



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)

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

- 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 cm³ 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

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 $^{52}_{24}\text{Cr}$.

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.

- 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.

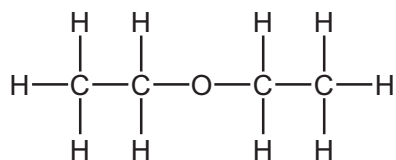
Which row describes P and Q?

	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?

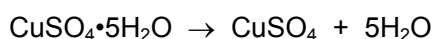
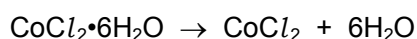
- A** CHO **B** C₂H₅O **C** C₄H₈O **D** C₄H₁₀O
- 10 During the electrolysis of concentrated hydrochloric acid, gases are produced at both electrodes.
- Which statement describes the test result for the gas collected at the negative electrode?
- A** It bleaches damp litmus paper.
- B** It burns with a 'pop'.
- C** It relights a glowing splint.
- D** It turns limewater milky.

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.



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 cm³ 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?

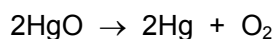
	volume of water added / cm ³	temperature / °C
A	10	30
B	10	50
C	40	30
D	40	50

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.



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

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

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?

A simplified periodic table with 18 columns and 4 rows. The columns are grouped into four sets of three. The first set (columns 1-3) has 2 elements in the first row and 3 in the others. The second set (columns 4-6) has 1 element in the first row and 3 in the others. The third set (columns 7-9) has 2 elements in the first row and 3 in the others. The fourth set (columns 10-18) has 2 elements in the first row and 3 in the others. The elements are labeled A, B, C, and D. A is in the first row, column 4. B is in the first row, column 10. C is in the second row, column 18. D is in the third row, column 9.

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

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

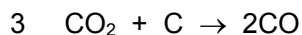
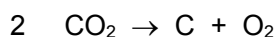
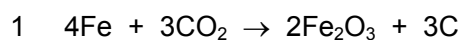
metal	rate of effervescence
calcium	very high
copper	none
iron	low
magnesium	high

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.



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.

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

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

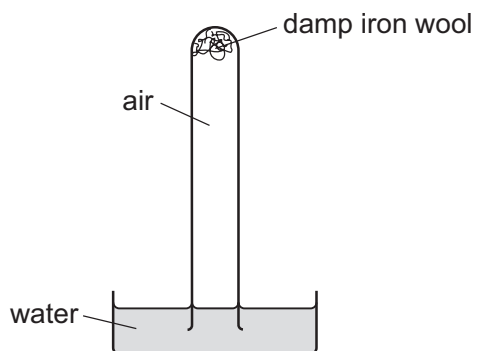
Which statement is correct?

- 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.

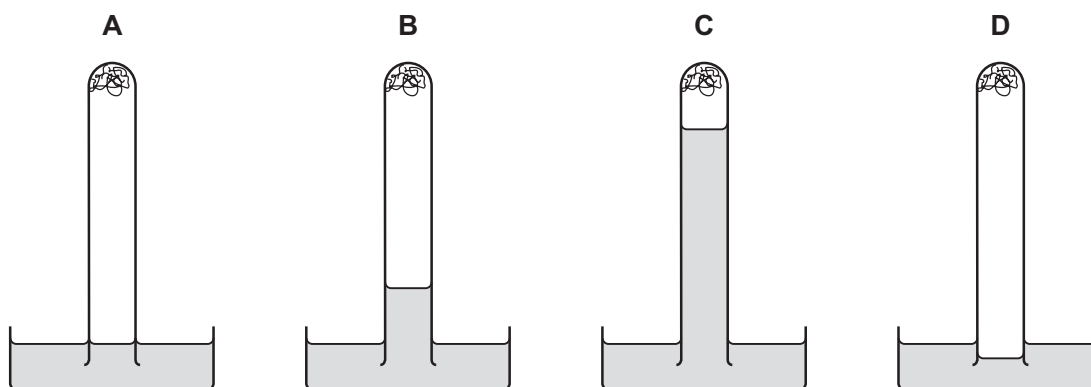
Which row shows the composition of clean, dry air?

	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

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	✓	x	key ✓ = true x = false
B	greenhouse gas	✓	✓	
C	present in unpolluted air	x	x	
D	produced during respiration	x	✓	

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.

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

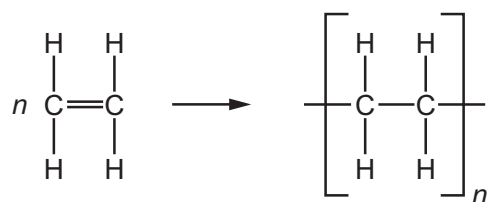
	alkene	hydrogen	water
A	✓	✓	✓
B	✓	✓	x
C	✓	x	✓
D	x	✓	✓

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										
		Key atomic number atomic symbol name relative atomic mass												1 H hydrogen 1													
3	4													5	6	7	8	9									
Li lithium 7	Be beryllium 9													B boron 11	C carbon 12	N nitrogen 14	O oxygen 16	F fluorine 19	He helium 4								
11	12													13	14	15	16	17	18								
Na sodium 23	Mg magnesium 24													Al aluminium 27	Si silicon 28	P phosphorus 31	S sulfur 32	Cl chlorine 35.5	Ar argon 40								
19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36										
K potassium 39	Ca calcium 40	Sc scandium 45	Ti titanium 48	V vanadium 51	Cr chromium 52	Mn manganese 55	Fe iron 56	Co cobalt 59	Ni nickel 59	Cu copper 64	Zn zinc 65	Ga gallium 70	Ge germanium 73	As arsenic 75	Se selenium 79	Br bromine 80	Kr krypton 84										
37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54										
Rb rubidium 85	Sr strontium 88	Y yttrium 89	Zr zirconium 91	Nb niobium 93	Mo molybdenum 96	Tc technetium —	Ru ruthenium 101	Rh rhodium 103	Pd palladium 106	Ag silver 108	Cd cadmium 112	In indium 115	Sn tin 119	Sb antimony 122	Te tellurium 128	I iodine 127	Xe xenon 131										
55	56	57–71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86										
Cs caesium 133	Ba barium 137	lanthanoids	Hf hafnium 178	Ta tantalum 181	W tungsten 184	Re rhenium 186	Os osmium 190	Ir iridium 192	Pt platinum 195	Au gold 197	Hg mercury 201	Tl thallium 204	Pb lead 207	Bi bismuth 209	Po polonium —	At astatine —	Rn radon —										
87	88	89–103	104	105	106	107	108	109	110	111	112		114		116												
Fr francium —	Ra radium —	actinoids	Rf rutherfordium —	Db dubnium —	Sg seaborgium —	Bh bohrium —	Hs hassium —	Mt meitnerium —	Ds darmstadtium —	Rg roentgenium —	Cn copernicium —		Fl flerovium —	Lv livermorium —													

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 dm³ at room temperature and pressure (r.t.p.).

