium nitrate	hydrochloric acid
B	aluminium nitrate	sodium hydroxide solution
C	ammonium chloride	hydrochloric acid
D	ammonium chloride	sodium hydroxide solution

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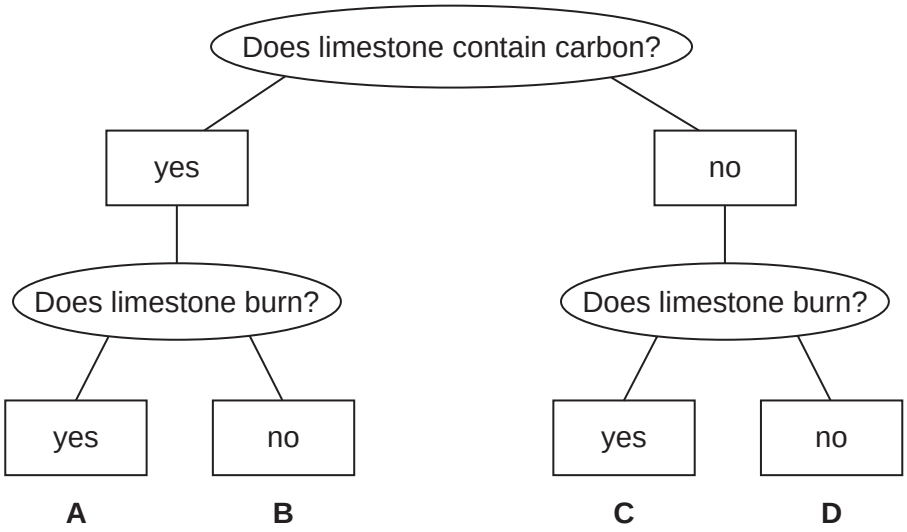
32 In the experiment shown, a white precipitate forms in the limewater.



What are X and Y?

	X	Y
A	aqueous sodium hydroxide	zinc
B	aqueous sodium hydroxide	zinc carbonate
C	dilute sulfuric acid	zinc
D	dilute sulfuric acid	zinc carbonate

33 Which box corresponds to limestone?



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34 Petroleum is an important fossil fuel.

Which row correctly describes petroleum?

	type of substance	composition
A	compound	mainly hydrocarbons
B	compound	only hydrogen and carbon
C	mixture	mainly hydrocarbons
D	mixture	only hydrogen and carbon

35 Butane reacts as shown.

$$\text{butane} \xrightarrow[\text{and heat}]{\text{catalyst}} \text{butene} + \text{hydrogen}$$

What is this type of reaction?

A combustion

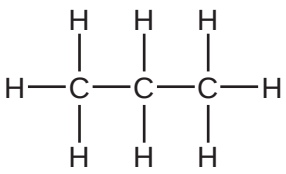
B cracking

C polymerisation

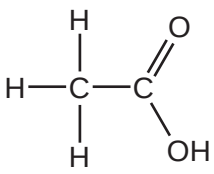
D reduction

36 Which substance is in the same homologous series as methanol?

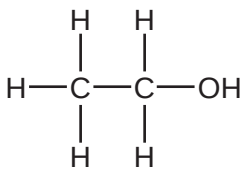
A



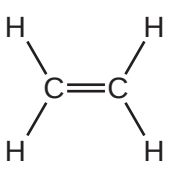
B



C



D



37 Which statement could **not** be correct for an alkane?

A It burns readily in a plentiful supply of air to form only carbon dioxide and water.

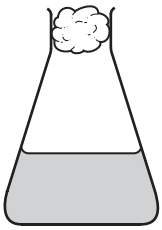
B It decolourises aqueous bromine.

C It has a boiling point of –42 °C.

D The carbon and hydrogen atoms in the molecule are joined by sharing pairs of electrons.

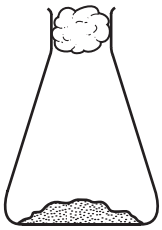
38 In which conical flask will ethanol be produced?

A



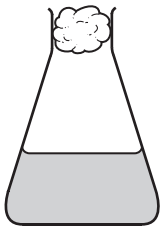
water and sugar

B



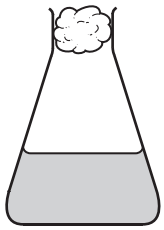
sugar and yeast

C



water, sugar and yeast

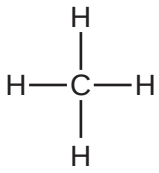
D



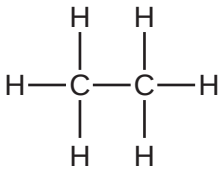
water and yeast

39 Which molecule can be polymerised?

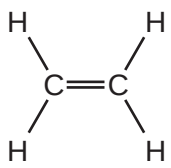
A



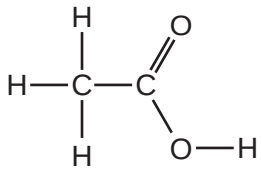
B



C



D



40 Which row describes what happens when ethanol burns in air?

	a white powder is left	heat energy is given out	carbon dioxide is formed	water is formed
A	✓	✗	✓	✓
B	✗	✓	✓	✓
C	✗	✓	✓	✗
D	✗	✓	✗	✓

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The Periodic Table of Elements

Group																	
I	II											III	IV	V	VI	VII	VIII
							1 H hydrogen 1										2 He helium 4
3 Li lithium 7	4 Be beryllium 9											5 B boron 11	6 C carbon 12	7 N nitrogen 14	8 O oxygen 16	9 F fluorine 19	10 Ne neon 20
11 Na sodium 23	12 Mg magnesium 24											13 Al aluminium 27	14 Si silicon 28	15 P phosphorus 31	16 S sulfur 32	17 Cl chlorine 35.5	18 Ar argon 40
19 K potassium 39	20 Ca calcium 40	21 Sc scandium 45	22 Ti titanium 48	23 V vanadium 51	24 Cr chromium 52	25 Mn manganese 55	26 Fe iron 56	27 Co cobalt 59	28 Ni nickel 59	29 Cu copper 64	30 Zn zinc 65	31 Ga gallium 70	32 Ge germanium 73	33 As arsenic 75	34 Se selenium 79	35 Br bromine 80	36 Kr krypton 84
37 Rb rubidium 85	38 Sr strontium 88	39 Y yttrium 89	40 Zr zirconium 91	41 Nb niobium 93	42 Mo molybdenum 96	43 Tc technetium –	44 Ru ruthenium 101	45 Rh rhodium 103	46 Pd palladium 106	47 Ag silver 108	48 Cd cadmium 112	49 In indium 115	50 Sn tin 119	51 Sb antimony 122	52 Te tellurium 128	53 I iodine 127	54 Xe xenon 131
55 Cs caesium 133	56 Ba barium 137	57–71 lanthanoids	72 Hf hafnium 178	73 Ta tantalum 181	74 W tungsten 184	75 Re rhenium 186	76 Os osmium 190	77 Ir iridium 192	78 Pt platinum 195	79 Au gold 197	80 Hg mercury 201	81 Tl thallium 204	82 Pb lead 207	83 Bi bismuth 209	84 Po polonium –	85 At astatine –	86 Rn radon –
87 Fr francium –	88 Ra radium –	89–103 actinoids	104 Rf rutherfordium –	105 Db dubnium –	106 Sg seaborgium –	107 Bh bohrium –	108 Hs hassium –	109 Mt meitnerium –	110 Ds darmstadtium –	111 Rg roentgenium –	112 Cn copernicium –		114 Fl flerovium –		116 Lv livermorium –		

Key

atomic number
atomic symbol
name
relative atomic mass

lanthanoids	57 La lanthanum 139	58 Ce cerium 140	59 Pr praseodymium 141	60 Nd neodymium 144	61 Pm promethium –	62 Sm samarium 150	63 Eu europium 152	64 Gd gadolinium 157	65 Tb terbium 159	66 Dy dysprosium 163	67 Ho holmium 165	68 Er erbium 167	69 Tm thulium 169	70 Yb ytterbium 173	71 Lu lutetium 175
actinoids	89 Ac actinium –	90 Th thorium 232	91 Pa protactinium 231	92 U uranium 238	93 Np neptunium –	94 Pu plutonium –	95 Am americium –	96 Cm curium –	97 Bk berkelium –	98 Cf californium –	99 Es einsteinium –	100 Fm fermium –	101 Md mendelevium –	102 No nobelium –	103 Lr lawrencium –

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