

Cambridge International Examinations

Cambridge International General Certificate of Secondary Education

CHEMISTRY 0620/12

May/June 2016 Paper 1 Multiple Choice (Core)

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 20.

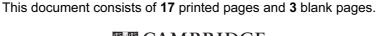
Electronic calculators may be used.

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



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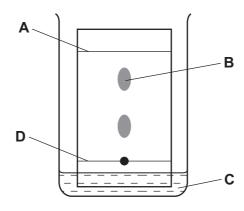


1 In which changes do the particles move further apart?

$$\begin{array}{ccc} & W & X \\ \text{gas} & \rightleftharpoons & \text{liquid} & \rightleftharpoons & \text{solid} \\ & Y & & 7 \end{array}$$

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

2 In the chromatography experiment shown, which label represents the solvent front?



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

Quickly add 50 cm³ 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** Two statements about diamond are given.
 - 1 Diamond has a giant three-dimensional covalent structure of carbon atoms.
 - 2 Diamond is one of the hardest substances known.

Which is correct?

- A Both statements are correct and statement 1 explains statement 2.
- **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.

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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 atom of element Q contains 19 electrons, 19 protons and 20 neutrons.

What is Q?

- A calcium
- **B** potassium
- **C** strontium
- **D** yttrium
- 7 Lithium is in Group I of the Periodic Table. Nitrogen is in Group V of the Periodic Table.

Lithium reacts with nitrogen to form the ionic compound lithium nitride.

What happens to the electrons when lithium atoms and nitrogen atoms form ions?

	lithium atoms	nitrogen atoms			
A	each lithium atom loses one electron to form a Li ⁺ ion	each nitrogen atom gains three electrons to form an N³- ion			
В	each lithium atom loses one electron to form a Li ⁺ ion	each nitrogen atom gains five electrons to form an N ⁵⁻ ion			
С	each lithium atom gains one electron to form a Li ⁻ ion	each nitrogen atom loses three electrons to form an N ³⁺ ion			
D	each lithium atom gains one electron to form a Li⁻ ion	each nitrogen atom loses five electrons to form an N ⁵⁺ ion			

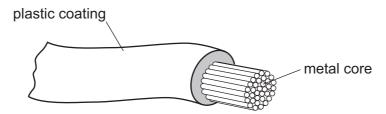
The equation shows the reaction between magnesium and sulfuric acid. [A_r: H, 1; O, 16; Mg, 24; S, 32]

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

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.

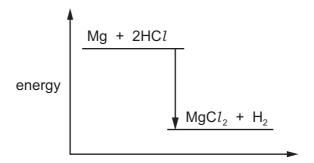


Which statement about the substances used is correct?

- 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** What are the products at the electrodes when dilute sulfuric acid is electrolysed using inert electrodes?

	anode	cathode		
Α	hydrogen	oxygen		
В	oxygen	hydrogen		
С	sulfur	oxygen		
D	sulfur dioxide	hydrogen		

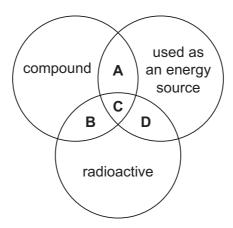
11 The energy level diagram for the reaction between magnesium and hydrochloric acid is shown.



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

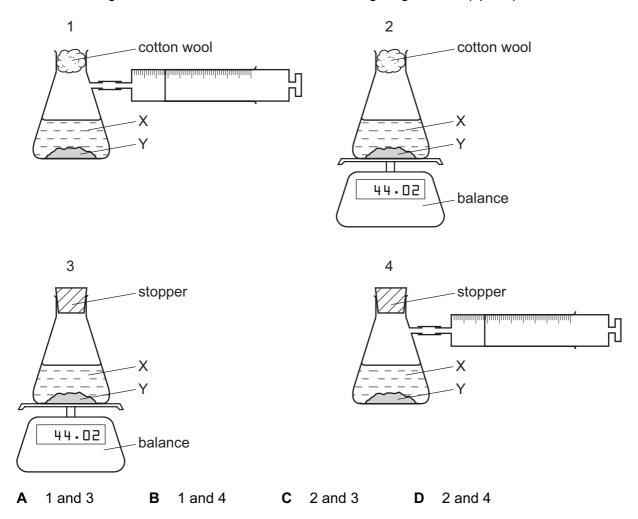
- A Energy is given out during the reaction.
- **B** The products are at a lower energy level than the reactants.
- **C** The reaction is endothermic.
- **D** The temperature increases during the reaction.
- **12** The diagram shows some properties that substances may have.

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

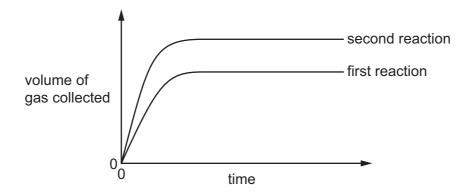


13 A liquid X reacts with solid Y to form a gas.

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



14 The results of two separate reactions between excess calcium carbonate and hydrochloric acid are shown.



Which statement explains the differences between the reactions?

- A More calcium carbonate was used in the second reaction.
- **B** The same volume of more concentrated acid was used in the second reaction.
- **C** The second reaction was allowed to react for longer.
- **D** The temperature was higher in the second reaction.

15 The equations below all show redox reactions.

Fe₂O₃ + 3CO
$$\rightarrow$$
 2Fe + 3CO₂
2ZnO + C \rightarrow 2Zn + CO₂
Fe₂O₃ + 2A $l \rightarrow$ A l_2 O₃ + 2Fe
2CO + 2NO \rightarrow 2CO₂ + N₂

Which oxide is oxidised in these reactions?

- **A** Fe_2O_3
- B CO
- **C** ZnO
- **D** NO

16 In which reaction is the colour change from blue to white?

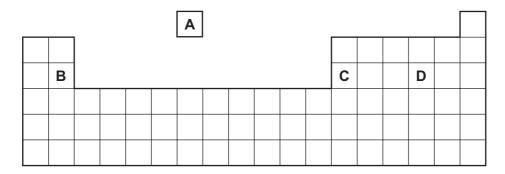
- A heating hydrated cobalt(II) chloride
- **B** heating hydrated copper(II) sulfate
- **C** adding water to anhydrous cobalt(II) chloride
- **D** adding water to anhydrous copper(II) sulfate

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

	1	2
Α	✓	✓
В	✓	X
С	X	✓
D	X	X

18 Part of the Periodic Table is shown.

Which element forms an acidic oxide?



- 19 What is the correct sequence of steps for the preparation of a pure sample of copper(II) sulfate crystals from copper(II) oxide and sulfuric acid?
 - $\textbf{A} \quad \text{dissolving} \rightarrow \text{crystallisation} \rightarrow \text{evaporation} \rightarrow \text{filtration}$
 - **B** dissolving \rightarrow evaporation \rightarrow filtration \rightarrow crystallisation
 - \mathbf{C} dissolving \rightarrow filtration \rightarrow crystallisation \rightarrow evaporation
 - **D** dissolving \rightarrow filtration \rightarrow evaporation \rightarrow crystallisation

20 The following tests are carried out on an aqueous solution of salt X.

test	observation
sodium hydroxide solution is added	a green precipitate is formed which dissolves in excess
a small piece of aluminium foil is then added to the mixture and the mixture is heated	a gas is given off which turns damp, red litmus paper blue

What is X?

- A aluminium nitrate
- B ammonium sulfate
- **C** chromium(III) nitrate
- **D** iron(II) nitrate

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 Rubidium is a Group I metal.

Which statement about rubidium is **not** correct?

- A It has a higher melting point than lithium.
- **B** It has one electron in its outer shell.
- C It reacts vigorously with water.
- **D** It reacts with chlorine to form rubidium chloride, RbC*l*.

23 The table gives information about four elements, P, Q, R and S.

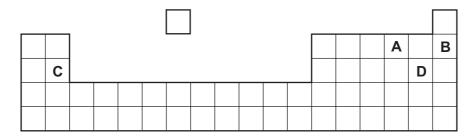
	melting point in °C	electrical conductivity of element when solid	density in g/cm ³	colour of iodide of element
Р	98	good	0.97	white
Q	– 39	good	13.53	red
R	1410	poor	2.33	colourless
S	1535	good	7.87	green

Which elements could be transition elements?

- A P, Q and S
- **B** Q and S only **C** R and S only **D** S only

24 Part of the Periodic Table is shown.

Which element is a gas that does not form a compound with potassium?



- **25** Which property is **not** considered a typical metallic property?
 - A good conductor of heat
 - **B** low melting point
 - **C** malleable (can be hammered into shape)
 - **D** strong

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26 Some chemical properties of three metals W, X and Y and their oxides are shown.

metal	reaction with steam	reaction with dilute hydrochloric acid	reaction of metal oxide with carbon
W	reacts	reacts	reacts
Х	no reaction	no reaction	reacts
Υ	reacts	reacts	no reaction

What is the order of reactivity of these metals, most reactive first?

- $A \quad W \to Y \to X$
- $\textbf{B} \quad X \to Y \to W$
- $\textbf{C} \quad Y \to W \to X$
- $\mathbf{D} \quad \mathsf{Y} \to \mathsf{X} \to \mathsf{W}$

27 Iron from a blast furnace is treated with oxygen and with calcium oxide to make steel.

Which substances in the iron are removed?

	oxygen removes	calcium oxide removes		
Α	carbon	acidic oxides		
В	carbon	basic oxides		
С	iron	acidic oxides		
D	iron	basic oxides		

28 Copper is sometimes used to make cooking utensils.



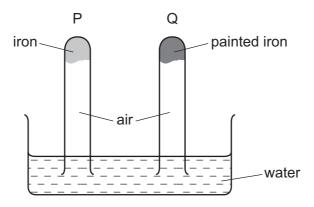
Three properties of copper are given.

- 1 corrosion resistant
- 2 good conductor of electricity
- 3 good conductor of heat

Which properties make copper a suitable metal for making cooking utensils?

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

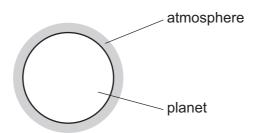
29 The diagram shows an experiment to investigate how paint affects the rusting of iron.



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.

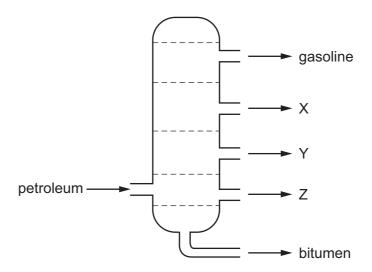
gas	percentage by volume		
carbon dioxide	4		
nitrogen	72		
oxygen	24		

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

							13		
31	Wh	nich of the following are tests for water?							
		1	1 It turns anhydrous copper(II) sulfate blue.						
		2	It boils a	t 100)°C.				
		3	It turns a	anhyd	drous cobalt((I) ch	lloride paper bl	ue.	
	Α	1, 2 and	13 E	3 1	and 2 only	С	1 and 3 only	D	2 and 3 only
32		fur dioxio air.	de, carbor	n moi	noxide and o	xides	s of nitrogen ar	e com	nmon gaseous pollutants found in
	Wh	ich pollut	tants cont	ribute	e to acid rain	?			
	Α	carbon	monoxide	and	sulfur dioxid	е			
	В	oxides of nitrogen and sulfur dioxide							
	С	oxides of nitrogen only							
	D	sulfur di	ioxide onl	У					
33	Wh	ich comp	oound is n	ot us	sed as a fertil	iser?	,		
	Α	ammon	ium phosį	phate	Э				
	В	ammon	ium sulfat	:e					
	С	calcium	carbonat	e					
	D	potassiı	um nitrate	:					
34	Lim	ne (calciu	m oxide)	is us	ed to treat wa	aste v	water from a fa	ctory.	
	Wh	ich subst	tance is re	emov	ed by the lim	e?			
	Α	ammon	ia						
	В	sodium	chloride						
	С	sodium	hydroxide	9					
	D	sulfuric	acid						

35 The diagram shows the separation of petroleum into fractions.



What could X, Y and Z represent?

	X	Υ	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 compound is **not** an alkane, C_nH_{2n+2}?

- A CH₃CH₂CH₂CH₃
- **B** (CH₃)₂CHCH₃
- C CH₃CHCHCH₃
- \mathbf{D} (CH₃)₃CH

37 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	H—————————————————————————————————————
В	ethane	H H
С	ethene	H H — C—C—H — H
D	ethene	H H

38 Which term describes the formation of ethanol from glucose?

- A cracking
- **B** distillation
- **C** fermentation
- **D** polymerisation

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 Which statement about carboxylic acids is **not** correct?
 - **A** Aqueous ethanoic acid has a pH below pH 7.
 - **B** They contain the functional group –COOH.
 - **C** They produce carbon dioxide when reacted with a metal carbonate.
 - **D** Methyl orange turns yellow in aqueous ethanoic acid.

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The Periodic Table of Elements

	III/	2	£	helium 4	10	Ne	neon 20	18	Ā	argon 40	36	궃	krypton 84	54	Xe	xenon 131	98	R	radon -			
	IIA				6	ш	fluorine 19	17	Cl	chlorine 35.5	35	Ŗ	bromine 80	53	Н	iodine 127	85	Αt	astatine -			
	IN				8	0	oxygen 16	16	ഗ	sulfur 32	34	Se	selenium 79	52	<u>e</u>	tellurium 128	84	Ъо	molod	116	^	livermorium –
	^				7	z	nitrogen 14	15	۵	phosphorus 31	33	As	arsenic 75	51	Sb	antimony 122	83	ï	bismuth 209			
	2				9	ပ	carbon 12	14	:S	silicon 28	32	Ge	germanium 73	20	Sn	tin 119	82	Ъ	lead 207	114	Fl	flerovium -
	=				2	В	boron 11	13	Αl	aluminium 27	31	Ga	gallium 70	49	In	indium 115	81	<i>1</i> L	thallium 204			
											30	Zu	zinc 65	48	S	cadmium 112	80	Hg	mercury 201	112	C	copernicium -
											29	Cn	copper 64	47	Ag	silver 108	62	Au	gold 197	111	Rg	roentgenium -
Group											28	Z	nickel 59	46	Pd	palladium 106	78	చ	platinum 195	110	Ds	darmstadtium -
Gre					,						27	ဝိ	cobalt 59	45	몺	rhodium 103	77	'n	iridium 192	109	Ψ	meitnerium -
		- ;	I	hydrogen 1							26	Fe	iron 56					Os	osmium 190	108	Hs	hassium -
								,			25	Mn	manganese 55	43	ည	technetium -	75	Re	rhenium 186	107	Bh	bohrium -
					_	pol	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	Q N	niobium 93	73	<u>Б</u>	tantalum 181	105	Op	dubnium –
						atc	rek				22	F	titanium 48	40	Zr	zirconium 91	72	Ξ	hafnium 178	104	쪼	rutherfordium -
											21	Sc	scandium 45	39	>	yttrium 89	57–71	lanthanoids		89–103	actinoids	
	=				4	Be	beryllium 9	12	Mg	magnesium 24	20	Ca	calcium 40	38	S	strontium 88	99	Ba	barium 137	88	Ra	radium
	_				က	=	lithium 7	1	Na	sodium 23	19	×	potassium 39	37	В	rubidium 85	55	Cs	caesium 133	87	ъ́	francium

				00			
69			63	62 63	61 62 63	60 61 62 63	59 60 61 62 63
Д	ğ		Eu	Sm Eu	Sm Eu	Pm Sm Eu	Pr Nd Pm Sm Eu
terbium	iniui		europium	samarium europium g	promethium samarium europium	neodymium promethium samarium europium g	praseodymium promethium samarium europium g
159	22		152	150 152	150 152	144 – 150 152	141 144 – 150 152
97	96		95	94 95	93 94 95	92 93 94 95	91 92 93 94 95
BK Cf	CH		Pu Am (Am	Pu Am	Pu Am	U Np Pu Am
perkelium	urium	_	americium	plutonium americium	m neptunium plutonium americium	uranium neptunium plutonium americium	protactinium uranium neptunium plutonium americium
ı	ı		1	1	1	238 – – – –	231 238 – – – –

The volume of one mole of any gas is 24 dm³ at room temperature and pressure (r.t.p.)