Cambridge Assessment International Education
Cambridge International General Certificate of Secondary Education

CHEMISTRY **0620/12**

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)

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.

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

	arrangement	motion
A	random	move in all directions
B	random	stay in one place
C	regular	move freely
D	regular	vibrate about a fixed point

2 A student measures 25.00 cm^3 of dilute hydrochloric acid accurately.

Which apparatus is most suitable?

A beaker

B measuring cylinder

C burette

D dropping pipette

3 Which sequence is used to separate a soluble salt from a mixture of a soluble and an insoluble salt?

A add solvent, heat the mixture, crystallise the mixture

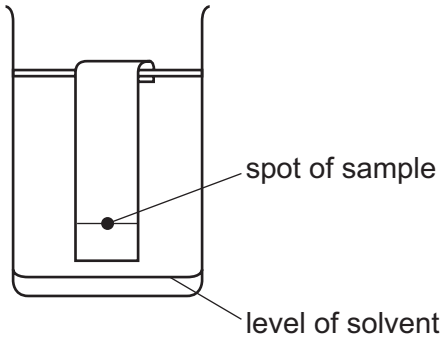
B add solvent, heat the mixture, filter, crystallise the filtrate

C heat the mixture, filter, crystallise the filtrate

D heat the mixture, filter, add solvent, crystallise the filtrate

4 Which diagram shows the correct level of the solvent at the start of a chromatography experiment?

A



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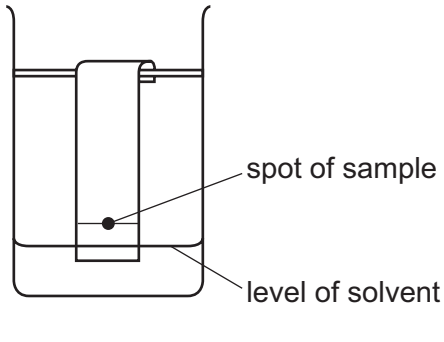
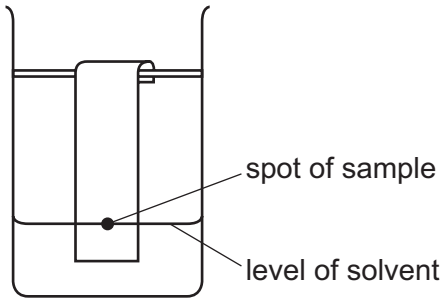
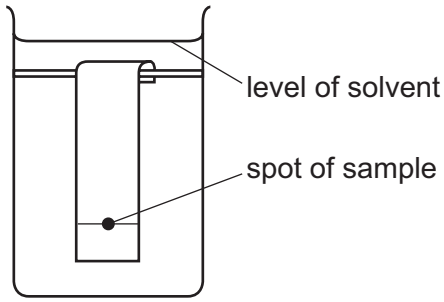


C



D



5 What is an isotope of $^{31}_{15}E$?

A $^{31}_{14}E$ **B** $^{33}_{15}E$ **C** $^{31}_{16}E$ **D** $^{33}_{16}E$

6 Which statement about the formation of ions in chemical reactions is correct?

A A bromine atom loses an electron and forms a –1 ion.

B A chlorine atom gains an electron and forms a –1 ion.

C A potassium atom gains an electron and forms a +1 ion.

D A sodium atom loses an electron and forms a –1 ion.

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 explains why graphite is used as a lubricant?

A Each carbon atom in graphite forms three bonds.

B The bonding in graphite is covalent.

C The carbon atoms are arranged in hexagons.

D There are weak forces between the layers of carbon atoms.

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 Samples of dilute sulfuric acid and concentrated hydrochloric acid are separately electrolysed.

Which row describes the product at each electrode during the electrolysis of both substances?

	product at each anode	product at each cathode
A	different	different
B	different	same
C	same	different
D	same	same

11 Which row describes the energy level diagram and energy change in an exothermic reaction?

	energy level diagram	energy is
A	reactants higher than products	absorbed
B	reactants higher than products	released
C	reactants lower than products	absorbed
D	reactants lower than products	released

12 Which process is a physical change?

A a firework exploding

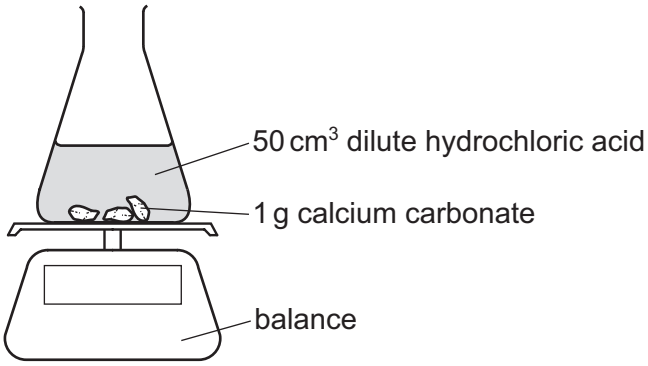
B burning wood

C chocolate melting

D iron rusting

13 An experiment is set up as shown.

The mass of the conical flask and its contents is measured at 30 second intervals.



Which statement about the reaction and about changes to the reaction conditions is correct?

A Adding 10 cm^3 of water to the 50 cm^3 of acid increases the rate of the reaction.

B Increasing the size of the pieces of calcium carbonate increases the rate of the reaction.

C Increasing the temperature increases the rate of the reaction.

D The mass of the conical flask increases as carbon dioxide is formed.

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 Different types of reaction are listed.

1 oxidation

2 decomposition

3 combustion

4 reduction

The equation shows the reaction of magnesium with oxygen.

$$2Mg + O_2 \rightarrow 2MgO$$

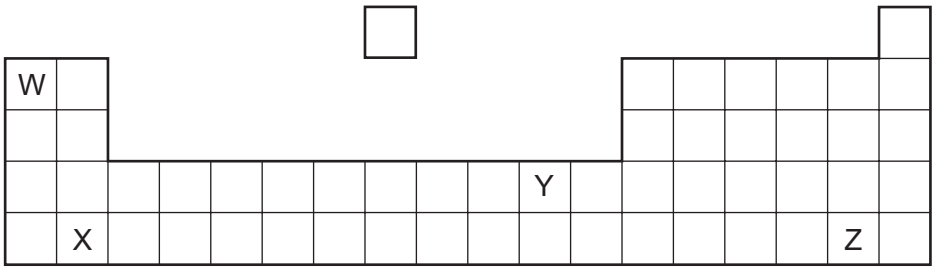
Which types of reaction does magnesium undergo in this reaction?

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

16 Which colours are seen when litmus and methyl orange are added to separate samples of aqueous sodium hydroxide?

	litmus	methyl orange
A	blue	orange
B	blue	yellow
C	purple	orange
D	purple	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 An acid is neutralised by adding an excess of an insoluble solid base.

A soluble salt is formed.

How is the pure salt obtained from the reaction mixture?

A crystallisation → evaporation → filtration

B evaporation → crystallisation → filtration

C filtration → crystallisation → evaporation

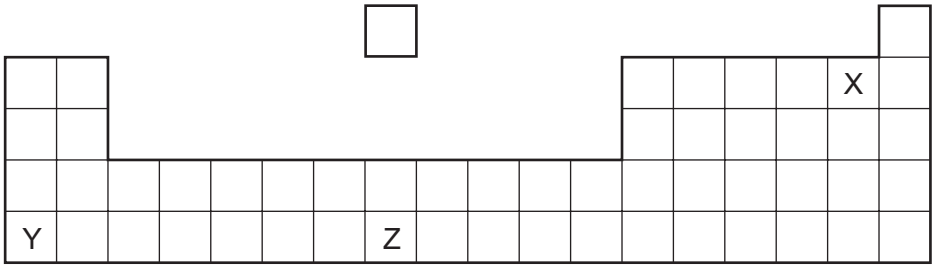
D filtration → evaporation → crystallisation

19 A substance is tested with three different reagents.

Which row shows the results obtained with aqueous iron(II) nitrate?

	aqueous sodium hydroxide	acidified aqueous silver nitrate	acidified aqueous barium nitrate
A	green precipitate, insoluble in excess	no reaction	no reaction
B	green precipitate, insoluble in excess	white precipitate	white precipitate
C	white precipitate, insoluble in excess	cream precipitate	no reaction
D	white precipitate that dissolves in excess	no reaction	white precipitate

20 Part of the Periodic Table is shown.



Which row describes the properties of X, Y and Z?

	good conductor of electricity	high melting point
A	X	Z
B	Y	Z and X
C	Y and Z	Z
D	Z and X	X

21 The melting points and boiling points of the elements of Group I of the Periodic Table are shown.

element	melting point / °C	boiling point / °C
lithium	181	1330
sodium	98	883
potassium	63	759
rubidium	39	688
caesium	28	671

Which pair of elements are liquid at 800 °C?

A caesium and rubidium

B potassium and sodium

C lithium and sodium

D potassium and caesium

22 The table gives some information about four metals, Q, R, S and T.

	melting point in °C	density in g / dm^3	colour of metal sulfate	catalytic activity
Q	650	1.74	white	no
R	1455		green	
S	842	1.55	white	no
T	1085	8.96		yes

Which statements are correct?

1 T forms a coloured sulfate.

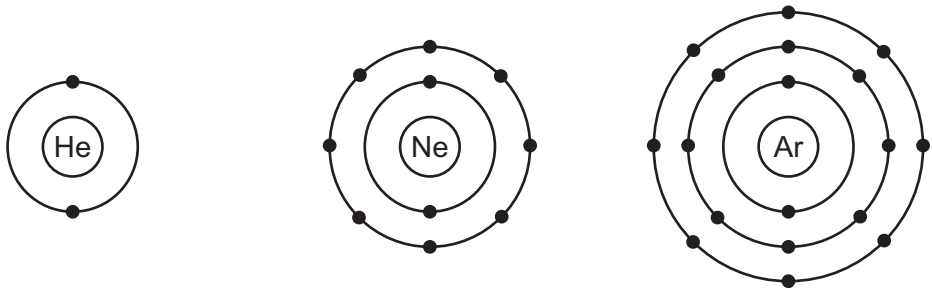
2 Q and S are transition elements.

3 The density of R is 0.53 g / cm^3.

4 R shows catalytic activity.

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

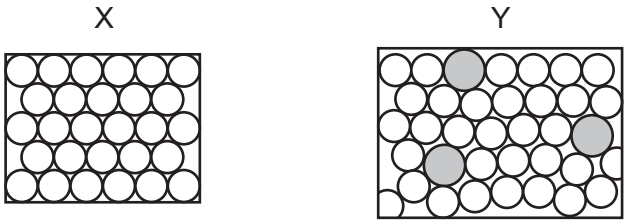
23 The electronic structures of helium, neon and argon are shown.



Which row describes these gases?

	reactivity	form of the gas	electronic structure
A	reactive	monoatomic	incomplete outer shell of electrons
B	unreactive	diatomic	complete outer shell of electrons
C	unreactive	diatomic	incomplete outer shell of electrons
D	unreactive	monoatomic	complete outer shell of electrons

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



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 different metals are reacted separately with dilute hydrochloric acid and with water. The results are shown.

metal	reaction with dilute hydrochloric acid	reaction with water
R	reacts	no reaction
S	no reaction	no reaction
T	reacts	reacts

What is the order of reactivity of the metals starting with the most reactive?

A R → S → T

B S → R → T

C T → R → S

D T → S → R

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 Which property of aluminium makes it useful in the manufacture of aircraft?

A conducts electricity

B high boiling point

C low density

D silver colour

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 The following gases pollute the atmosphere.

1 sulfur dioxide

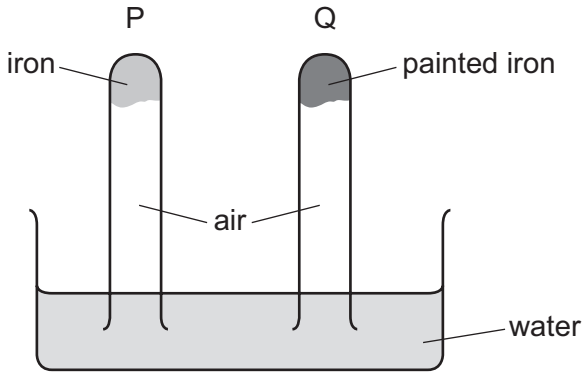
2 oxides of nitrogen

3 carbon monoxide

Which gases contribute to acid rain?

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

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 Ammonia gas is produced when compound X is warmed with an ammonium salt.

What is X?

A calcium carbonate

B calcium hydroxide

C sodium chloride

D potassium nitrate

32 Which statement describes a disadvantage of sulfur dioxide?

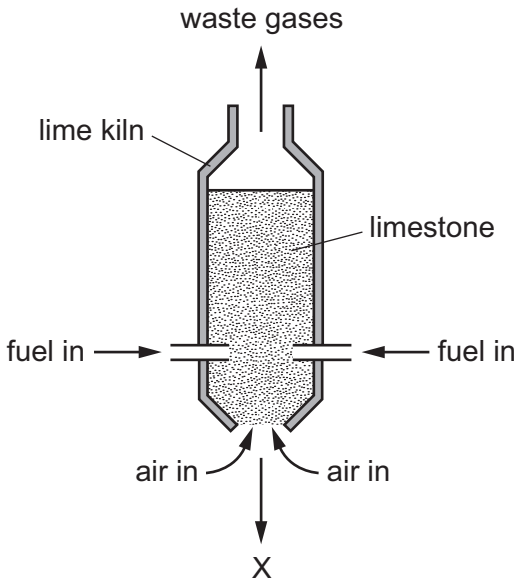
A It can be used as a bleach when making wood pulp.

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

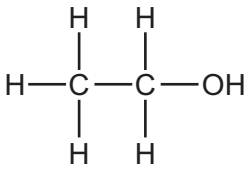
B calcium hydroxide

C calcium oxide

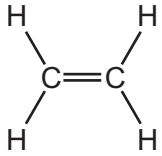
D calcium sulfate

34 What is the structure of ethanoic acid?

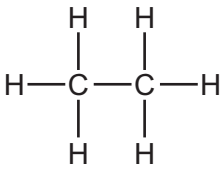
A



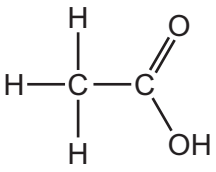
B



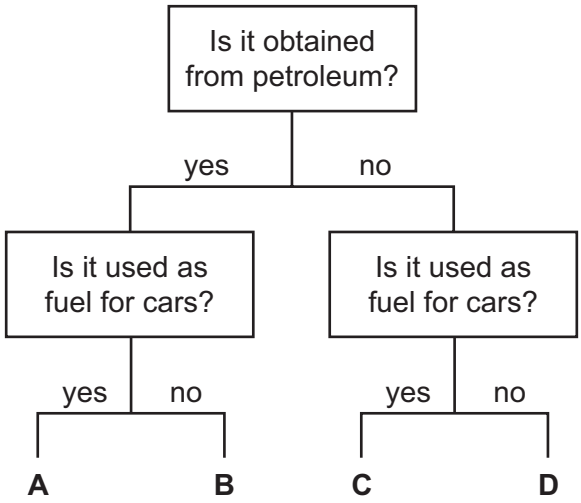
C



D



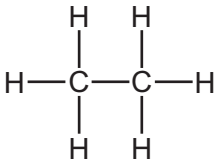
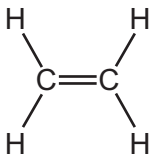
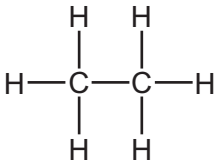
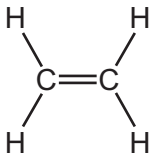
35 Which fuel could be gasoline?



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 statement about homologous series is **not** correct?

A All homologous series are hydrocarbons.

B Members of a homologous series have the same functional group.

C Members of a homologous series have similar chemical properties.

D The alkanes are an example of a homologous series.

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

39 What are the properties of aqueous ethanoic acid?

	decolourises bromine water	reacts with calcium carbonate to make carbon dioxide	turns damp red litmus blue
A	✓	✓	✗
B	✓	✗	✓
C	✗	✓	✗
D	✗	✗	✓

40 Which polymers are found in foods?

1 carbohydrates

2 poly(ethene)

3 protein

4 *Terylene*

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

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.).