

Cambridge International General Certificate of Secondary Education

CHEMISTRY

Paper 1 Multiple Choice (Core)

0620/11 May/June 2016

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.

The syllabus is approved for use in England, Wales and Northern Ireland as a Cambridge International Level1/Level 2 Certificate.

This document consists of 16 printed pages.





1 In which changes do the particles move further apart?

$$gas \stackrel{W}{\rightleftharpoons} Iiquid \stackrel{X}{\rightleftharpoons} solid$$

$$Y \qquad Z$$

$$A W and X \qquad B W and Z \qquad C X and Y \qquad D Y and Z$$

2 A sample of a dye is investigated by chromatography.

A line is drawn across a piece of chromatography paper and a spot of the dye is placed on it.

The paper is placed in water.



Which row is correct?

	what is used to draw the line	position of spot	
Α	ink	above the level of the water	
В	ink	below the level of the water	
С	pencil	above the level of the water	
D	pencil	below the level of the water	

3 One of the instructions for an experiment reads as follows.

Quickly add $50 \, \text{cm}^3$ of acid.

What is the best piece of apparatus to use?

- A a burette
- B a conical flask
- C a measuring cylinder
- D a pipette

4 Diamond and graphite are macromolecules.

Which statement about diamond and graphite is **not** correct?

- A They are giant structures with high melting points.
- **B** They are non-conductors of electricity.
- **C** They contain only atoms of a non-metal.
- **D** They have covalent bonds between the atoms.
- 5 The table shows the electronic structure of four atoms.

atom	electronic structure
W	2,8,1
х	2,8,4
Y	2,8,7
Z	2,8,8

Which two atoms combine to form a covalent compound?

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

6 An aluminium atom has a nucleon number of 27 and a proton number of 13.

How many neutrons does this aluminium atom contain?

A 13 **B** 14 **C** 27 **D** 40

- 7 What happens when a bond is formed between a green gaseous element and a soft metallic element?
 - **A** The gas atoms gain an electron.
 - **B** The gas atoms lose an electron.
 - **C** The metal atoms gain an electron.
 - **D** The two elements share a pair of electrons.
- 8 The equation shows the reaction between magnesium and sulfuric acid. [*A*_r: H, 1; O, 16; Mg, 24; S, 32]

$$Mg + H_2SO_4 \rightarrow MgSO_4 + H_2$$

In this reaction, which mass of magnesium sulfate is formed when 6g of magnesium react with excess sulfuric acid?

A 8 **B** 24 **C** 30 **D** 60

9 The diagram shows an electrical cable.



Which statement about the substances used is correct?

- A The coating is plastic because it conducts electricity well.
- **B** The core is copper because it conducts electricity well.
- **C** The core is copper because it is cheap and strong.
- **D** The core is iron because it is cheap and strong.
- **10** When substance X is electrolysed, the amount of gases P and Q formed is shown.



What is substance X?

- A concentrated aqueous sodium chloride
- B concentrated hydrochloric acid
- C dilute sulfuric acid
- **D** molten lead(II) bromide

11 The energy level diagram for the reaction between sodium hydrogen carbonate and dilute hydrochloric acid is shown.



Which row correctly describes the type of reaction and the energy of the reactants and products?

	type of reaction	energy of the reactants and products
Α	endothermic	the products have more energy than the reactants
В	endothermic	the reactants have more energy than the products
С	exothermic	the products have more energy than the reactants
D	exothermic	the reactants have more energy than the products

12 The diagram shows some properties that substances may have.

To which labelled part of the diagram does ²³⁵U belong?



13 A liquid X reacts with solid Y to form a gas.

Which two diagrams show suitable methods for investigating the rate (speed) of the reaction?



14 An experiment, S, is carried out to measure the volume of hydrogen produced when excess dilute sulfuric acid is added to zinc.

A second experiment, T, is carried out using the same mass of zinc but under different conditions.

The results of the two experiments are shown.



Which changes in the conditions between experiments S and T give curve T?

	addition of a catalyst	the zinc is in large pieces not powdered
Α	\checkmark	\checkmark
В	\checkmark	x
С	x	\checkmark
D	x	×

15 Aluminium reacts with iron(III) oxide as shown.

iron(III) oxide + aluminium \rightarrow iron + aluminium oxide

Which statement about this reaction is correct?

- A Aluminium is oxidised.
- **B** Aluminium oxide is reduced.
- **C** Iron(III) oxide is oxidised.
- **D** Iron is oxidised.

16 Which reaction is reversible?

- $\textbf{A} \quad Cu \ + \ ZnSO_4 \ \rightarrow \ CuSO_4 \ + \ Zn$
- $\textbf{B} \quad \text{CuO} \ + \ \text{H}_2\text{SO}_4 \ \rightarrow \ \text{CuSO}_4 \ + \ \text{H}_2\text{O}$
- $\label{eq:constraint} \mbox{C} \ \ \mbox{CuO} \ + \ \mbox{H}_2 \ \rightarrow \ \mbox{Cu} \ + \ \mbox{H}_2 \mbox{O}$
- $\textbf{D} \quad CuSO_4.5H_2O \rightarrow CuSO_4 + 5H_2O$

- 17 Which statements are properties of an acid?
 - 1 reacts with ammonium sulfate to form ammonia
 - 2 turns red litmus blue

	1	2
Α	1	1
В	\checkmark	x
С	x	\checkmark
D	X	x

18 Part of the Periodic Table is shown.

Which element forms an acidic oxide?



- **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	
Α	to ensure all of the acid has reacted	to obtain solid copper(II) sulfate	
в	to ensure all of the acid has reacted	to remove excess copper(II) oxide	
С	to speed up the reaction	to obtain solid copper(II) sulfate	
D	to speed up the reaction	to remove excess copper(II) oxide	

20 The results of two tests on solid X are shown.

test	observation	
aqueous sodium hydroxide added	green precipitate formed	
acidified 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
- 21 Where in the Periodic Table is the metallic character of the elements greatest?

	left or right side of a period	at the top or bottom of a group
Α	left	bottom
В	left	top
С	right	bottom
D	right	top

22 Some properties of four elements, P, Q, R and S, are shown in the table.

Two of these elements are in Group I of the Periodic Table and two are in Group VII.

element reaction with water		physical state at room temperature
Р	reacts vigorously	solid
Q	does not react with water	solid
R	reacts explosively	solid
S	dissolves giving a coloured solution	liquid

Which statement is correct?

- A P is below R in Group I.
- **B** Q is above R in Group I.
- **C** Q is below S in Group VII.
- **D** R is below S in Group VII.

	melting point in °C	density in g/cm ³	colour	electrical conductor
Α	114	4.9	purple	no
В	659	2.7	grey	yes
С	1677	4.5	grey	yes
D	3727	2.3	black	yes

23 Which of the following could be a transition element?

- **24** Two statements about argon are given.
 - 1 Argon has a full outer shell of electrons.
 - 2 Argon is very reactive and is used in lamps.

Which is correct?

- **A** Both statements are correct and statement 2 explains statement 1.
- **B** Both statements are correct but statement 2 does not explain statement 1.
- **C** Statement 1 is correct but statement 2 is incorrect.
- **D** Statement 2 is correct but statement 1 is incorrect.
- **25** Three students, X, Y and Z, were told that solid P reacts with dilute acids and also conducts electricity.

The table shows the students' suggestions about the identity of P.

Х	Y	Z	
copper	iron	graphite	

Which of the students are correct?

Α	X, Y and Z	В	X only	C Y only	D	Z only
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- W has a coloured oxide which can be reduced by carbon.
- X has a black oxide and is also found in nature as a pure metal.
- Y has an oxide which cannot be reduced by carbon.

Which metal is the most reactive and what is the possible identity of W?

	most reactive metal	possible identity of W
Α	х	Cu
в	х	Fe
С	Y	Cu
D	Y	Fe

27 Tin is a metal that is less reactive than iron and is extracted from its ore cassiterite, SnO₂.

Which statements about tin are correct?

- 1 Tin can be extracted from cassiterite using carbon.
- 2 Tin does not conduct electricity.
- 3 Tin is hard and shiny.
- **A** 1, 2 and 3 **B** 1 and 2 only **C** 1 and 3 only **D** 2 and 3 only
- 28 Which statement about the uses of metals is correct?
 - A Aluminium is used in the manufacture of aircraft because of its strength and high density.
 - **B** Copper is used in electrical wiring because of its strength and high density.
 - **C** Mild steel is used in the manufacture of car bodies because of its strength and resistance to corrosion.
 - **D** Stainless steel is used in the construction of chemical plant because of its strength and resistance to corrosion.

29 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

30 A new planet has been discovered and its atmosphere has been analysed.



The table shows the composition of its atmosphere.

gas	percentage by volume
carbon dioxide	4
nitrogen	72
oxygen	24

Which gases are present in the atmosphere of the planet in a higher percentage than they are in the Earth's atmosphere?

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

31 Water was added to separate samples of anhydrous cobalt(II) chloride and anhydrous copper(II) sulfate.

Which row describes the colour changes that take place in these reactions?

	cobalt(II) chloride	copper(II) sulfate
Α	blue to pink	blue to white
В	blue to pink	white to blue
С	pink to blue	blue to white
D	pink to blue	white to blue

- 32 Which pollutant found in air does **not** have an effect on respiration?
 - A carbon monoxide
 - **B** lead compounds
 - **C** oxides of nitrogen
 - D sulfur dioxide
- **33** A farmer's soil is very low in both nitrogen (N) and phosphorus (P).

Which fertiliser would improve the quality of this soil most effectively?

		percentage	
	nitrogen (N)	phosphorus (P)	potassium (K)
Α	11	11	27
В	12	37	10
С	28	10	10
D	31	29	9

34 When limestone is heated it forms lime (calcium oxide) and carbon dioxide.

$$CaCO_3(s) \rightarrow CaO(s) + CO_2(g)$$

Which statement is not correct?

- **A** Carbon dioxide is a greenhouse gas which may contribute to climate change.
- **B** Slaked lime is used to neutralise industrial waste.
- **C** The lime can be used to treat alkaline soil.
- **D** This reaction is an example of thermal decomposition.

35 The diagram shows the separation of petroleum into fractions.



What could X, Y and Z represent?

	Х	Y	Z
Α	diesel oil	lubricating fraction	paraffin
В	lubricating fraction	diesel oil	paraffin
С	paraffin	lubricating fraction	diesel oil
D	paraffin	diesel oil	lubricating fraction

- 36 Which of the compounds shown are in the same homologous series?
 - 1 CH₃OH
 - 2 CH₃CH₂OH
 - 3 CH₃COOH
 - 4 CH₃CH₂CH₂OH

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

37 Compound Q decolourises bromine water.

Compound Q has two carbon atoms in each molecule.

Which statement about compound Q is correct?

- A It contains carbon-hydrogen double bonds.
- **B** It has six hydrogen atoms per molecule.
- **C** It has two carbon-carbon double bonds.
- **D** It is produced by cracking alkanes.

- 38 What is used in the production of ethanol from ethene?
 - A hydrogen and oxygen
 - B oxygen only
 - C steam
 - D yeast
- **39** Ethene forms an addition polymer as shown.



Which terms describe this polymer?

- **A** a saturated compound called poly(ethane)
- **B** a saturated compound called poly(ethene)
- **C** an unsaturated compound called poly(ethane)
- **D** an unsaturated compound called poly(ethene)
- 40 The diagram shows a molecule of an organic compound W.



Which statement is not correct?

- **A** A solution of W in water has a pH greater than pH 7.
- **B** A solution of W in water reacts with sodium hydroxide solution.
- **C** When copper(II) carbonate is added to a solution of W in water, a gas is produced.
- **D** When magnesium is added to a solution of W in water, a gas is produced.

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	VIII	2	Не	helium 4	10	Ne	neon 20	18	Ar	argon 40	36	Ϋ́	krypton 84	54	Xe	xenon 131	86	Rn	radon -				
	۸II				6	LL	fluorine 19	17	Cl	chlorine 35.5	35	Ъ	bromine 80	53	Ι	iodine 127	85	At	astatine -				-
	N				8	0	oxygen 16	16	ი	sulfur 32	34	Se	selenium 79	52	Те	tellurium 128	84	Ро	polonium –	116	2	livermorium –	-
	>				7	z	nitrogen 14	15	٩	phosphorus 31	33	As	arsenic 75	51	Sb	antimony 122	83	Ξ	bismuth 209				
	2				9	ပ	carbon 12	14	N.	silicon 28	32	Ge	germanium 73	50	Sn	tin 119	82	Pb	lead 207	114	Fl	flerovium -	
	≡				5	Ш	boron 11	13	Al	aluminium 27	31	Ga	gallium 70	49	In	indium 115	81	11	thallium 204				-
											30	Zn	zinc 65	48	Cq	cadmium 112	80	Hg	mercury 201	112	C	copernicium -	-
											29	Cu	copper 64	47	Ag	silver 108	62	Au	gold 197	111	Rg	roentgenium -	-
dno											28	ïZ	nickel 59	46	Ъd	palladium 106	78	Ę	platinum 195	110	Ds	darmstadtium -	
Gro											27	ပိ	cobalt 59	45	Rh	rhodium 103	77	Ir	iridium 192	109	Mt	meitnerium -	
		-	E	hydrogen 1							26	Ъе	iron 56	44	Ru	ruthenium 101	76	Os	osmium 190	108	Hs	hassium -	-
					1						25	Mn	manganese 55	43	Ч	technetium -	75	Re	rhenium 186	107	Вh	bohrium –	-
						loc	ISS				24	ŋ	chromium 52	42	Mo	molybdenum 96	74	\geq	tungsten 184	106	Sg	seaborgium -	-
				Key	atomic number	mic sym	name tive atomic ma				23	>	vanadium 51	41	qN	niobium 93	73	Та	tantalum 181	105	Db	dubnium –	-
						ato	rela				22	F	titanium 48	40	Zr	zirconium 91	72	Ŧ	hafnium 178	104	Rf	rutherfordium -	-
											21	Sc	scandium 45	39	≻	yttrium 89	57-71	lanthanoids		89–103	actinoids		1
	=				4	Be	beryllium 9	12	Mg	magnesium 24	20	Ca	calcium 40	38	Sr	strontium 88	56	Ba	barium 137	88	Ra	radium -	
	-				e	:	lithium 7	11	Na	sodium 23	19	×	potassium 39	37	Rb	rubidium 85	55	Cs	caesium 133	87	г Н	francium -	1

	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71
lanthanoids	La	Ce	ŗ	ΡN	Ρm	Sm	Еu	Gd	Tb	D	Ч	ц	Тп	Υb	Lu
	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
	89	06	91	92	93	94	95	96	97	98	66	100	101	102	103
actinoids	Ac	Th	Ра		Np	Pu	Am	Cm	ВĶ	ŭ	Es	Е'n	Md	No	Ľ
	actinium	thorium	protactinium	uranium	neptunium	plutonium	americium	curium	berkelium	californium	einsteinium	fermium	mendelevium	nobelium	lawrencium
	I	232	231	238	I	I	I	I	I	I	I	I	I	I	I

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

The Periodic Table of Elements

16