



**Cambridge Assessment International Education**  
Cambridge International General Certificate of Secondary Education

**CHEMISTRY**

**0620/12**

Paper 1 Multiple Choice (Core)

**February/March 2019**

**45 minutes**

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

\* 3 8 6 9 7 8 7 3 5 8 \*

**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 Level 1/Level 2 Certificate.

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

1 Four processes are listed.

- 1 Brownian motion
- 2 condensation
- 3 diffusion
- 4 evaporation

Which processes involve a change of state?

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

2 A student measures the time taken for 2.0g of magnesium to dissolve in 50 cm<sup>3</sup> of dilute sulfuric acid.

Which apparatus is essential to complete the experiment?

- 1 stop-clock
- 2 measuring cylinder
- 3 thermometer
- 4 balance

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

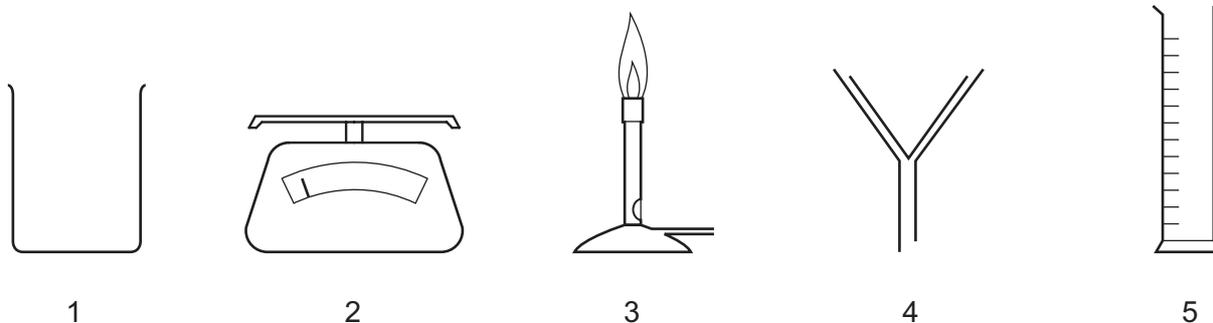
3 Which method should be used to separate a mixture of two liquids?

- A** crystallisation  
**B** electrolysis  
**C** filtration  
**D** fractional distillation

- 4 Lead(II) iodide is insoluble in water.

Lead(II) iodide is made by adding aqueous lead(II) nitrate to aqueous potassium iodide.

Which pieces of apparatus are needed to obtain solid lead(II) iodide from 20 cm<sup>3</sup> of aqueous lead(II) nitrate?



- A** 1, 2 and 4      **B** 1, 3 and 5      **C** 1, 4 and 5      **D** 2, 4 and 5

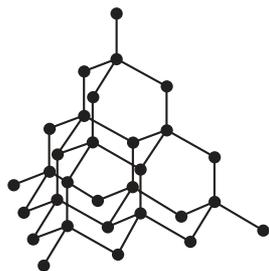
- 5 Which row describes isotopes of the same element?

	number of protons	number of neutrons
<b>A</b>	different	different
<b>B</b>	different	same
<b>C</b>	same	different
<b>D</b>	same	same

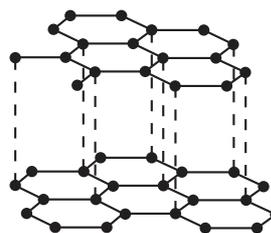
- 6 Which row describes the structure of the positive ion in sodium chloride?

	protons	electrons	neutrons
<b>A</b>	11	11	12
<b>B</b>	11	10	12
<b>C</b>	17	17	18
<b>D</b>	17	18	18

7 Which pair of statements about diamond and graphite is correct?



diamond

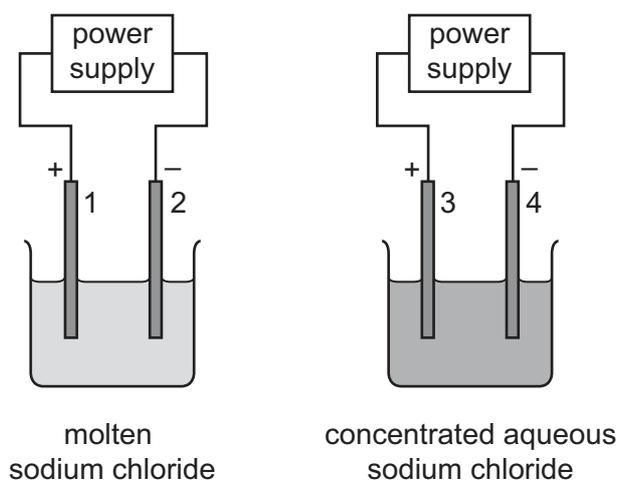


graphite

- A** Diamond and graphite are both pure carbon. They are both macromolecules.
- B** Diamond and graphite can both be used as electrodes. Graphite is also used as a lubricant.
- C** Diamond has covalent bonds. Graphite has ionic bonds.
- D** Diamond is hard with a high melting point. Graphite is soft with a low melting point.
- 8 What is the nucleon number of an atom?
- A** the number of neutrons
- B** the number of protons
- C** the total number of protons and neutrons
- D** the total number of protons and electrons
- 9 The relative formula mass,  $M_r$ , of calcium carbonate,  $\text{CaCO}_3$ , is 100.
- What is the mass of carbon present in 100 g of calcium carbonate?
- A** 12 g                      **B** 36 g                      **C** 40 g                      **D** 60 g

10 Two electrolysis experiments were carried out as shown.

The graphite electrodes are labelled 1–4.



Which row describes the products at the electrodes in these experiments?

	electrode 1	electrode 2	electrode 3	electrode 4
<b>A</b>	chlorine	hydrogen	chlorine	hydrogen
<b>B</b>	chlorine	sodium	chlorine	hydrogen
<b>C</b>	chlorine	sodium	hydrogen	chlorine
<b>D</b>	sodium	chlorine	sodium	chlorine

11 10g of ammonium nitrate is added to water at 25 °C and the mixture stirred.

The ammonium nitrate dissolves and, after one minute, the temperature of the solution is 10 °C.

Which word describes this change?

- A** endothermic
- B** exothermic
- C** neutralisation
- D** reduction

12 Which process involves a chemical change?

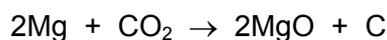
- A** dissolving copper(II) sulfate
- B** distilling ethanol
- C** freezing water
- D** neutralising copper(II) oxide

- 13 Lumps of limestone react with dilute hydrochloric acid according to the equation shown.



Which change in conditions decreases the rate of the reaction?

- A increase the concentration of the acid
  - B increase the volume of the acid
  - C increase the size of the lumps of limestone
  - D increase the temperature
- 14 Which reaction is reversible?
- A  $\text{Cu} + \text{ZnSO}_4 \rightarrow \text{CuSO}_4 + \text{Zn}$
  - B  $\text{CuO} + \text{H}_2\text{SO}_4 \rightarrow \text{CuSO}_4 + \text{H}_2\text{O}$
  - C  $\text{CuO} + \text{H}_2 \rightarrow \text{Cu} + \text{H}_2\text{O}$
  - D  $\text{CuSO}_4 \cdot 5\text{H}_2\text{O} \rightarrow \text{CuSO}_4 + 5\text{H}_2\text{O}$
- 15 The reaction between magnesium and carbon dioxide is shown in the equation.



Which statement describes what happens in this reaction?

- A Carbon is oxidised.
  - B Magnesium is reduced.
  - C Neither oxidation nor reduction happens.
  - D The carbon in carbon dioxide is reduced.
- 16 Barium hydroxide is an alkali. It reacts with hydrochloric acid.
- How does the pH of the hydrochloric acid change as an excess of aqueous barium hydroxide is added?
- A The pH decreases from pH 14 and becomes constant at pH 7.
  - B The pH decreases from pH 14 to about pH 1.
  - C The pH increases from pH 1 and becomes constant at pH 7.
  - D The pH increases from pH 1 to about pH 14.

- 17 Copper(II) sulfate crystals are blue. They are made by adding an excess of copper(II) oxide to sulfuric acid.

The mixture is heated and stirred.

It is then filtered and the filtrate is allowed to evaporate, leaving blue crystals.

Why is filtration necessary?

- A to remove soluble properties
  - B to remove sulfuric acid
  - C to remove the blue crystals
  - D to remove unreacted copper(II) oxide
- 18 The results of two tests on an aqueous solution of X are shown.

test	observation
aqueous sodium hydroxide added	green precipitate formed
acidified aqueous silver nitrate added	yellow precipitate formed

What is X?

- A copper(II) chloride
  - B copper(II) iodide
  - C iron(II) chloride
  - D iron(II) iodide
- 19 Information about the solubility in water of four oxides is shown.

Which oxide, when added to water, gives a solution with a pH less than pH7?

	name of oxide	solubility in water
A	nitrogen dioxide	soluble
B	copper(II) oxide	insoluble
C	silicon(IV) oxide	insoluble
D	barium oxide	soluble

20 The elements sodium to argon form Period 3 of the Periodic Table.

Which row describes the trend across Period 3 from left to right?

	number of outer shell electrons	metallic character	group number
<b>A</b>	decreases	decreases	decreases
<b>B</b>	decreases	increases	decreases
<b>C</b>	increases	decreases	increases
<b>D</b>	increases	increases	increases

21 Astatine is below iodine in Group VII in the Periodic Table.

Which row describes the properties of astatine?

	state at room temperature	reactivity
<b>A</b>	gas	displaces chlorine, bromine and iodine
<b>B</b>	gas	displaces iodine but does not displace chlorine or bromine
<b>C</b>	solid	displaces iodine but does not displace chlorine or bromine
<b>D</b>	solid	does not displace chlorine, bromine or iodine

22 Which row describes a transition element?

	density in g/cm <sup>3</sup>	colour of chloride
<b>A</b>	0.98	green
<b>B</b>	0.98	white
<b>C</b>	8.90	green
<b>D</b>	8.90	white

23 Which statement explains why elements in Group VIII of the Periodic Table are unreactive?

- A** They are monatomic gases.
- B** They form stable diatomic molecules.
- C** They have a full outer shell of electrons.
- D** They share electrons with each other.

24 The electrical conductivity of magnesium was tested.

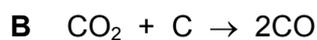
Magnesium was then added to dilute sulfuric acid and a gas, Q, was produced.

Which row is correct?

	electrical conductivity of magnesium	gas Q
<b>A</b>	good	hydrogen
<b>B</b>	good	oxygen
<b>C</b>	poor	hydrogen
<b>D</b>	poor	oxygen

25 Four reactions that take place in the blast furnace to produce iron are shown.

Which reaction is used to keep the furnace hot?



26 The list gives the order of some metals and hydrogen in the reactivity series.

Metal X is also included.

most reactive    K  
                                  Mg  
                                  Zn  
                                  H  
                                  X  
 least reactive    Cu

Which row correctly shows the properties of metal X?

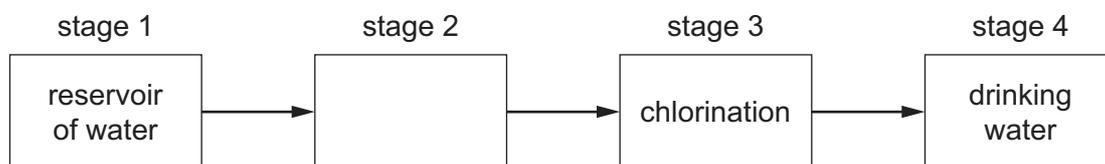
	reacts with dilute acids	oxide reduced by carbon
<b>A</b>	no	no
<b>B</b>	no	yes
<b>C</b>	yes	no
<b>D</b>	yes	yes

27 The properties of four elements are shown.

Which element is used to make aircraft bodies?

	density	brittle or malleable
<b>A</b>	high	brittle
<b>B</b>	high	malleable
<b>C</b>	low	brittle
<b>D</b>	low	malleable

28 The diagram shows how water is treated to make it suitable for drinking.



What happens in stage 2?

- A** condensation
- B** sublimation
- C** evaporation
- D** filtration

29 A farmer treats a field with calcium hydroxide to make it less acidic.

When the farmer adds ammonium nitrate fertiliser to the field immediately after the calcium hydroxide, they react.

Why does this reaction make the fertiliser less effective?

- A** It makes ammonia gas, so less nitrogen is absorbed by the soil.
- B** It makes an acid, making the soil acidic again.
- C** It makes nitrogen gas, so less nitrogen is absorbed by the soil.
- D** It makes the fertiliser too strong, stopping the plants growing so well.

30 Which row showing an air pollutant and its major source is **not** correct?

	pollutant	major source of pollutant
<b>A</b>	carbon monoxide	complete combustion of carbon fuels
<b>B</b>	lead compounds	leaded petrol
<b>C</b>	oxides of nitrogen	car engines
<b>D</b>	sulfur dioxide	fossil fuels containing sulfur

31 Which substances are needed for iron to rust?

- A** carbon dioxide and oxygen
- B** oxygen only
- C** water and carbon dioxide
- D** water and oxygen

32 Methane and carbon dioxide are both greenhouse gases.

Which row identifies a source of methane and a source of carbon dioxide?

	source of methane	source of carbon dioxide
<b>A</b>	decomposition of vegetation	hydrogen car exhausts
<b>B</b>	digestion in animals	diesel car exhausts
<b>C</b>	petrol car exhausts	decomposition of vegetation
<b>D</b>	respiration	petrol car exhausts

33 Which element has an oxide that is used as a food preservative?

- A** helium
- B** hydrogen
- C** iron
- D** sulfur

34 Lime is made by heating limestone.

Which equation represents this reaction?

- A  $\text{CaCO}_3 \rightarrow \text{Ca} + \text{O}_2 + \text{CO}$   
 B  $\text{CaCO}_3 \rightarrow \text{CaO} + \text{CO}_2$   
 C  $\text{CaCO}_3 + \text{H}_2\text{O} \rightarrow \text{CaO} + \text{H}_2\text{CO}_3$   
 D  $\text{CaCO}_3 + \text{H}_2\text{O} \rightarrow \text{Ca(OH)}_2 + \text{CO}_2$

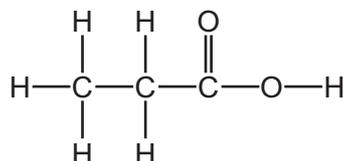
35 Most objects made from synthetic polymers last for many years.

Why do these polymers last for so long?

	chemically unreactive	biodegradable
<b>A</b>	no	no
<b>B</b>	no	yes
<b>C</b>	yes	no
<b>D</b>	yes	yes

36 The structure of a compound, G, is shown.

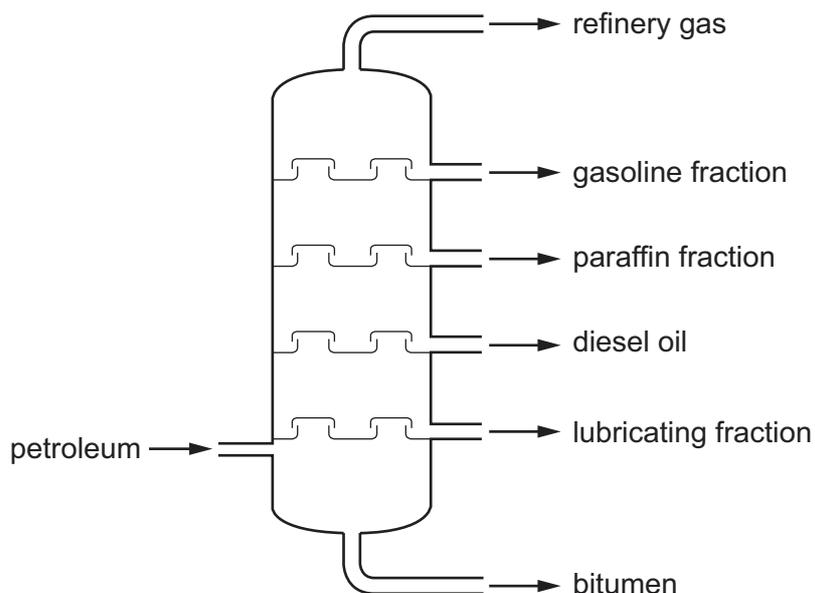
G is in the same homologous series as ethanoic acid.



Which row describes some of the properties of an aqueous solution of G?

	produces a gas with magnesium	turns methyl orange yellow
<b>A</b>	no	yes
<b>B</b>	no	no
<b>C</b>	yes	no
<b>D</b>	yes	yes

37 The fractional distillation of petroleum is shown.



Which fraction is the least volatile?

- A bitumen
- B diesel oil
- C gasoline fraction
- D refinery gas

38 Which row shows the properties of methane?

	soluble in water	state at room temperature	gives a positive test with aqueous bromine
<b>A</b>	no	gas	no
<b>B</b>	no	gas	yes
<b>C</b>	yes	liquid	no
<b>D</b>	yes	liquid	yes

39 The formulae of five compounds are listed.

- 1  $C_4H_{10}$
- 2  $C_2H_5OH$
- 3  $C_4H_9OH$
- 4  $C_4H_9COOH$
- 5  $C_5H_{11}OH$

Which compounds are in the same homologous series?

- A 1, 3 and 4 only
  - B 2, 3 and 5 only
  - C 3 and 4 only
  - D 3 and 5 only
- 40 Which process is used to make an alkene from a long-chain alkane?
- A combustion
  - B condensation
  - C cracking
  - D polymerisation

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The Periodic Table of Elements

		Group															
I	II	III	IV	V	VI	VII	VIII										
3 <b>Li</b> lithium 7	4 <b>Be</b> beryllium 9	<div style="border: 1px solid black; padding: 5px; text-align: center;"> <b>Key</b>                      atomic number                      atomic symbol                      name                      relative atomic mass                 </div>										2 <b>He</b> helium 4					
11 <b>Na</b> sodium 23	12 <b>Mg</b> magnesium 24											5 <b>B</b> boron 11	6 <b>C</b> carbon 12	7 <b>N</b> nitrogen 14	8 <b>O</b> oxygen 16	9 <b>F</b> fluorine 19	10 <b>Ne</b> neon 20
19 <b>K</b> potassium 39	20 <b>Ca</b> calcium 40	21 <b>Sc</b> scandium 45	22 <b>Ti</b> titanium 48	23 <b>V</b> vanadium 51	24 <b>Cr</b> chromium 52	25 <b>Mn</b> manganese 55	26 <b>Fe</b> iron 56	27 <b>Co</b> cobalt 59	28 <b>Ni</b> nickel 59	29 <b>Cu</b> copper 64	30 <b>Zn</b> zinc 65	31 <b>Ga</b> gallium 70	32 <b>Ge</b> germanium 73	33 <b>As</b> arsenic 75	34 <b>Se</b> selenium 79	35 <b>Br</b> bromine 80	36 <b>Kr</b> krypton 84
37 <b>Rb</b> rubidium 85	38 <b>Sr</b> strontium 88	39 <b>Y</b> yttrium 89	40 <b>Zr</b> zirconium 91	41 <b>Nb</b> niobium 93	42 <b>Mo</b> molybdenum 96	43 <b>Tc</b> technetium —	44 <b>Ru</b> ruthenium 101	45 <b>Rh</b> rhodium 103	46 <b>Pd</b> palladium 106	47 <b>Ag</b> silver 108	48 <b>Cd</b> cadmium 112	49 <b>In</b> indium 115	50 <b>Sn</b> tin 119	51 <b>Sb</b> antimony 122	52 <b>Te</b> tellurium 128	53 <b>I</b> iodine 127	54 <b>Xe</b> xenon 131
55 <b>Cs</b> caesium 133	56 <b>Ba</b> barium 137	57–71 lanthanoids	72 <b>Hf</b> hafnium 178	73 <b>Ta</b> tantalum 181	74 <b>W</b> tungsten 184	75 <b>Re</b> rhenium 186	76 <b>Os</b> osmium 190	77 <b>Ir</b> iridium 192	78 <b>Pt</b> platinum 195	79 <b>Au</b> gold 197	80 <b>Hg</b> mercury 201	81 <b>Tl</b> thallium 204	82 <b>Pb</b> lead 207	83 <b>Bi</b> bismuth 209	84 <b>Po</b> polonium —	85 <b>At</b> astatine —	86 <b>Rn</b> radon —
87 <b>Fr</b> francium —	88 <b>Ra</b> radium —	89–103 actinoids	104 <b>Rf</b> rutherfordium —	105 <b>Db</b> dubnium —	106 <b>Sg</b> seaborgium —	107 <b>Bh</b> bohrium —	108 <b>Hs</b> hassium —	109 <b>Mt</b> meitnerium —	110 <b>Ds</b> darmstadtium —	111 <b>Rg</b> roentgenium —	112 <b>Cn</b> copernicium —	114 <b>Fl</b> flerovium —	116 <b>Lv</b> livermorium —	—	—	—	—

lanthanoids	57 <b>La</b> lanthanum 139	58 <b>Ce</b> cerium 140	59 <b>Pr</b> praseodymium 141	60 <b>Nd</b> neodymium 144	61 <b>Pm</b> promethium —	62 <b>Sm</b> samarium 150	63 <b>Eu</b> europium 152	64 <b>Gd</b> gadolinium 157	65 <b>Tb</b> terbium 159	66 <b>Dy</b> dysprosium 163	67 <b>Ho</b> holmium 165	68 <b>Er</b> erbium 167	69 <b>Tm</b> thulium 169	70 <b>Yb</b> ytterbium 173	71 <b>Lu</b> lutetium 175
actinoids	89 <b>Ac</b> actinium —	90 <b>Th</b> thorium 232	91 <b>Pa</b> protactinium 231	92 <b>U</b> uranium 238	93 <b>Np</b> neptunium —	94 <b>Pu</b> plutonium —	95 <b>Am</b> americium —	96 <b>Cm</b> curium —	97 <b>Bk</b> berkelium —	98 <b>Cf</b> californium —	99 <b>Es</b> einsteinium —	100 <b>Fm</b> fermium —	101 <b>Md</b> mendelevium —	102 <b>No</b> nobelium —	103 <b>Lr</b> lawrencium —

The volume of one mole of any gas is 24 dm<sup>3</sup> at room temperature and pressure (r.t.p.).