Cambridge International Examinations
Cambridge International General Certificate of Secondary Education

CHEMISTRY **0620/13**

Paper 1 Multiple Choice (Core) **May/June 2018**

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.

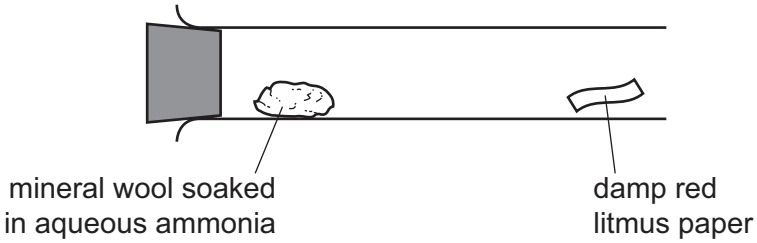
Read the instructions on the Answer Sheet very carefully.

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.

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

This document consists of **15** printed pages and **1** blank page.

1 Mineral wool soaked in aqueous ammonia is placed in the apparatus shown.



After five minutes, the damp red litmus paper turned blue.

Which process led to this change?

A crystallisation

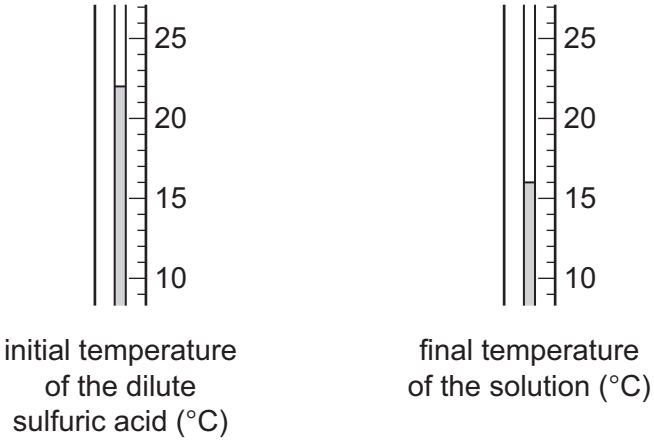
B diffusion

C distillation

D sublimation

2 Solid R reacted with dilute sulfuric acid.

The initial temperature of the dilute sulfuric acid and the final temperature of the solution are shown.



What was the change in temperature in °C?

A –6 **B** –4 **C** 4 **D** 6

3 The melting points of four impure samples of lead(II) bromide were measured. The results are shown.

Which sample is the most pure?

	temperature when the sample started to melt / °C	temperature when the sample finished melting / °C
A	342	355
B	353	360
C	365	371
D	372	373

4 Symbols representing four particles are shown.

$^{40}_{20}W$ $^{41}_{20}X^{2+}$ $^{37}_{18}Y$ $^{37}_{17}Z$

The letters are not the chemical symbols.

Which particles have the same number of neutrons?

A W and X^{2+} **B** W and Z **C** X^{2+} and Y **D** Y and Z

5 Which name is given to a pure substance made from more than one type of atom?

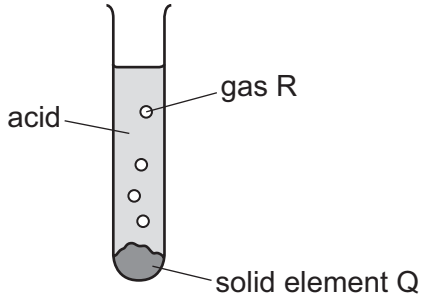
A alloy

B compound

C element

D mixture

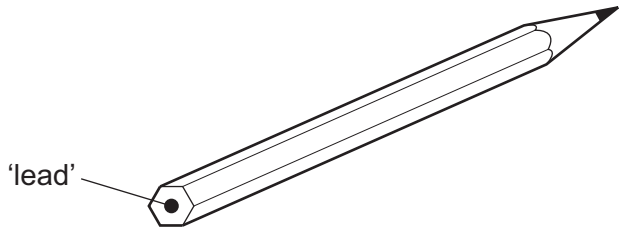
6 The diagram shows solid element Q reacting with an acid to produce gas R.



Which row describes Q and R?

	Q	R
A	metal	element with covalent bonds
B	metal	element with ionic bonds
C	non-metal	compound with covalent bonds
D	non-metal	compound with ionic bonds

7 The 'lead' in a pencil is made of a mixture of graphite and clay.



When the percentage of graphite is increased, the pencil slides across the paper more easily.

Which statement explains this observation?

A Graphite has a high melting point.

B Graphite is a form of carbon.

C Graphite is a lubricant.

D Graphite is a non-metal.

8 The equation for the reaction between magnesium and dilute sulfuric acid is shown.

The M_r of $MgSO_4$ is 120.

$$Mg + H_2SO_4 \rightarrow MgSO_4 + H_2$$

Which mass of magnesium sulfate is formed when 12 g of magnesium completely reacts with dilute sulfuric acid?

A 5 g **B** 10 g **C** 60 g **D** 120 g

9 What is produced at each electrode when molten rubidium chloride is electrolysed using platinum electrodes?

	positive electrode	negative electrode
A	chlorine	hydrogen
B	chlorine	rubidium
C	hydrogen	chlorine
D	rubidium	chlorine

10 What is released when any fuel is burned?

A carbon dioxide

B heat energy

C smoke

D water

11 Group I metals react vigorously with water and release heat.

Which statement about this reaction is correct?

A The reaction is endothermic and the energy change is negative.

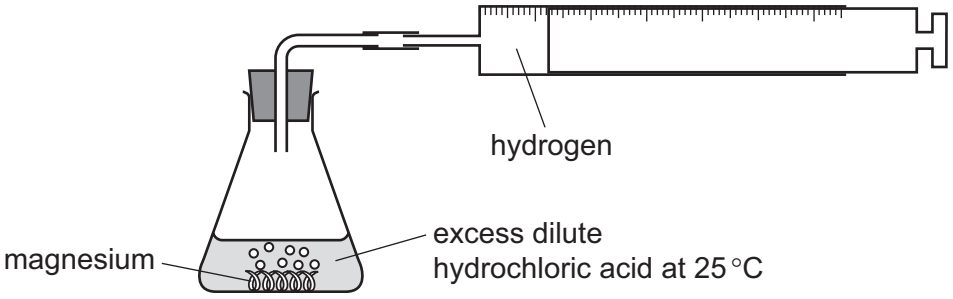
B The reaction is endothermic and the energy change is positive.

C The reaction is exothermic and the energy change is negative.

D The reaction is exothermic and the energy change is positive.

[Turn over

12 The diagram shows a rate of reaction experiment.



Increasing the concentration of the acid and increasing the temperature both affect the rate of reaction.

Which row is correct?

	increase the concentration of acid	increase the temperature
A	decrease rate of reaction	decrease rate of reaction
B	decrease rate of reaction	increase rate of reaction
C	increase rate of reaction	decrease rate of reaction
D	increase rate of reaction	increase rate of reaction

13 In a chemical reaction, blue compound X changed into white compound Y.

$$\underset{\text{blue}}{X} \rightarrow \underset{\text{white}}{Y}$$

Which statement describes this reaction?

A Hydrated cobalt(II) chloride is heated.

B Hydrated copper(II) sulfate is heated.

C Water is added to anhydrous cobalt(II) chloride.

D Water is added to anhydrous copper(II) sulfate.

14 Which equation shows an oxidation reaction?

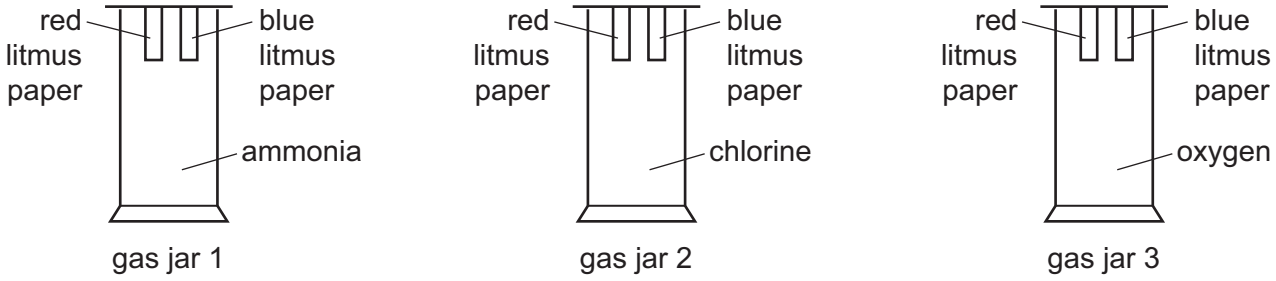
A $C + O_2 \rightarrow CO_2$

B $CaCO_3 \rightarrow CaO + CO_2$

C $CaO + 2HCl \rightarrow CaCl_2 + H_2O$

D $N_2O_4 \rightarrow 2NO_2$

15 Pieces of damp red litmus paper and damp blue litmus paper are placed in three different gas jars.



In which gas jars does at least one piece of litmus paper change colour?

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

16 Which statement about oxides is correct?

A A solution of magnesium oxide has a pH less than pH 7.

B A solution of sulfur dioxide has a pH greater than pH 7.

C Magnesium oxide reacts with nitric acid to make a salt.

D Sulfur dioxide reacts with hydrochloric acid to make a salt.

17 Which methods are suitable for preparing **both** zinc sulfate and copper(II) sulfate?

1 reacting the metal oxide with warm dilute aqueous sulfuric acid

2 reacting the metal with dilute aqueous sulfuric acid

3 reacting the metal carbonate with dilute aqueous sulfuric acid

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

18 A white crystalline solid is dissolved in distilled water.

A small amount of dilute nitric acid is added followed by aqueous silver nitrate.

No visible change occurs.

What can be deduced about the white crystalline solid?

A It contains chloride ions.

B It does not contain ammonium ions.

C It does not contain carbonate ions.

D It must contain either sulfate or nitrate ions.

19 Which element is classified as a non-metal in the Periodic Table?

A calcium

B chlorine

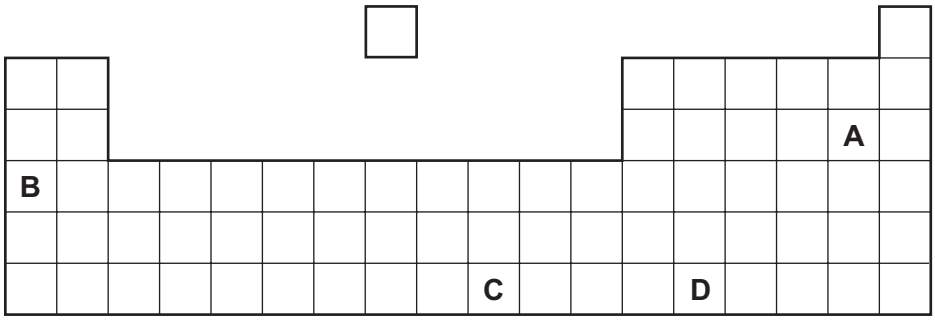
C chromium

D copper

20 Part of the Periodic Table is shown.

Element Q has a low boiling point, low density and does not conduct electricity.

Which element is Q?



21 Which row describes a typical transition element?

	density in g / cm^3	melting point in °C	boiling point in °C	colour of oxide
A	0.97	98	883	white
B	2.64	769	1382	white
C	3.10	–7	59	yellow
D	8.96	1085	2562	red

22 Helium is a noble gas.

Which statement is correct?

A A helium atom has eight electrons in its outer shell.

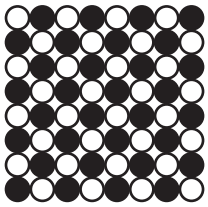
B Helium exists as diatomic molecules.

C Helium is used as an inert atmosphere in lamps.

D There are no naturally occurring chemical compounds of helium.

23 Which diagram represents a solid alloy?

A



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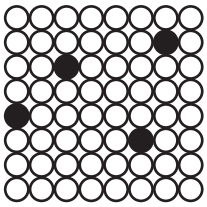

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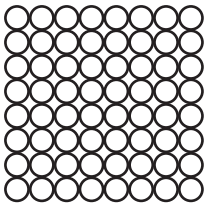

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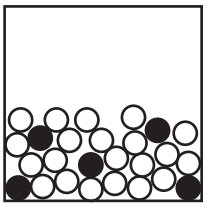


24 Some reactions of three metals and their oxides are shown.

metal	metal reacts with steam	metal oxide reacts with carbon
X	no	yes
Y	yes	no
Z	yes	yes

What is the order of reactivity of the metals?

	most reactive →		least reactive
A	X	Z	Y
B	Y	X	Z
C	Y	Z	X
D	Z	Y	X

25 Which statement about the extraction of metals is correct?

A Aluminium is extracted from bauxite by electrolysis.

B Aluminium is extracted from hematite by heating with carbon.

C Iron is extracted from bauxite by heating with carbon.

D Iron is extracted from hematite by electrolysis.

26 Which statement explains why aluminium is used to manufacture aircraft?

A It has a low density.

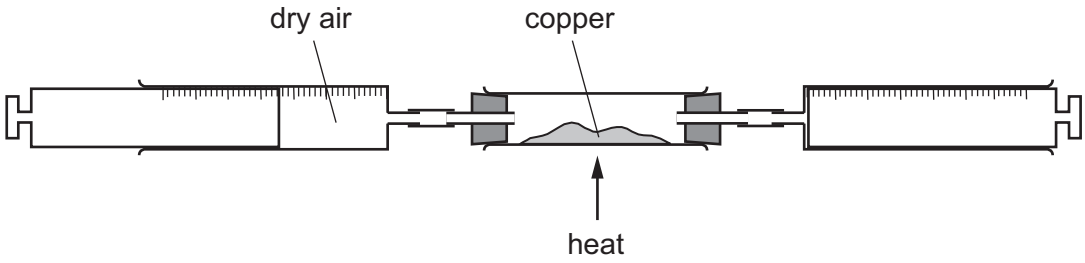
B It is a good conductor of electricity.

C It is a good conductor of heat.

D It is ductile.

[Turn over

27 Dry air is passed over hot copper until all the oxygen has reacted.



The volume of gas at the end of the reaction is 120 cm^3.

What is the starting volume of dry air?

A 132 cm^3 **B** 152 cm^3 **C** 180 cm^3 **D** 570 cm^3

28 A steel bicycle which had been left outdoors for several months was starting to rust.

What would **not** reduce the rate of corrosion?

A Remove the rust and paint the bicycle.

B Remove the rust and store the bicycle in a dry shed.

C Remove the rust and wipe the bicycle with a clean, damp cloth.

D Remove the rust and wipe the bicycle with an oily cloth.

29 Which statements about water are correct?

1 Household water contains dissolved salts.

2 Water for household use is filtered to remove soluble impurities.

3 Water is treated with chlorine to kill bacteria.

4 Water is used in industry for cooling.

A 1, 2, 3 and 4

B 1, 2 and 3 only

C 1, 3 and 4 only

D 2, 3 and 4 only

30 Fertilisers are often mixtures of solid compounds.

Which compounds can be mixed to provide the three elements needed for healthy plant growth?

A ammonium nitrate and calcium phosphate

B ammonium nitrate and potassium chloride

C ammonium phosphate and potassium chloride

D potassium chloride and calcium phosphate

31 Carbon dioxide and methane are both greenhouse gases which contribute to climate change.

Which statement explains how greenhouse gases contribute to climate change?

A They absorb heat radiation from the Earth.

B They absorb heat radiation from the Sun.

C They absorb light radiation from the Sun.

D They cause acid rain.

32 Element Z forms an oxide, ZO_2. Three uses of ZO_2 are listed.

- bleaching agent
- killing bacteria
- manufacturing an important acid

What is Z?

A carbon

B lead

C nitrogen

D sulfur

[Turn over

33 Limestone is an important material with many uses.

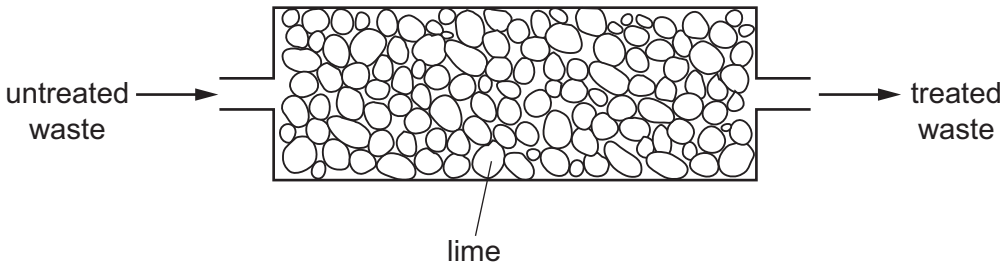
Limestone is heated to produce .....1..... and carbon dioxide.

This reaction is called .....2..... .

Which words correctly complete gaps 1 and 2?

	1	2
A	lime	neutralisation
B	lime	thermal decomposition
C	slaked lime	neutralisation
D	slaked lime	thermal decomposition

34 Lime is used to treat an industrial waste.



Which change occurs in the treatment?

	untreated waste		treated waste
A	acidic	→	neutral
B	alkaline	→	acidic
C	alkaline	→	neutral
D	neutral	→	acidic

35 What is **not** the correct use of the fraction named?

	name of fraction	use
A	fuel oil	making waxes
B	gas oil	fuel in diesel engines
C	kerosene	jet fuel
D	naphtha	making chemicals

36 Four organic compounds are listed.

ethane

ethanoic acid

ethanol

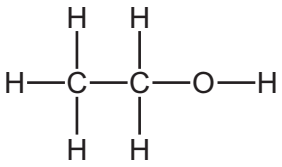
ethene

Which bond do all four compounds contain?

A C–C **B** C–H **C** C–O **D** O–H

37 The structures of some organic compounds are shown.

1



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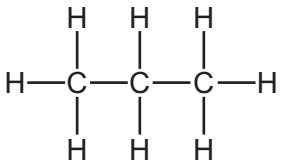

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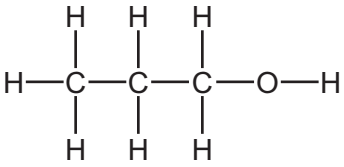

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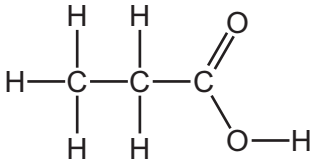

Which compounds belong to the same homologous series?

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

38 Which substances can be obtained by cracking hydrocarbons?

A ethanol and ethene

B ethanol and hydrogen

C ethene and hydrogen

D ethene and poly(ethene)

39 Sugars and ethene can both be made into ethanol using different reactions.

Which type of reaction is used in each case?

	sugars to ethanol	ethene to ethanol
A	fermentation	addition
B	fermentation	cracking
C	incomplete combustion	addition
D	incomplete combustion	cracking

40 Which substances are natural polymers?

	ethanol	protein	starch	vinegar
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.).