Cambridge International Examinations
Cambridge International General Certificate of Secondary Education

CHEMISTRY **0620/11**

Paper 1 Multiple Choice (Core) **October/November 2017**

45 minutes

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

* 1 3 3 0 8 8 0 5 2 1 *

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.

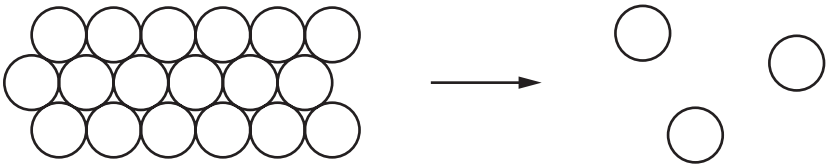
Each correct answer will score one mark. A mark will not be deducted for a wrong answer.
Any rough working should be done in this booklet.
A copy of the Periodic Table is printed on page 16.
Electronic calculators may be used.

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.

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1 The diagram shows how the arrangement of particles changes when a substance changes state.



Which change of state is shown?

A boiling

B condensation

C evaporation

D sublimation

2 Which method can be used to separate a mixture of salt and water to obtain **both** parts of the mixture?

A crystallisation

B distillation

C evaporation

D filtration

3 A student put 25.0 cm^3 of dilute hydrochloric acid into a conical flask.

The student added 2.5 g of solid sodium carbonate and measured the change in temperature of the mixture.

Which apparatus does the student need to use to obtain the most accurate results?

A balance, measuring cylinder, thermometer

B balance, pipette, stopwatch

C balance, pipette, thermometer

D burette, pipette, thermometer

4 Propanone, C_3H_6O, is a liquid at room temperature.

What is the boiling point of pure propanone?

A –61 °C to –51 °C

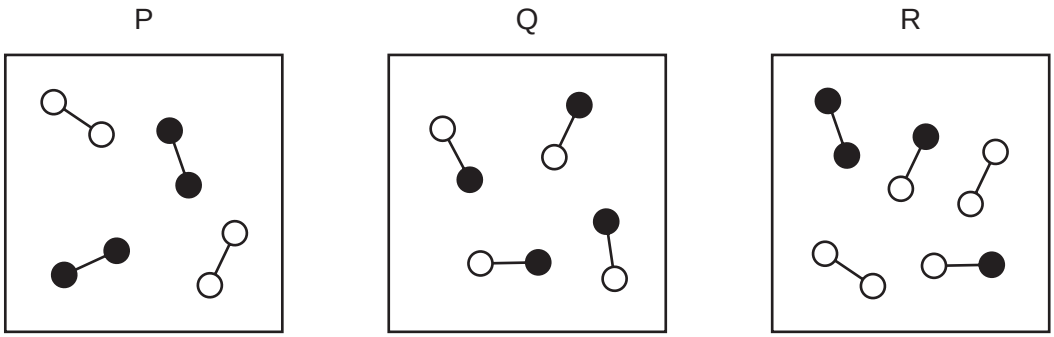
B –56 °C

C 51 °C to 61 °C

D 56 °C

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5 Which statement about the boxes P, Q and R is correct?



A Box P contains two compounds and box R contains two elements.

B Box P contains two elements and box Q contains a mixture.

C Box P contains two elements and box Q contains one compound.

D Box Q contains two compounds and box R contains a mixture.

6 The number of particles in atoms W, X, Y and Z are shown.

	protons	electrons	neutrons
W	6	6	6
X	6	6	7
Y	7	7	7
Z	7	7	8

Which statement is correct?

A W and X are isotopes of carbon.

B X and Y are isotopes of nitrogen.

C X has a mass number of 12.

D Z has an atomic number of 8.

7 Which row describes the type of bonding present in substances 1 and 2?

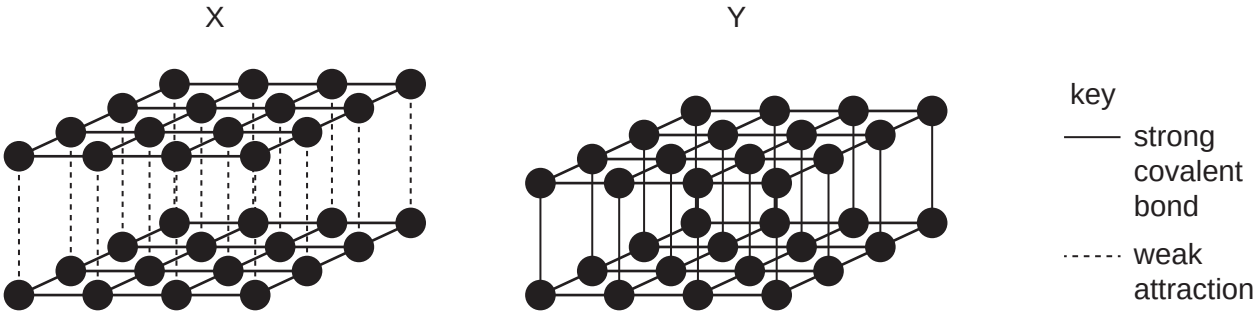
	substance 1	substance 2
A	methane has ionic bonding	graphite has covalent bonding
B	graphite has ionic bonding	potassium chloride has covalent bonding
C	potassium chloride has ionic bonding	methane has covalent bonding
D	potassium chloride has ionic bonding	graphite has ionic bonding

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[Turn over

8 Substances with giant covalent structures can be used as lubricants and as cutting tools for hard materials.

The diagram shows how the atoms are arranged in two giant covalent substances, X and Y.



Which statement is correct?

A Only X is used as a cutting tool and only Y is used as a lubricant.

B Only X is used as a lubricant and only Y is used as a cutting tool.

C X and Y are both used as cutting tools.

D X and Y are both used as lubricants.

9 The equation shows the thermal decomposition of magnesium carbonate (M_r = 84).

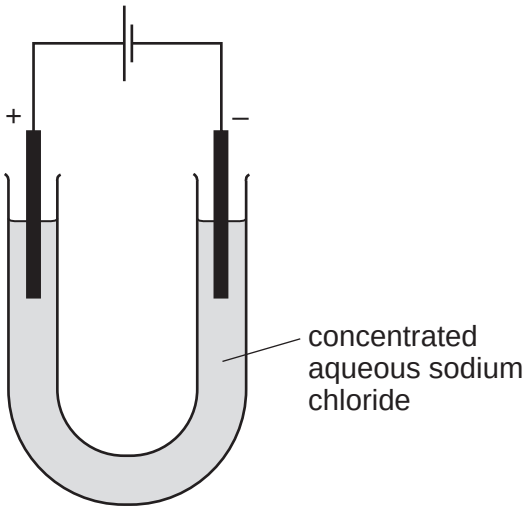
$$MgCO_3 \rightarrow MgO + CO_2$$

Which mass of magnesium oxide is formed when 21.0 g of magnesium carbonate are completely decomposed?

A 1.9 g **B** 4.0 g **C** 10.0 g **D** 40.0 g

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10 Electricity is passed through concentrated aqueous sodium chloride. Inert electrodes are used.



What is formed at the negative electrode?

A chlorine

B hydrogen

C oxygen

D sodium

11 Two chemical processes are described.

- During the combustion of gasoline, energy is .....1..... .
- During the electrolysis of sulfuric acid, energy is .....2..... .

Which words complete gaps 1 and 2?

	1	2
A	given out	given out
B	given out	taken in
C	taken in	given out
D	taken in	taken in

12 When dilute sulfuric acid reacts with aqueous sodium hydroxide, the temperature of the solution increases.

Which words describe this reaction?

A endothermic and neutralisation

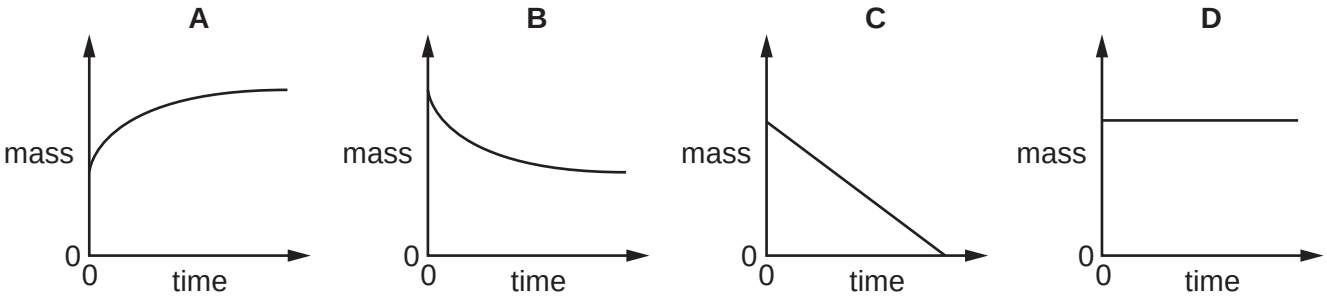
B endothermic and redox

C exothermic and neutralisation

D exothermic and redox

13 The mass of a beaker and its contents is plotted against time.

Which graph represents what happens when sodium carbonate reacts with an excess of dilute hydrochloric acid in an open beaker?



14 When blue copper(II) sulfate is heated, a white solid and water are formed.

The white solid turns blue and gives out heat when water is added to it.

Which terms describe the blue copper(II) sulfate and the reactions?

	the blue copper(II) sulfate is	reactions
A	a mixture	can be reversed
B	a mixture	cannot be reversed
C	hydrated	can be reversed
D	hydrated	cannot be reversed

15 Which changes increase the rate of reaction between calcium carbonate and dilute hydrochloric acid?

1 increasing the concentration of the acid

2 increasing the temperature

3 increasing the size of the pieces of calcium carbonate

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

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16 The equations for two reactions P and Q are given.

P $2\underline{NaNO_2} + O_2 \rightarrow 2NaNO_3$

Q $2\underline{Hg}O \rightarrow 2Hg + O_2$

In which of these reactions does oxidation of the underlined substance occur?

	P	Q
A	✓	✓
B	✓	✗
C	✗	✓
D	✗	✗

17 What is **not** a typical characteristic of acids?

A They react with alkalis producing water.

B They react with **all** metals producing hydrogen.

C They react with carbonates producing carbon dioxide.

D They turn blue litmus paper red.

18 Magnesium, phosphorus and chlorine are elements in the same period of the Periodic Table.

Which row describes the type of oxide formed by each of these elements?

	magnesium	phosphorus	chlorine
A	acidic	acidic	basic
B	acidic	basic	basic
C	basic	acidic	acidic
D	basic	basic	acidic

19 Zinc sulfate is made by reacting an excess of zinc oxide with dilute sulfuric acid.

The excess zinc oxide is then removed from the solution.

Which process is used to obtain solid zinc sulfate from the solution?

A crystallisation

B dissolving

C filtration

D fractional distillation

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20 What is used to test for chlorine?

A a glowing splint

B damp litmus paper

C limewater

D potassium manganate(VII) solution

21 Which statements about the trends across a period of the Periodic Table are correct?

1 Aluminium is more metallic than sodium.

2 Beryllium is more metallic than carbon.

3 Boron is more metallic than lithium.

4 Magnesium is more metallic than silicon.

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

22 Astatine is an element in Group VII of the Periodic Table.

Astatine is .....1..... reactive than iodine.

The melting point of astatine is .....2..... than the melting point of iodine.

Astatine is .....3..... in colour than bromine.

Which words complete gaps 1, 2 and 3?

	1	2	3
A	less	higher	darker
B	less	lower	lighter
C	more	higher	darker
D	more	lower	lighter

23 Which row describes the properties of a typical transition element?

	melting point	forms coloured compounds	can act as a catalyst
A	high	no	no
B	high	yes	yes
C	low	no	yes
D	low	yes	no

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24 Why is argon gas used to fill electric lamps?

A It conducts electricity.

B It glows when heated.

C It is less dense than air.

D It is not reactive.

25 What is a property of **all** metals?

A conduct electricity

B hard

C low melting points

D react with water

26 Which material is **not** involved in the large-scale extraction of iron from iron ore?

A bauxite

B calcium carbonate (limestone)

C carbon (coke)

D hematite

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[Turn over

27 Some reactions of three metals are listed in the table.

metal	metal reacts with dilute hydrochloric acid	metal oxide is reduced by carbon
P	yes	no
Q	no	yes
R	yes	yes

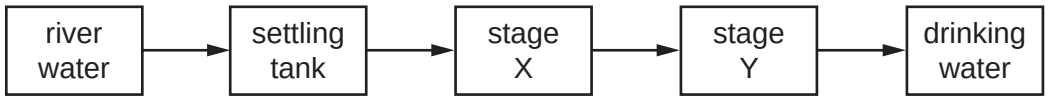
What is the order of reactivity of the metals?

	most reactive →		least reactive
A	P	R	Q
B	Q	P	R
C	R	P	Q
D	R	Q	P

28 Which uses of the metals shown are both correct?

	aluminium	stainless steel
A	aircraft bodies	cutlery
B	car bodies	aircraft bodies
C	chemical plant	food containers
D	food containers	car bodies

29 The flow chart shows stages in the treatment of river water to produce drinking water.



What occurs at stages X and Y?

	X	Y
A	distillation	chlorination
B	distillation	filtration
C	filtration	chlorination
D	filtration	distillation

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30 Which gas is over 30% of air?

A argon

B carbon dioxide

C nitrogen

D oxygen

31 Iron is a metal that rusts in the presence of oxygen and water.

Mild steel is used for .....1..... and is prevented from rusting by .....2..... .

Stainless steel does not rust. It is produced by .....3..... iron with another metal.

Which words complete gaps 1, 2 and 3?

	1	2	3
A	car bodies	greasing	covering
B	car bodies	painting	mixing
C	cutlery	greasing	covering
D	cutlery	painting	mixing

32 A mixture produces a gas both when it reacts with an acid and when it reacts with an alkali.

Which ions are present in the mixture?

A ammonium ions and carbonate ions

B ammonium ions and oxide ions

C hydrogen ions and carbonate ions

D hydrogen ions and oxide ions

33 Some marble chips (calcium carbonate) are heated strongly and substances X and Y are formed.

Substance X is a white solid that reacts with water, giving out heat. Substance Y is a colourless gas.

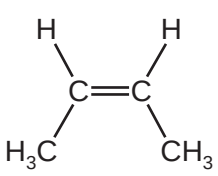
What are substances X and Y?

	X	Y
A	calcium chloride	oxygen
B	calcium hydroxide	carbon dioxide
C	calcium oxide	carbon dioxide
D	calcium sulfate	oxygen

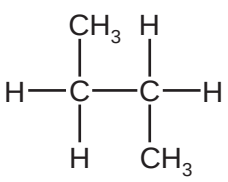
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34 The structures of some organic molecules are shown.

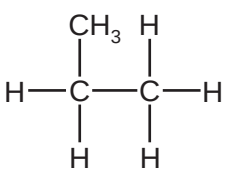
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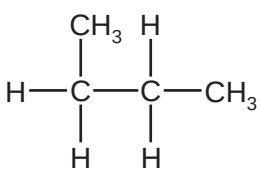
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3



4



Which structures represent an alkane with four carbon atoms?

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

35 Some of the fractions obtained from the fractional distillation of petroleum are used as fuels for vehicles.

Which two fractions are used as fuels for vehicles?

A bitumen fraction and gasoline fraction

B bitumen fraction and naphtha fraction

C gasoline fraction and kerosene fraction

D kerosene fraction and lubricating fraction

36 Burning fossil fuels releases heat energy.

Which substance is **not** a fossil fuel?

A coal

B hydrogen

C natural gas

D petroleum

37 X, Y and Z are three hydrocarbons.

X $CH_2=CH_2$ Y $CH_3–CH=CH_2$ Z $CH_3–CH_2–CH=CH_2$

What do compounds X, Y and Z have in common?

1 They are all alkenes.

2 They are all part of the same homologous series.

3 They all have the same boiling point.

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

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38 The table shows bonds that are present and bonds that are not present in compound X.

bond	
C–C	✓
C=C	✗
C–H	✓
C–O	✓
C=O	✓
O–H	✓

What type of compound is X?

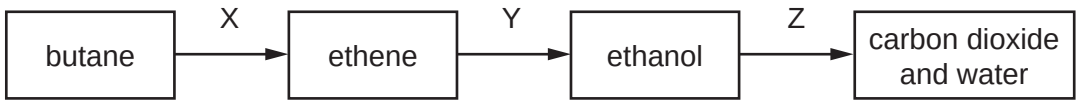
A a carboxylic acid

B an alcohol

C an alkane

D an alkene

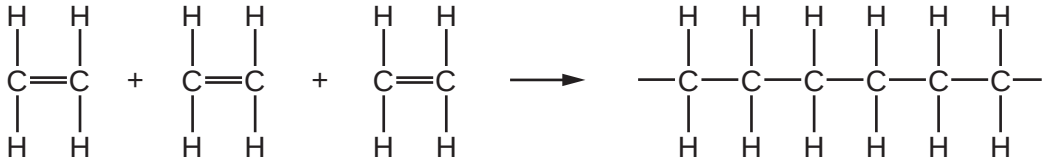
39 The diagram shows a reaction sequence.



Which row names the processes X, Y and Z?

	X	Y	Z
A	cracking	fermentation	respiration
B	cracking	hydration	combustion
C	distillation	fermentation	respiration
D	distillation	hydration	combustion

40 Molecules of a substance react together as shown.



Which type of reaction has taken place?

A cracking

B oxidation

C polymerisation

D reduction

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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.).