Cambridge Assessment International Education
Cambridge International General Certificate of Secondary Education

CHEMISTRY **0620/12**

Paper 1 Multiple Choice (Core) **October/November 2019**

45 minutes

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

* 4 3 4 6 6 2 4 8 2 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 **15** printed pages and **1** blank page.

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1 The diagram shows a cup of hot tea.



Which row describes the water particles in the air above the cup compared with the water particles in the cup?

	moving faster	closer together
A	✓	✗
B	✓	✓
C	✗	✗
D	✗	✓

2 A student is asked to measure the time taken for 0.4 g of magnesium carbonate to react completely with 25.0 cm^3 of dilute hydrochloric acid.

Which pieces of apparatus does the student need?

A balance, stop-clock, pipette

B balance, stop-clock, thermometer

C balance, pipette, thermometer

D stop-clock, pipette, thermometer

3 Petroleum is a mixture.

Which method is used to separate petroleum?

A chromatography

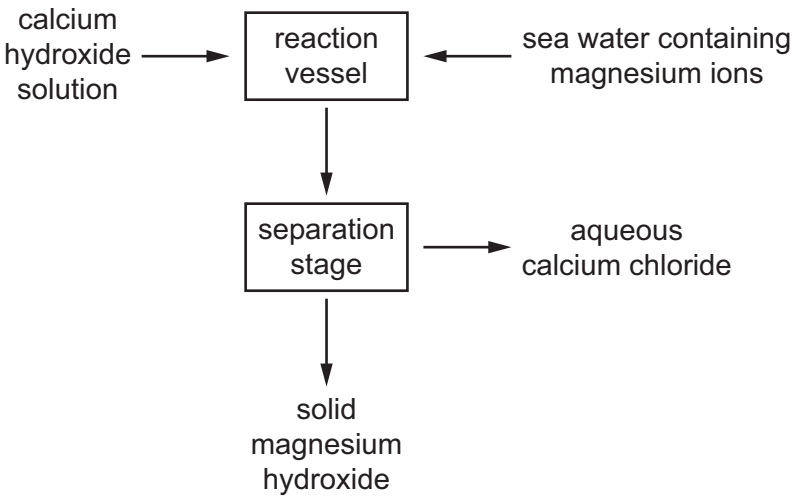
B cracking

C filtration

D fractional distillation

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4 Magnesium hydroxide can be obtained from sea water as shown.



Which process is used in the separation stage to separate solid magnesium hydroxide from the mixture?

A crystallisation

B filtration

C distillation

D chromatography

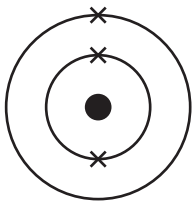
5 What is the total number of electrons in one molecule of ammonia, NH_3?

A 6 **B** 8 **C** 10 **D** 11

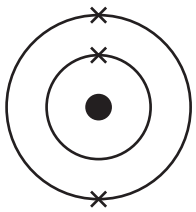
6 An isotope of lithium has the symbol $^{7}_{3}\text{Li}$.

What is the arrangement of electrons in one atom of this isotope of lithium?

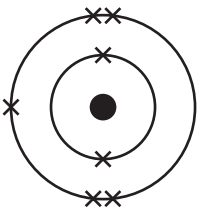
A



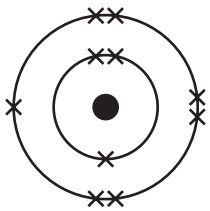
B



C



D



7 Which statement about an alloy is correct?

A It is a compound made of two or more elements, one of which is a metal.

B It is a layer of a metal plated onto another metal.

C It is a mixture of a metal with other elements.

D It is a single element.

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8 Graphite is a form of carbon.

Why can graphite be used as a lubricant?

A Graphite contains unbonded electrons which move through the structure.

B Graphite contains weak covalent bonds so the atoms move easily.

C Graphite has a low melting point so it easily turns into a liquid.

D Graphite has weak attractive forces between layers so they can move.

9 Magnesium burns in oxygen to form magnesium oxide.

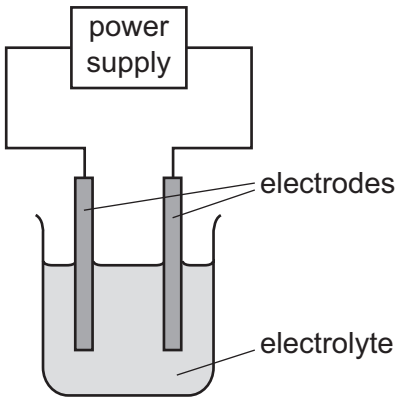
The equation for the reaction is shown.

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

Which mass of magnesium oxide is formed when 48 g of magnesium is burned?

A 20 g **B** 40 g **C** 80 g **D** 160 g

10 The apparatus used for electrolysis is shown.



Which statement is correct?

A Copper forms at the anode in some electrolysis reactions.

B Hydrogen forms at the cathode in some electrolysis reactions.

C Oxygen forms at the cathode in some electrolysis reactions.

D The negative electrode is called the anode.

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11 The temperature of the water in two beakers, X and Y, is measured as 21.5 °C.

5 g of sodium chloride is dissolved in the water in beaker X. The temperature changes to 18.0 °C.

5 g of calcium oxide is dissolved in the water in beaker Y. The temperature changes to 29.4 °C.

Which types of process are occurring in beakers X and Y?

	X	Y
A	endothermic	endothermic
B	endothermic	exothermic
C	exothermic	endothermic
D	exothermic	exothermic

12 Which reaction produces a white-coloured substance?

A adding water to anhydrous cobalt(II) chloride

B adding water to anhydrous copper(II) sulfate

C heating hydrated cobalt(II) chloride

D heating hydrated copper(II) sulfate

13 Four students collect the gas produced from the reaction of calcium carbonate with dilute hydrochloric acid. Each student records the time taken to collect a volume of gas.

Which results show the highest average rate of reaction?

A 15 cm^3 of gas collected in 20 seconds

B 50 cm^3 of gas collected in 40 seconds

C 75 cm^3 of gas collected in 80 seconds

D 90 cm^3 of gas collected in 100 seconds

14 Which row identifies a chemical and a physical change?

	chemical change	physical change
A	boiling ethanol	burning ethanol
B	burning ethanol	evaporating ethanol
C	dissolving ethanol in water	burning ethanol
D	evaporating ethanol	dissolving ethanol in water

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[Turn over

15 When magnesium is heated with zinc oxide a reaction occurs.

The equation is shown.

$$Mg + ZnO \rightarrow MgO + Zn$$

Which substance is oxidised?

A magnesium

B magnesium oxide

C zinc

D zinc oxide

16 Which statement describes the properties of hydrochloric acid?

A Carbon dioxide is produced when limestone reacts with hydrochloric acid.

B Hydrogen is produced when sodium hydroxide reacts with hydrochloric acid.

C Methyl orange turns yellow in strong hydrochloric acid.

D Red litmus paper turns blue when dipped into hydrochloric acid.

17 A sample of X is heated with aqueous sodium hydroxide and small pieces of aluminium.

A gas is produced which turns red litmus paper blue.

Aqueous sodium hydroxide solution is added to a second sample of X. A pale green precipitate is observed.

What is X?

A ammonium nitrate

B chromium(II) chloride

C iron(II) nitrate

D iron(II) sulfate

18 Which element forms an acidic oxide?

A calcium

B lithium

C magnesium

D sulfur

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19 A method used to make copper(II) sulfate crystals is shown.

1 Place dilute sulfuric acid in a beaker.

2 Warm the acid.

3 Add copper(II) oxide until it is in excess.

4 Filter the mixture.

5 Evaporate the filtrate until crystals start to form.

6 Leave the filtrate to cool.

What are the purposes of step 3 and step 4?

	step 3	step 4
A	to ensure all of the acid has reacted	to obtain solid copper(II) sulfate
B	to ensure all of the acid has reacted	to remove the excess of copper(II) oxide
C	to speed up the reaction	to obtain solid copper(II) sulfate
D	to speed up the reaction	to remove the excess of copper(II) oxide

20 Which statements describe changes that occur from left to right across a period of the Periodic Table?

1 The atomic number of the elements increases.

2 The metallic character of the elements decreases.

3 The physical state of the elements changes from gas to solid.

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

21 Which pair of elements reacts together most violently?

A chlorine and lithium

B chlorine and potassium

C iodine and lithium

D iodine and potassium

22 Which is a typical property of transition elements?

A can act as catalysts

B poor electrical conductivity

C low melting point

D low density

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23 Helium is a noble gas.

Which statement about helium is correct?

A It has eight electrons in its outer shell.

B It is a diatomic gas.

C It is reactive.

D It is used for filling balloons.

24 Some properties of substance X are listed.

- It conducts electricity when molten.
- It has a high melting point.
- It burns in oxygen and the oxide dissolves in water to give a solution with pH 11.

What is X?

A a covalent compound

B a macromolecule

C a metal

D an ionic compound

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25 Four unknown metals, Q, R, S and T, are reacted with water, steam and dilute hydrochloric acid.

The results are shown in the table.

	reaction with water	reaction with steam	reaction with dilute hydrochloric acid
Q	slow reaction	fast reaction	fast reaction
R	no reaction	no reaction	no reaction
S	no reaction	very slow reaction	slow reaction
T	fast reaction	explodes	explodes

Which statements are correct?

1 R is the least reactive metal.

2 T could be potassium.

3 S is more reactive than Q and R.

4 Metals react faster with steam than they do with water.

A 1, 2 and 4 only

B 1 and 2 only

C 2 and 3 only

D 3 and 4 only

26 What is added to molten iron to make steel?

A small amounts of carbon

B limestone and coke

C calcium oxide and oxygen

D hematite and air

27 Which row describes the uses of aluminium, copper and mild steel?

	aluminium	copper	mild steel
A	aircraft bodies	electrical wiring	car bodies
B	car bodies	cooking utensils	electrical wiring
C	electrical wiring	aircraft bodies	food containers
D	food containers	aircraft bodies	cooking utensils

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[Turn over

28 River water contains soluble impurities, insoluble impurities and bacteria.

River water is made safe to drink by filtration and chlorination.

Which statement is correct?

A Filtration removes bacteria and insoluble impurities, and chlorination removes soluble impurities.

B Filtration removes insoluble impurities, and chlorination kills the bacteria.

C Filtration removes soluble and insoluble impurities, and chlorination kills the bacteria.

D Filtration removes soluble impurities and bacteria, and chlorination removes insoluble impurities.

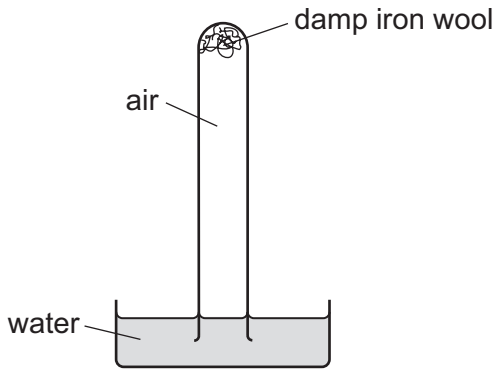
29 Clean, dry air contains nitrogen, oxygen and small amounts of other gases. The noble gases have been left out of the table.

Which row shows the composition of clean, dry air?

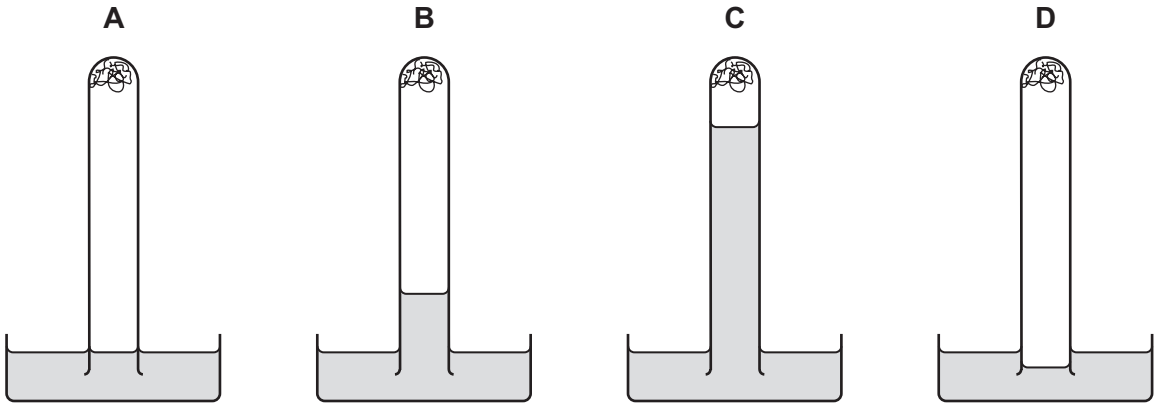
	nitrogen / %	oxygen / %	other gases
A	21	78	small amount of carbon dioxide
B	21	78	small amount of carbon monoxide
C	78	21	small amount of carbon dioxide
D	78	21	small amount of carbon monoxide

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30 The apparatus shown is set up and left for a week.



Which diagram shows the level of the water at the end of the week?



31 Farmers add calcium oxide (lime) and ammonium salts to their fields.

The compounds are not added at the same time because they react with each other.

Which gas is produced in this reaction?

A ammonia

B carbon dioxide

C hydrogen

D nitrogen

32 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

33 Which statement about the uses of sulfur dioxide is **not** correct?

A It is used as a bleach in the manufacture of paper.

B It is used as a food preservative.

C It is used in the manufacture of cement.

D It is used in the manufacture of sulfuric acid.

34 Which statement about limestone and lime is correct?

A Limestone combines with water to produce slaked lime.

B Lime is obtained from limestone by oxidation.

C Lime is used in the desulfurisation of flue gases.

D Lime is used in the treatment of alkaline soil.

35 Some fractions obtained from petroleum are listed.

	fraction	use	position collected in the fractionating column
1	gasoline	waxes and polishes	below refinery gas
2	bitumen	making roads	above kerosene
3	kerosene	jet fuel	below gasoline
4	refinery gas	heating and cooking	above gasoline

Which rows are correct?

A 1, 3 and 4

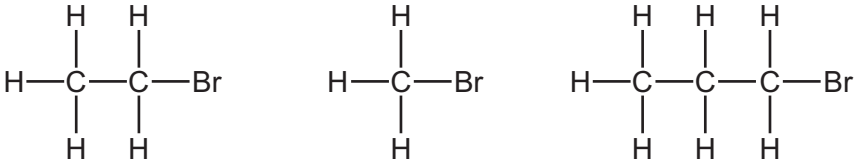
B 2, 3 and 4

C 3 and 4 only

D 4 only

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36 The structures of three compounds are shown.



Which statement explains why these three compounds have similar chemical properties?

A They all contain bromine, carbon and hydrogen.

B They all contain the same functional group.

C They are all carbon-based molecules.

D They are all saturated molecules.

37 Which statement about ethane is correct?

A It rapidly decolourises aqueous bromine.

B It does not burn.

C It forms long-chain compounds called polymers.

D It only contains single bonds between its atoms.

38 Which products are obtained by the cracking of an alkane?

	alkene	hydrogen	water
A	✓	✓	✓
B	✓	✓	✗
C	✓	✗	✓
D	✗	✓	✓

39 Which statement about an aqueous solution of ethanoic acid is correct?

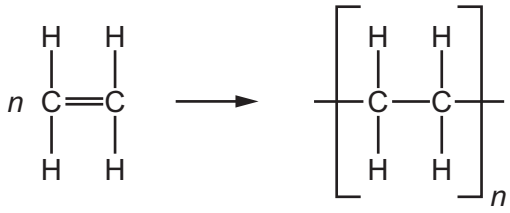
A It reacts with magnesium to form water as one of the products.

B It reacts with sodium carbonate to form carbon dioxide.

C It reacts with sodium hydroxide to form hydrogen.

D It turns red litmus paper blue.

40 The diagram shows the structure of a monomer and of the polymer made from it.



What are the monomer and polymer?

	monomer	polymer
A	ethane	poly(ethane)
B	ethane	poly(ethene)
C	ethene	poly(ethane)
D	ethene	poly(ethene)

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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.).