

Cambridge Assessment International Education

Cambridge International General Certificate of Secondary Education

CHEMISTRY 0620/11

Paper 1 Multiple Choice (Core) May/June 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 Level1/Level 2 Certificate.

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



1 Sodium chloride is a liquid at 900 °C.

How are the particles arranged and how do the particles move in sodium chloride at 900 °C?

	arrangement of particles	motion of particles
Α	regular	vibrate about a fixed point
В	regular	move randomly
С	random	vibrate about a fixed point
D	random	move randomly

2 2.00 g of powdered calcium carbonate is added to 50.0 cm³ of hydrochloric acid.

Which apparatus is used to measure the calcium carbonate and the hydrochloric acid?

	calcium carbonate	hydrochloric acid
Α	balance	burette
В	balance	thermometer
С	pipette	burette
D	pipette	thermometer

3 Rock salt is a mixture of sand and sodium chloride.

Sodium chloride is soluble in water but not in hexane.

Sand is insoluble in both water and hexane.

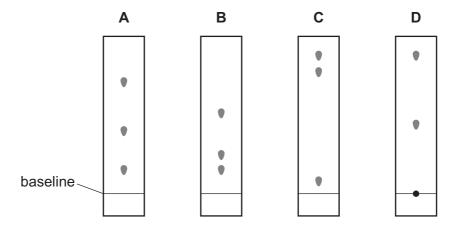
What is required to separate the sand from the sodium chloride?

- 1 filter paper
- 2 fractionating column
- 3 hexane
- 4 water

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

4 The colours in four dyes are separated using chromatography.

Which chromatogram shows an insoluble colour?



- **5** Which statement about an atom of fluorine, ¹⁹₉F, is correct?
 - **A** It contains more protons than neutrons.
 - **B** It contains a total of 28 protons, neutrons and electrons.
 - **C** Its isotopes contain different numbers of protons.
 - **D** Its nucleus contains 9 neutrons.
- **6** Calcium reacts with chlorine to produce calcium chloride.

What happens when a calcium ion forms during this reaction?

- **A** The calcium atom gains one electron.
- **B** The calcium atom gains two electrons.
- **C** The calcium atom loses one electron.
- **D** The calcium atom loses two electrons.
- 7 Which row describes the formation of single covalent bonds in methane?

A	atoms share a pair of electrons	both atoms gain a noble gas electronic structure
В	atoms share a pair of electrons	both atoms have the same number of electrons in their outer shell
С	electrons are transferred from one atom to another	both atoms gain a noble gas electronic structure
D	electrons are transferred from one atom to another	both atoms have the same number of electrons in their outer shell

8 Diamond and graphite have giant covalent structures of carbon atoms.

Which statement describes graphite?

- **A** It has a strong, rigid three-dimensional structure.
- **B** It has four strong covalent bonds between each carbon atom.
- **C** It has layers, which can slide over each other.
- **D** It has no free electrons, so does not conduct electricity.
- **9** The compound magnesium nitrate has the formula $Mg(NO_3)_2$.

What is the relative formula mass of magnesium nitrate?

- **A** 86
- **B** 134
- **C** 148
- **D** 172

10 Four substances are electrolysed using inert electrodes.

Which row describes the electrode products?

	substance	anode product	cathode product
Α	concentrated aqueous sodium chloride	hydrogen	chlorine
В	concentrated hydrochloric acid	chlorine	oxygen
С	dilute sulfuric acid	oxygen	hydrogen
D	molten lead bromide	lead	bromine

11 Dissolving ammonium chloride in water is an endothermic change.

Which row shows the energy change and temperature change of the mixture during the dissolving of ammonium chloride?

	energy change	temperature change
Α	energy is absorbed	decrease
В	energy is absorbed	increase
С	energy is released	decrease
D	energy is released	increase

- **12** Which process is a physical change?
 - A burning wood
 - **B** cooking an egg
 - **C** melting an ice cube
 - **D** rusting iron

13 Hydrogen peroxide solution decomposes very slowly at room temperature to produce oxygen gas. This gas forms a rising foam when liquid detergent is added.

Five test-tubes are half filled with hydrogen peroxide solution. A drop of liquid detergent is added to each one.

Different metal oxides are added to four of the test-tubes and the height of the foam formed after 1 minute is measured. The results are shown.

metal oxide	height of foam/cm
no metal oxide added	0.1
aluminium oxide	0.1
calcium oxide	0.2
copper(II) oxide	2.3
manganese(IV) oxide	5.4

Which conclusion can be drawn from these results?

- A Metal oxides do not affect the rate of this reaction.
- **B** All metal oxides increase the rate of this reaction and act as catalysts.
- **C** Manganese(IV) oxide is the best catalyst of the four metal oxides tested.
- **D** Only transition element oxides increase the rate of this reaction.
- 14 When blue-green crystals of nickel(II) sulfate are heated, water is produced and a yellow solid remains. When water is added to the yellow solid, the blue-green colour returns.

Which process describes these changes?

- **A** combustion
- **B** corrosion
- **C** neutralisation
- **D** reversible reaction

15 In a blast furnace, iron is extracted when iron(III) oxide reacts with carbon monoxide.

The equation is shown.

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

Which substance is oxidised and which is reduced?

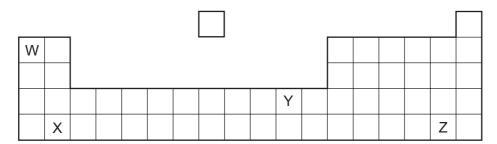
	oxidised	reduced
Α	СО	Fe ₂ O ₃
В	CO ₂	Fe
С	Fe	CO ₂
D	Fe ₂ O ₃	СО

16 Four different solutions are separately tested with blue litmus and with methyl orange. Each solution is known to be either acidic or alkaline. The results are shown.

solution	result with blue litmus	result with methyl orange
1	red	red
2	red	yellow
3	blue	yellow
4	blue	yellow

Which statement is correct?

- A Solutions 1 and 4 are acidic.
- **B** Solutions 1 and 2 are alkaline.
- **C** Solutions 3 and 4 are alkaline.
- **D** Solutions 3 and 4 are acidic.
- 17 The positions of elements W, X, Y and Z in the Periodic Table are shown.



Which elements form basic oxides?

A W, X and Y **B** W and X only **C** Y only **D** Z only

- 18 How could crystals of a pure salt be prepared from dilute sulfuric acid?
 - A add an excess of aqueous sodium hydroxide, filter, evaporate the filtrate to crystallisation point
 - **B** add an excess of copper(II) carbonate, filter, evaporate the filtrate to dryness
 - **C** add an excess of copper metal, filter, evaporate the filtrate to crystallisation point
 - **D** add an excess of zinc oxide, filter, evaporate the filtrate to crystallisation point
- **19** The results of two tests on a solution of compound Q are shown.

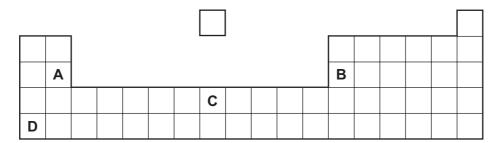
test	observation
add ammonia solution	green precipitate formed
add dilute nitric acid followed by aqueous barium nitrate	white precipitate formed

What is Q?

- A iron(II) chloride
- **B** iron(II) sulfate
- **C** iron(III) chloride
- **D** iron(III) sulfate
- **20** The properties of an element are shown.

electrical conductivity	density	reaction with water
high	low	reacts violently with cold water

Which element has these properties?

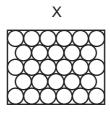


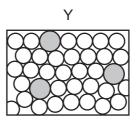
- 21 Which statement about elements in Group I and Group VII of the Periodic Table is correct?
 - **A** Bromine reacts with potassium chloride to produce chlorine.
 - **B** lodine is a monoatomic non-metal.
 - **C** Lithium has a higher melting point than potassium.
 - **D** Sodium is more reactive with water than potassium.

22 Which row describes the properties of a transition element?

	melting point	density	forms coloured compounds
Α	high	low	no
В	high	high	yes
С	low	low	no
D	low	low	yes

- 23 Which statement about elements in Group VIII of the Periodic Table is correct?
 - A They all have a full outer shell of electrons.
 - **B** They all react with Group I elements to form ionic compounds.
 - **C** They are all diatomic molecules.
 - **D** They are all liquids at room temperature.
- 24 The diagrams show the structure of two substances used to make electrical conductors.





Which statement correctly describes X and Y?

- **A** X is a pure metal and Y is a compound.
- **B** X is a pure metal and Y is an alloy.
- **C** X is a solid and Y is a liquid.
- **D** X is harder and stronger than Y.

25 The reactions of three metals, P, Q and R, are shown.

	metal reacts with dilute hydrochloric acid	metal reacts with water
Р	yes	no
Q	no	no
R	yes	yes

What is the order of reactivity of the metals?

	most reactive		least reactive
Α	Р	Q	R
В	Q	R	Р
С	R	Q	Р
D	R	Р	Q

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

Hematite, coke, limestone and hot air are added to the furnace.

Which explanation is **not** correct?

- **A** Coke burns and produces a high temperature.
- **B** Hematite is the ore containing the iron as iron(III) oxide.
- **C** Hot air provides the oxygen for the burning.
- **D** Limestone reduces the iron(III) oxide to iron.
- 27 Why is aluminium used to make containers for storing food?
 - A It conducts electricity.
 - **B** It has a high melting point.
 - C It is resistant to corrosion.
 - **D** It is strong.

28 Water can be treated by filtration then chlorination.

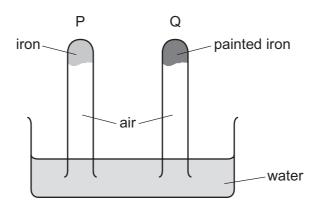
Which uses do **not** need water of this quality?

- 1 water for cooling in industry
- 2 water for washing clothes
- 3 water for drinking
- **A** 1, 2 and 3
- **B** 1 and 2 only
- 1 and 3 only **D**
- D 2 and 3 only

- **29** Four sources of air pollution are listed.
 - 1 burning fossil fuels containing sulfur
 - 2 nitrogen reacting with oxygen in car engines
 - 3 incomplete combustion of carbon fuels
 - 4 adding lead compounds to petrol

Which sources produce acid rain?

- A 1 and 2
- **B** 1 and 3
- **C** 2 and 3
- **D** 3 and 4
- **30** The diagram shows an experiment to investigate how paint affects the rusting of iron.

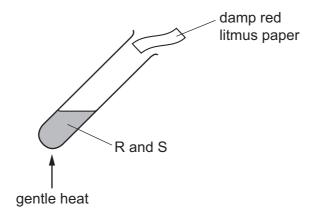


What happens to the water level in tubes P and Q?

	tube P	tube Q
Α	falls	rises
В	no change	rises
С	rises	falls
D	rises	no change

31 A mixture of two substances, R and S, is heated.

The damp red litmus paper turns blue.



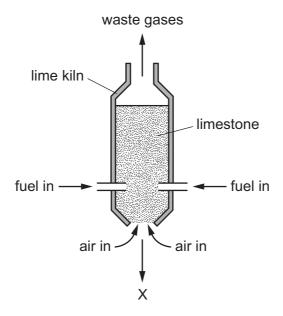
What are R and S?

	R	S
Α	a basic oxide	ammonium chloride
В	a basic oxide	sodium nitrate
С	an acidic oxide	ammonium chloride
D	an acidic oxide	sodium nitrate

32 Which statement describes a disadvantage of sulfur dioxide?

- **A** It can be used as a bleach when making wood pulp.
- **B** It can be used to kill bacteria in food.
- **C** It can be used to manufacture sulfuric acid.
- **D** It dissolves in water to form acid rain.

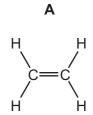
33 The diagram represents a lime kiln used to heat limestone to a very high temperature.

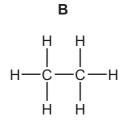


What leaves the kiln at X?

- A calcium carbonate
- B calcium hydroxide
- C calcium oxide
- **D** calcium sulfate

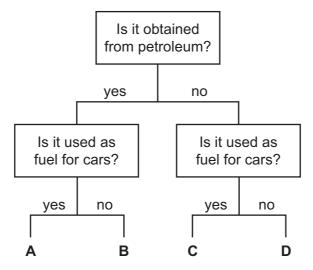
34 What is the structure of ethanol?





C

35 Which fuel could be gasoline?



36 A hydrocarbon W burns to form carbon dioxide and water.

W decolourises bromine water.

What is the name of W and what is its structure?

	name of W	structure of W
A	ethane	п—С— п—С—п п—С—п
В	ethane	H C H
С	ethene	т п—О—т п—О—т п
D	ethene	H H

not.

37	Wh	y is ethar	nol a memb	er of the homolo	gou	s series of alcoh	iols b	out propane is not ?
	Α	Ethanol	has two ca	rbon atoms per	mole	cule but propan	e ha	s three.
	В	Ethanol	can be mad	de from ethene l	but p	ropane is obtair	ned fr	om petroleum.
	С	Ethanol	is a liquid b	out propane is a	gas.			
	D	Ethanol	contains th	e same function	al gr	oup as other ald	ohol	s but propane does
38	Wh	ich stater	ments abou	t ethanol are co	rrect	?		
		1	It can be m	nade by ferment	ation	l .		
		2	It is an uns	aturated compo	und.			
		3	It burns in	air and can be ι	ısed	as a fuel.		
	Α	1, 2 and	3 B	1 and 2 only	С	1 and 3 only	D	2 and 3 only
39	Wh	ich stater	nents abou	t aqueous ethar	oic a	acid are correct?	>	
		1	Ethanoic a	cid contains the	func	ctional group –C	00F	I.
		2	Ethanoic a	cid reacts with o	carbo	nates to produc	e hy	drogen.
		3	Ethanoic a	cid turns Univer	sal l	ndicator paper b	lue.	
		4	Ethanoic a	cid has a pH lov	ver t	nan pH 7.		
	Α	1 and 2	В	1 and 3	С	1 and 4	D	2 and 4
40	Wh	ich natura	ally occurrin	ng polymers are	foun	d in foods?		
		1	complex ca	arbohydrates				
		2	nylon					
		3	salts					
		4	proteins					
	Α	1 and 2	В	1 and 4	С	2 and 3	D	3 and 4

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The Periodic Table of Elements

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	=			6	ш	fluorine 19	17	Cl	chlorine 35.5	35	Ŗ	bromine 80	53	Н	iodine 127	85	¥	astatine -			
	5			80	0	oxygen 16	16	S	sulfur 32	34	Se	selenium 79	52	<u>e</u>	tellurium 128	84	Ъ	polonium –	116	_	livermorium -
	>			7	z	nitrogen 14	15	۵	phosphorus 31	33	As	arsenic 75	51	Sp	antimony 122	83	Ξ	bismuth 209			
	≥			9	ပ	carbon 12	14	S	silicon 28	32	Ge	germanium 73	20	Sn	tin 119	82	Pb	lead 207	114	Εl	flerovium
	≡			2	Ш	boron 11	13	Αl	aluminium 27	31	Ga	gallium 70	49	In	indium 115	81	11	thallium 204			
										30	Zu	zinc 65	48	ဥ	cadmium 112	80	Ŗ	mercury 201	112	S	copernicium
										29	Cn	copper 64	47	Ag	silver 108	62	Αn	gold 197	111	Rg	roentgenium
Group										28	z	nickel 59	46	Pd	palladium 106	78	귙	platinum 195	110	Ds	darmstadtium -
Gro										27	ပိ	cobalt 59	45	R	rhodium 103	77	Ir	iridium 192	109	Mt	meitnerium -
		- I	hydrogen 1							26	Fe	iron 56	44	Ru	ruthenium 101	92	SO	osmium 190	108	Hs	hassium
										25	Mn	manganese 55	43	ည	technetium -	75	Re	rhenium 186	107	Bh	bohrium
					loq	ass				24	ပ်	chromium 52	42	Mo	molybdenum 96	74	>	tungsten 184	106	Sg	seaborgium
			Key	atomic number	atomic symbo	name relative atomic mass				23	>	vanadium 51	41	qN	niobium 93	73	Та	tantalum 181	105	Ор	dubnium
					ato	rela				22	j=	titanium 48	40	Zr	zirconium 91	72	Έ	hafnium 178	104	짪	rutherfordium -
										21	လွ	scandium 45	39	>	yttrium 89	57–71	lanthanoids		89–103	actinoids	
	=			4	Be	beryllium 9	12	Mg	magnesium 24	20	Ca	calcium 40	38	Š	strontium 88	56	Ba	barium 137	88	Ra	radium
	_			8	:=	lithium 7	7	Na	sodium 23	19	¥	potassium 39	37	Rb	rubidium 85	55	Cs	caesium 133	87	Ŧ	francium

	57	58	59	09	61	62	63	64	65	99	29	89	69	70	71
lanthanoids	Га	Ce	Ā	PΝ	Pm	Sm	Eu	В	Д	D	운	Щ	H	Υp	n
	lanthanum 139	cerium 140	praseodymium 141	neodymium 144	promethium -	samarium 150	europium 152	gadolinium 157	terbium 159	dysprosium 163	holmium 165	erbium 167	thulium 169	ytterbium 173	lutetium 175
	88	06	91	92	93	94	95	96	97	86	66	100	101	102	103
actinoids	Ac	T	Ра	\supset	ď	Pu	Am	CB	ă	ŭ	Es	Fm	Md	%	۲
	actinium	thorium	protactinium	uranium	neptunium	plutonium	americium	cunium	berkelium	californium	einsteinium	fermium	mendelevium	nobelium	lawrencium
	I	232	231	238	ı	ı	ı	ı	I	I	ı	I	ı	I	I

The volume of one mole of any gas is $24\,\mathrm{dm}^3$ at room temperature and pressure (r.t.p.).