Cambridge Assessment International Education
Cambridge International General Certificate of Secondary Education

CHEMISTRY **0620/11**

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)

* 5 6 3 4 6 5 6 9 1 5 *

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 **14** printed pages and **2** blank pages.

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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 A fractionating column is used to separate the hydrocarbon fractions in petroleum by fractional distillation.

Which row describes the properties of the fractions that condense at the top of the fractionating column?

	size of molecule	boiling point
A	large	high
B	large	low
C	small	high
D	small	low

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4 Some information about solid silver chloride and solid sodium chloride is shown.

- Silver chloride and sodium chloride do not dissolve in kerosene.
- Silver chloride is insoluble in water but sodium chloride is soluble in water.
- The boiling point of silver chloride is 1547 °C and the boiling point of sodium chloride is 1413 °C.

Which processes are used to separate a mixture of solid silver chloride and solid sodium chloride?

A Add kerosene, stir and then filter.

B Add water, stir and then filter.

C Add water, stir and then leave to crystallise.

D Add water, stir and then perform fractional distillation.

5 A covalent molecule M contains four shared pairs of electrons.

What is M?

A ammonia, NH_3

B hydrogen chloride, HCl

C methane, CH_4

D water, H_2O

6 An isotope of chromium is represented by $^{52}_{24}Cr$.

Which statement about an atom of this isotope of chromium is correct?

A It contains 24 electrons.

B It contains 24 neutrons.

C It contains 28 protons.

D It contains 52 neutrons.

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7 Substances P and Q both conduct electricity.

P is a mixture of two different types of atom.

Q is made of only one type of atom.

Which row describes P and Q?

	P	Q
A	alloy	element
B	alloy	compound
C	compound	alloy
D	compound	element

8 Graphite is a form of carbon.

Why can graphite be used as a lubricant?

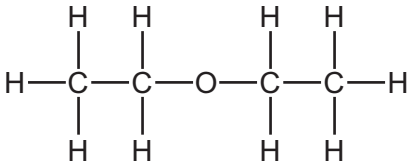
A Graphite contains unbonded electrons which move through the structure.

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 The structure of a molecule is shown.



What is the formula of the molecule?

A CHO **B** C_2H_5O **C** C_4H_8O **D** $C_4H_{10}O$

10 During the electrolysis of concentrated hydrochloric acid, gases are produced at both electrodes.

Which statement describes the test result for the gas collected at the negative electrode?

A It bleaches damp litmus paper.

B It burns with a ‘pop’.

C It relights a glowing splint.

D It turns limewater milky.

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11 Which statements about endothermic reactions are correct?

1 The energy of the products is greater than the energy of the reactants.

2 The energy of the reactants is greater than the energy of the products.

3 The temperature of the surroundings increases during the reaction.

4 The temperature of the surroundings decreases during the reaction.

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

12 Equations for the formation of anhydrous cobalt(II) chloride and anhydrous copper(II) sulfate are shown.

$$CoCl_2 \cdot 6H_2O \rightarrow CoCl_2 + 6H_2O$$

$$CuSO_4 \cdot 5H_2O \rightarrow CuSO_4 + 5H_2O$$

Which statement about the reactions is **not** correct?

A Both reactions are exothermic.

B Both reactions are reversible.

C Hydrated cobalt(II) chloride changes colour from pink to blue.

D Hydrated copper(II) sulfate changes colour from blue to white.

13 A method used to investigate the rate of reaction of calcium carbonate with dilute hydrochloric acid under different conditions is shown.

- Place 50 cm^3 of dilute hydrochloric acid in a conical flask.
- Add a known volume of water to the conical flask.
- Heat the conical flask to the required temperature.
- Add 1.0 g of calcium carbonate to the conical flask.
- Measure the time taken for the reaction to finish.

Which volume of water and which temperature gives the shortest time taken for the reaction to finish?

	volume of water added / cm^3	temperature / °C
A	10	30
B	10	50
C	40	30
D	40	50

14 Which is a chemical change?

A boiling water

B cooking an egg

C dissolving sugar

D melting ice cubes

15 Mercury(II) oxide, HgO, decomposes when heated.

The equation is shown.

$$2HgO \rightarrow 2Hg + O_2$$

Why is this a reduction reaction?

A The products weigh less than the reactants.

B There are fewer reactants than products.

C There is a gain of oxygen.

D There is a loss of oxygen.

16 Carbonic acid is a weak acid formed when carbon dioxide dissolves in water.

What is the pH of the solution?

A 1 **B** 5 **C** 7 **D** 9

17 Solid X is tested as shown.

reaction with dilute aqueous sodium hydroxide	flame test	reaction with dilute hydrochloric acid
no reaction	red flame	gas produced which turned limewater milky

What is X?

A copper(II) carbonate

B lithium carbonate

C potassium carbonate

D sodium sulfate

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18 Which oxide is basic?

A carbon dioxide

B sodium oxide

C sulfur dioxide

D water

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 set of elements shows the change from metallic to non-metallic character across a period of the Periodic Table?

A beryllium → magnesium → calcium

B fluorine → bromine → iodine

C oxygen → boron → lithium

D sodium → silicon → chlorine

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

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22 What is **not** a typical property of a transition element?

A acts as a catalyst

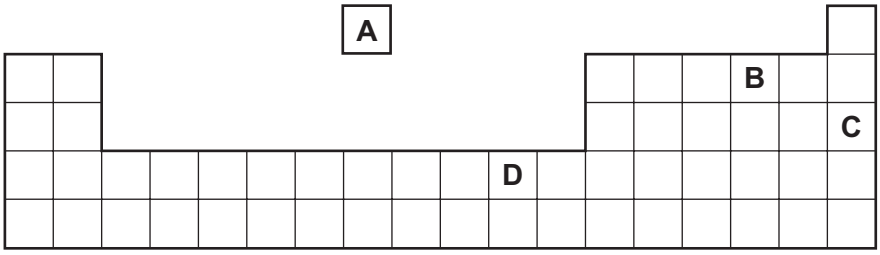
B forms coloured compounds

C has a high melting point

D has a low density

23 Part of the Periodic Table is shown.

Which element is used to provide an inert atmosphere?



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 different metals are reacted with an equal volume of dilute hydrochloric acid. The results of the reactions are shown.

metal	rate of effervescence
calcium	very high
copper	none
iron	low
magnesium	high

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

A iron → magnesium → calcium → copper

B magnesium → calcium → copper → iron

C copper → iron → magnesium → calcium

D calcium → magnesium → iron → copper

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

The equations for four different reactions are shown.

1 $4Fe + 3CO_2 \rightarrow 2Fe_2O_3 + 3C$

2 $CO_2 \rightarrow C + O_2$

3 $CO_2 + C \rightarrow 2CO$

4 $Fe_2O_3 + 3CO \rightarrow 2Fe + 3CO_2$

Which equations represent reactions that occur in the blast furnace?

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

27 Which statement is correct?

A Aluminium is used in the manufacture of aircraft because it has a high density.

B Copper is used for cooking utensils because it is a good conductor of heat.

C Mild steel is used for car bodies because it is resistant to corrosion.

D Stainless steel is used for cutlery because it is a conductor of electricity.

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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.

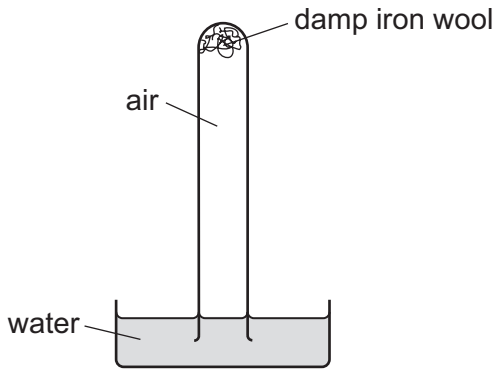
29 Clean, dry air contains nitrogen, oxygen and small amounts of other gases. The noble gases have been left out of the table.

Which row shows the composition of clean, dry air?

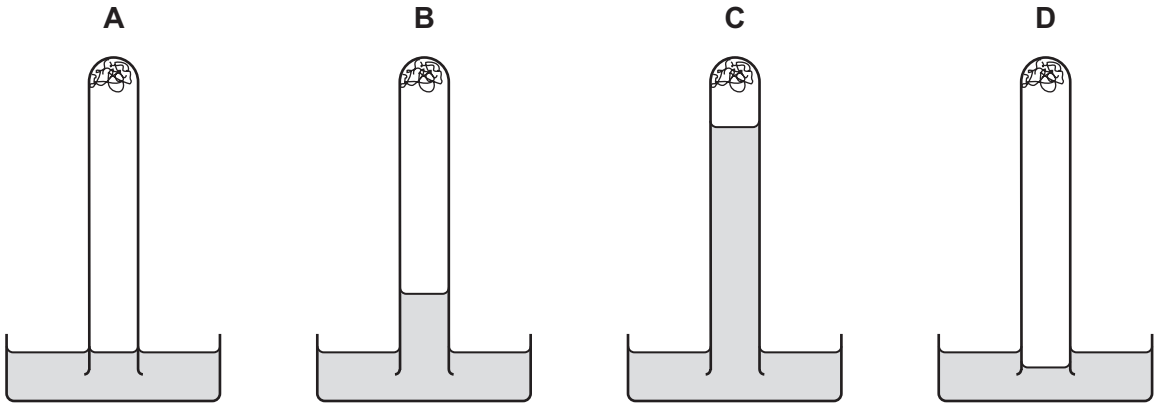
	nitrogen / %	oxygen / %	other gases
A	21	78	small amount of carbon dioxide
B	21	78	small amount of carbon monoxide
C	78	21	small amount of carbon dioxide
D	78	21	small amount of carbon monoxide

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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 What is **not** a use of sulfur dioxide?

A as a bleach

B as a food preservative

C in the manufacture of wood pulp for paper

D treating acidic soils

34 Which process is used to obtain lime from limestone?

A cracking

B fractional distillation

C neutralisation

D thermal decomposition

35 Petroleum is separated by fractional distillation.

Which statement about the fractions produced is correct?

A Bottled gas for heating and cooking is obtained from the naphtha fraction.

B Diesel oil is used as a fuel for jet aircraft.

C Substances used to make polishes are obtained from the lubricating fraction.

D The kerosene fraction contains many useful waxes.

36 Which compounds have similar chemical properties?

A butanol and butanoic acid

B ethane and ethene

C methane and butane

D propene and propanol

37 Which statement about a molecule of ethane is correct?

A An ethane molecule has at least one double covalent bond.

B It has C–H and C–O bonds.

C An ethane molecule has seven covalent bonds.

D Its bonds are formed by the transfer of electrons.

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

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

39 Which statements about aqueous ethanoic acid are correct?

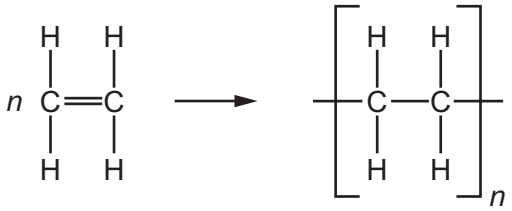
1 It has a pH value of 10.

2 It reacts with metal carbonates to produce carbon dioxide gas.

3 It reacts with magnesium metal to produce hydrogen gas.

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

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.).