Cambridge Assessment International Education
Cambridge International General Certificate of Secondary Education

CHEMISTRY **0620/13**

Paper 1 Multiple Choice (Core) **May/June 2019**

45 minutes

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

* 3 4 0 1 9 2 3 0 7 2 *

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.

This syllabus is regulated for use in England, Wales and Northern Ireland as a Cambridge International Level1/Level 2 Certificate.

This document consists of **16** printed pages.

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1 Which row describes the arrangement and motion of the particles in a liquid?

	arrangement	motion
A	irregular and most particles touching	moving slowly
B	irregular spaces between all particles	moving slowly
C	regular and most particles touching	moving slowly
D	regular spaces between all particles	moving quickly

2 Which piece of apparatus is used to measure 24.8 cm^3 of gas produced during a reaction?

A beaker

B conical flask

C measuring cylinder

D pipette

3 Calcium carbonate is insoluble in water. Sodium chloride is soluble in water.

Which sequence of steps is used to obtain a pure, dry sample of calcium carbonate from a mixture of calcium carbonate and aqueous sodium chloride?

A filter → dry the residue with filter paper → wash the residue with water

B filter → heat the filtrate to crystallising point → leave the filtrate to cool and crystallise

C filter → wash the filtrate with water → dry the filtrate

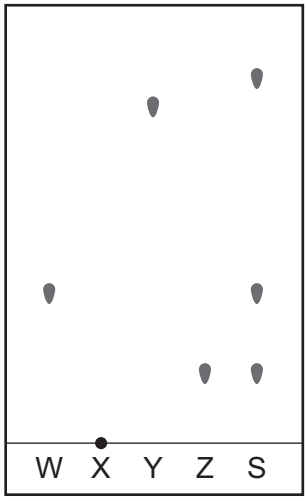
D filter → wash the residue with water→ dry the residue

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4 A student uses paper chromatography to identify the food dyes in a coloured sweet, S.

The student uses four known food dyes, W, X, Y, and Z, and ethanol as the solvent.

The chromatogram obtained is shown.



Which statements are correct?

1 S contains only two dyes.

2 X is insoluble in ethanol.

3 S contains Y and Z.

4 S contains W.

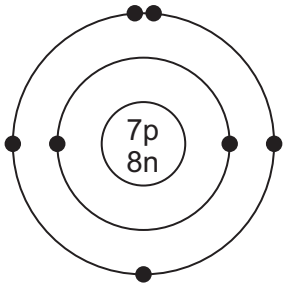
A 1, 2 and 4 only

B 2 and 3 only

C 2 and 4 only

D 4 only

5 The structure of an atom is shown.



key
● = electron
n = neutron
p = proton

Which element is the atom an isotope of?

A nitrogen

B oxygen

C phosphorus

D titanium

6 What happens when sodium atoms combine with chlorine atoms to form sodium chloride?

A Sodium atoms gain one electron and chlorine atoms lose one electron.

B Sodium atoms lose one electron and chlorine atoms gain one electron.

C Sodium atoms and chlorine atoms share one electron with each other.

D Sodium atoms and chlorine atoms share two electrons with each other.

7 Which row describes the formation of single covalent bonds in methane?

A	atoms share a pair of electrons	both atoms gain a noble gas electronic structure
B	atoms share a pair of electrons	both atoms have the same number of electrons in their outer shell
C	electrons are transferred from one atom to another	both atoms gain a noble gas electronic structure
D	electrons are transferred from one atom to another	both atoms have the same number of electrons in their outer shell

8 Which statement about diamond is correct?

A It is a giant covalent structure consisting of carbon atoms and each atom is bonded to four other atoms.

B It is a giant covalent structure consisting of flat sheets of carbon atoms.

C It is a structure held together by ionic bonds and each ion is bonded to four other ions.

D It is a structure held together by ionic bonds and each ion is bonded to three other ions.

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9 The compound magnesium nitrate has the formula $Mg(NO_3)_2$.

What is the relative formula mass of magnesium nitrate?

A 86 **B** 134 **C** 148 **D** 172

10 Which substance does **not** produce a gas at both electrodes during electrolysis?

A concentrated aqueous sodium chloride

B concentrated hydrochloric acid

C dilute sulfuric acid

D molten lead(II) bromide

11 Which row describes the changes that occur when metals burn in oxygen?

	temperature	metal is
A	decreases	oxidised
B	decreases	reduced
C	increases	oxidised
D	increases	reduced

12 Which process is a physical change?

A burning magnesium in air

B dissolving sodium chloride in water

C adding magnesium to hydrochloric acid

D heating green copper(II) carbonate until it turns black

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[Turn over

13 A student reacts strips of zinc with dilute sulfuric acid and measures the time taken to produce 100 cm^3 of hydrogen.

The experiment is repeated using different conditions.

The results are shown in the table.

experiment	time to produce 100 cm^3 of hydrogen / s
1	250
2	100

Which changes in conditions produce the results shown in experiment 2?

1 Add a catalyst.

2 Dilute the acid.

3 Use zinc powder.

4 Heat the acid.

A 1, 3 and 4 only

B 1 and 4 only

C 2 and 3 only

D 2 and 4 only

14 When blue-green crystals of nickel(II) sulfate are heated, water is produced and a yellow solid remains. When water is added to the yellow solid, the blue-green colour returns.

Which process describes these changes?

A combustion

B corrosion

C neutralisation

D reversible reaction

15 Zinc is formed when zinc oxide is heated with carbon.

$$\text{zinc oxide} + \text{carbon} \rightarrow \text{zinc} + \text{carbon monoxide}$$

Which substance is oxidised in this reaction?

A carbon

B carbon monoxide

C zinc

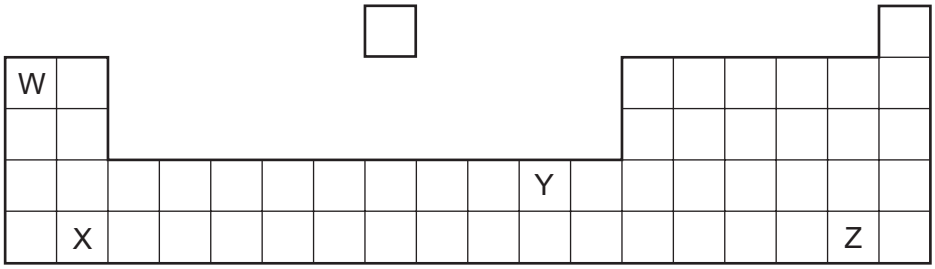
D zinc oxide

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16 Which row shows the colours of litmus and methyl orange with solutions of acids and bases?

	solution	litmus	methyl orange
A	acid	red	red
B	acid	blue	yellow
C	base	blue	red
D	base	red	yellow

17 The positions of elements W, X, Y and Z in the Periodic Table are shown.



Which elements form basic oxides?

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

18 Copper(II) sulfate is made when copper(II) carbonate reacts with dilute sulfuric acid.

$$CuCO_3 + H_2SO_4 \rightarrow CuSO_4 + H_2O + CO_2$$

Pure copper(II) sulfate crystals are obtained.

Which reagent is in excess and how are the crystals obtained?

	reagent in excess	how the crystals are obtained
A	copper(II) carbonate	filter and evaporate the solution to dryness
B	copper(II) carbonate	filter, evaporate to crystallising point and then cool
C	dilute sulfuric acid	evaporate the solution to dryness
D	dilute sulfuric acid	evaporate to crystallising point and then cool

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19 Two separate tests are done on a solution of a compound, X.

The results are shown.

1 Adding aqueous ammonia forms a blue precipitate that dissolves in an excess of aqueous ammonia.

2 Adding dilute nitric acid and aqueous barium nitrate forms a white precipitate.

What is X?

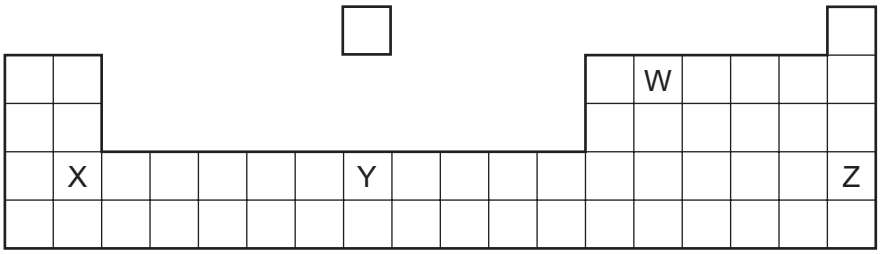
A chromium(III) chloride

B chromium(III) sulfate

C copper(II) chloride

D copper(II) sulfate

20 Part of the Periodic Table is shown.



Which row describes W, X, Y and Z?

	metal	non-metal
A	X	W, Y and Z
B	X and Y	W and Z
C	W and Z	X and Y
D	W, Y and Z	X

21 Which statement about the properties of elements in Group I and in Group VII is correct?

A Bromine displaces iodine from an aqueous solution of potassium iodide.

B Chlorine, bromine and iodine are diatomic gases at room temperature.

C Lithium, sodium and potassium are soft non-metals.

D Lithium, sodium and potassium have an increasing number of electrons in their outer shells.

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22 Some information about four elements, P, Q, R and S, is shown.

	melting point in °C	density in g / cm^3	colour of chloride
P	1247	7.43	pink
Q	1410	2.33	white
R	1910	6.11	purple
S	115	2.07	red

Which elements are transition elements?

A P and R **B** P and S **C** Q and R **D** R and S

23 Gas G has 10 electrons. Gas H has eight more electrons than gas G. Both gases are monoatomic.

Which statement about G and H is correct?

A Both gases are in the same group of the Periodic Table.

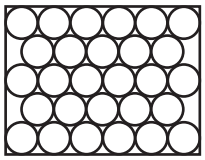
B Both gases are in the same period of the Periodic Table.

C Both gases are very reactive.

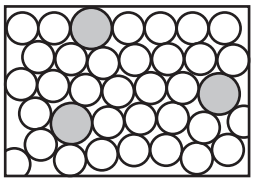
D Gas G has a higher atomic mass than gas H.

24 The diagrams show the structure of two substances used to make electrical conductors.

X



Y



Which statement correctly describes X and Y?

A X is a pure metal and Y is a compound.

B X is a pure metal and Y is an alloy.

C X is a solid and Y is a liquid.

D X is harder and stronger than Y.

25 Three metals, L, M and N, are added separately to dilute hydrochloric acid and cold water.

The results are shown.

metal	reaction with hydrochloric acid	reaction with cold water
L	hydrogen forms	no reaction
M	hydrogen forms	hydrogen forms
N	no reaction	no reaction

What is the order of reactivity of the metals?

	least reactive →		most reactive
A	L	N	M
B	M	L	N
C	N	L	M
D	N	M	L

26 Iron is extracted from its ore in a blast furnace.

Hematite, coke, limestone and hot air are added to the furnace.

Which explanation is **not** correct?

A Coke burns and produces a high temperature.

B Hematite is the ore containing the iron as iron(III) oxide.

C Hot air provides the oxygen for the burning.

D Limestone reduces the iron(III) oxide to iron.

27 Aluminium is used to make containers for storing food.

Which property makes it suitable for this use?

A conducts heat

B low density

C resists corrosion

D shiny surface

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28 Water can be treated by filtration then chlorination.

Which uses do **not** need water of this quality?

1 water for cooling in industry

2 water for washing clothes

3 water for drinking

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

29 Which statement about acid rain is **not** correct?

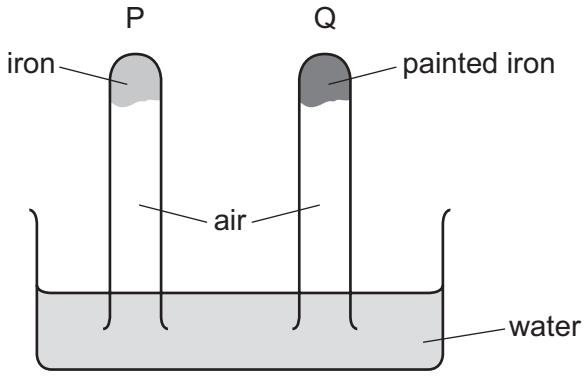
A It causes limestone buildings and statues to erode.

B It is formed from the burning of compounds which contain sulfur.

C It is formed from the combustion of hydrogen as a fuel.

D It is formed from the oxides of nitrogen formed in car engines.

30 The diagram shows an experiment to investigate how paint affects the rusting of iron.



What happens to the water level in tubes P and Q?

	tube P	tube Q
A	falls	rises
B	no change	rises
C	rises	falls
D	rises	no change

31 Which gas is produced when ammonium chloride is warmed with aqueous sodium hydroxide?

A ammonia

B chlorine

C hydrogen

D nitrogen

32 Which statement describes a disadvantage of sulfur dioxide?

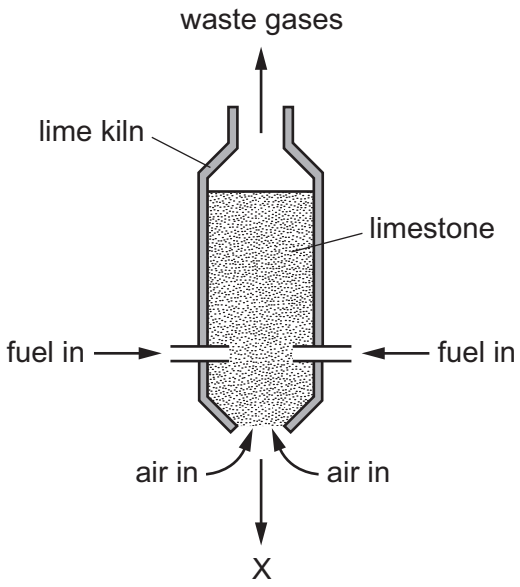
A It can be used as a bleach when making wood pulp.

B It can be used to kill bacteria in food.

C It can be used to manufacture sulfuric acid.

D It dissolves in water to form acid rain.

33 The diagram represents a lime kiln used to heat limestone to a very high temperature.



What leaves the kiln at X?

A calcium carbonate

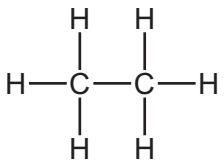
B calcium hydroxide

C calcium oxide

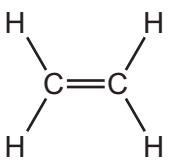
D calcium sulfate

34 The structures of four compounds are shown.

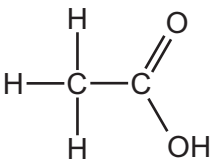
1



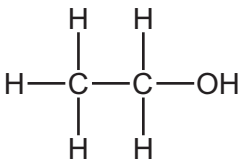
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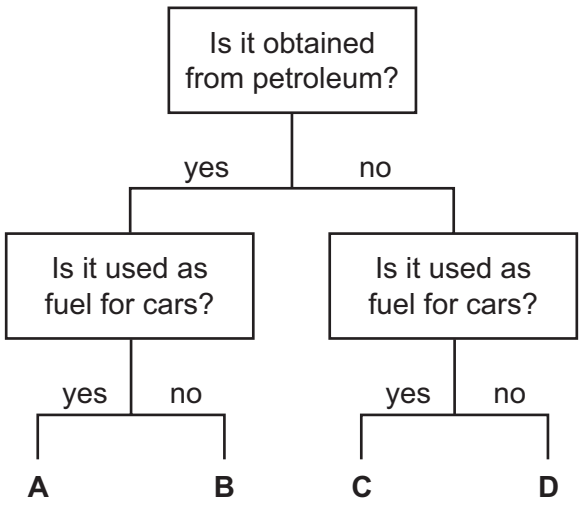
4



Which row gives the names of the compounds?

	1	2	3	4
A	ethene	ethane	ethanol	ethanoic acid
B	ethane	ethene	ethanoic acid	ethanol
C	ethene	ethane	ethanoic acid	ethanol
D	ethane	ethene	ethanol	ethanoic acid

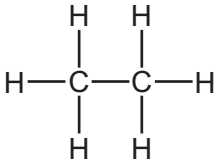
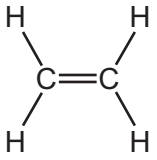
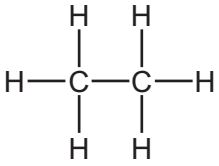
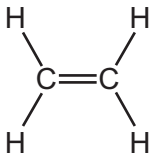
35 Which fuel could be gasoline?



36 A hydrocarbon W burns to form carbon dioxide and water.

W decolourises bromine water.

What is the name of W and what is its structure?

	name of W	structure of W
A	ethane	
B	ethane	
C	ethene	
D	ethene	

37 Which statements about homologous series are correct?

1 All members have similar chemical properties.

2 All members have the same molecular mass.

3 Ethane and ethene are members of the same homologous series.

4 Ethane and propane are members of the same homologous series.

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

38 Which statements about ethanol are correct?

1 It can be made by fermentation.

2 It is an unsaturated compound.

3 It burns in air and can be used as a fuel.

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

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39 Which statement about aqueous ethanoic acid is correct?

A It reacts with metal carbonates to form salts, hydrogen and water.

B It reacts with metal oxides to form salts and oxygen.

C It reacts with reactive metals to form salts and hydrogen.

D It turns damp red litmus paper blue.

40 Which substances are synthetic polymers?

1 *Terylene*

2 nylon

3 protein

4 poly(ethene)

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

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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.).