

# Cambridge IGCSE<sup>™</sup>

CHEMISTRY 0620/12

Paper 1 Multiple Choice (Core)

February/March 2020

45 minutes

You must answer on the multiple choice answer sheet.

You will need: Multiple choice answer sheet

Soft clean eraser

Soft pencil (type B or HB is recommended)

#### **INSTRUCTIONS**

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 multiple choice answer sheet.
- Follow the instructions on the multiple choice answer sheet.
- Write in soft pencil.
- Write your name, centre number and candidate number on the multiple choice answer sheet in the spaces provided unless this has been done for you.
- Do not use correction fluid.
- Do not write on any bar codes.
- You may use a calculator.

## **INFORMATION**

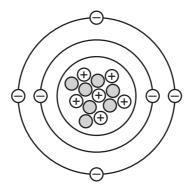
- The total mark for this paper is 40.
- Each correct answer will score one mark. A mark will not be deducted for a wrong answer.
- Any rough working should be done on this question paper.
- The Periodic Table is printed in the question paper.



1 Which row represents the particles of a gas colliding most frequently?

	pressure	temperature
Α	high	high
В	high	low
С	low	high
D	low	low

- 2 Which test is used to show that a sample of water is pure?
  - **A** Evaporate the water to see if any solids remain.
  - **B** Heat the water to check its boiling point.
  - **C** Test with anhydrous cobalt(II) chloride.
  - **D** Use universal indicator paper to check its pH.
- 3 Which piece of apparatus is used to measure 1.5 cm<sup>3</sup> of a solution accurately?
  - **A** 25 cm<sup>3</sup> measuring cylinder
  - **B** 25 cm<sup>3</sup> pipette
  - **C** 50 cm<sup>3</sup> measuring cylinder
  - **D** 50 cm<sup>3</sup> burette
- 4 A representation of an atom is shown.



What is the nucleon number of this atom?

**A** 6

**B** 7

**C** 12

**D** 13

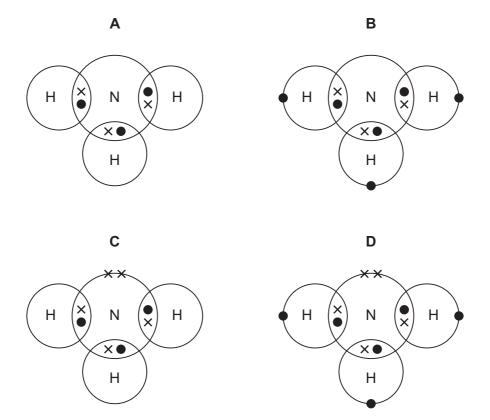
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**5** Lithium reacts with fluorine to form the compound lithium fluoride.

Which statement about this reaction is correct?

- **A** Each fluorine atom gains one electron.
- **B** Each fluorine atom gains two or more electrons.
- **C** Each fluorine atom loses one electron.
- **D** Each fluorine atom loses two or more electrons.
- **6** Ammonia, NH<sub>3</sub>, is a covalent molecule.

Which diagram shows the outer shell electron arrangement in a molecule of ammonia?



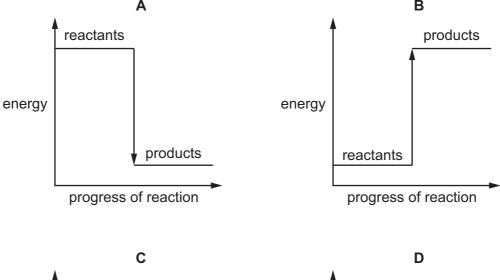
7 Which row describes the structure and a use of diamond?

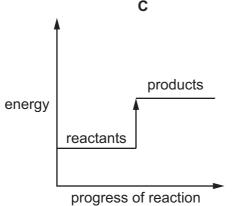
	structure	use
Α	ionic	in cutting tools
В	ionic	lubricant
С	macromolecular	in cutting tools
D	macromolecular	lubricant

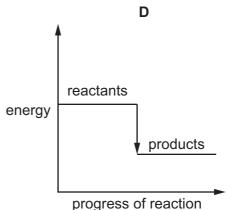
8 Methane, CH<sub>4</sub>, burns in air to form carbon dioxide and water.

What is the balanced equation for this reaction?

- **A**  $CH_4(g) + O_2(g) \rightarrow CO_2(g) + 2H_2O(g)$
- **B**  $CH_4(g) + 2O_2(g) \rightarrow CO_2(g) + 2H_2O(g)$
- **C**  $CH_4(g) + 2O_2(g) \rightarrow CO_2(g) + H_2O(g)$
- **D**  $CH_4(g) + 3O_2(g) \rightarrow CO_2(g) + 2H_2O(g)$
- **9** Which statement about electrolysis is correct?
  - **A** Chemical energy is converted to electrical energy.
  - **B** Electrons flow through the electrolyte.
  - C lonic compounds are broken down.
  - **D** Metals are formed at the positive electrode.
- 10 Which energy level diagram shows the reaction that will give out the most energy?







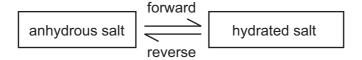
- 11 Which change is a physical change?
  - **A** Copper(II) carbonate changes colour from green to black when it is heated, and stays black when it cools.
  - **B** Ethanol reacts with oxygen to form carbon dioxide and water.
  - **C** Hydrogen peroxide decomposes into water and oxygen when it is boiled.
  - **D** Ice forms liquid water when it is heated.
- **12** Marble chips (calcium carbonate) react with hydrochloric acid in an exothermic reaction.

calcium carbonate + hydrochloric acid → calcium chloride + water + carbon dioxide

When excess marble chips are added to dilute hydrochloric acid the rate of the reaction starts off fast, then gets slower until the reaction stops.

Why does the reaction rate get slower?

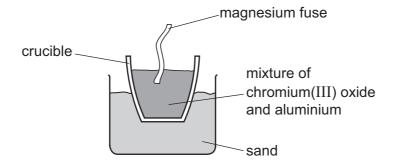
- A The concentration of the hydrochloric acid is decreasing.
- **B** The concentration of calcium chloride is increasing.
- **C** The calcium carbonate is completely used up.
- **D** The temperature of the mixture decreases.
- 13 The diagram shows the change from an anhydrous salt to its hydrated form.



Which statement is correct?

- **A** The forward reaction requires heat and water.
- **B** The forward reaction requires water only.
- **C** The reverse reaction requires heat and water.
- **D** The reverse reaction requires water only.

**14** A violent reaction occurs when a mixture of chromium(III) oxide and aluminium is ignited with a magnesium fuse as shown.



The equation for the reaction is shown.

$$Cr_2O_3 + 2Al \rightarrow 2Cr + Al_2O_3$$

Which substance is oxidised in the reaction?

- **A** aluminium
- B aluminium oxide
- **C** chromium
- **D** chromium(III) oxide
- 15 A farmer's soil is acidic.

Which substance should the farmer add to neutralise the soil?

- A ammonium sulfate
- **B** calcium oxide
- C hydrochloric acid
- D NPK fertiliser

**16** Three elements, X, Y and Z, are burned in oxygen.

The oxides formed are dissolved in water and the pH of the solutions measured.

The results are shown.

	pH of oxide solution
Х	2.0
Υ	14.0
Z	8.0

Which statements are correct?

- 1 Element X could be sulfur.
- 2 Element Y could be sodium.
- 3 Element Z is a non-metal.
- 4 No metal elements were used.
- **A** 1 only **B** 1 and 2 **C** 2 and 3 **D** 3 and 4
- 17 The following substances can be reacted together to prepare salts.
  - 1 copper(II) oxide and excess hydrochloric acid
  - 2 hydrochloric acid and excess sodium hydroxide
  - 3 hydrochloric acid and excess zinc carbonate

In which reactions can the excess reactant be separated from the solution by filtration?

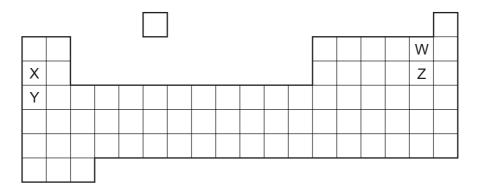
**A** 1 and 2 **B** 1 and 3 **C** 2 and 3 **D** 3 only

18 Salt S is dissolved in water and three tests are carried out on the solution.

	test	result
1	aqueous sodium hydroxide is added	green precipitate formed, insoluble in excess sodium hydroxide
2	dilute nitric acid is added	no reaction
3	aqueous barium nitrate is added to the acidified solution from test 2	white precipitate formed

What is the identity of S?

- A copper(II) chloride
- B copper(II) sulfate
- c iron(II) chloride
- **D** iron(II) sulfate
- 19 Which statement about the Periodic Table is correct?
  - A Most metallic elements are on the left.
  - **B** Elements in the same period have the same number of outer electrons.
  - **C** Elements on the left are usually gases.
  - **D** The relative atomic mass of the elements increases from right to left.
- 20 The diagram shows elements W, X, Y and Z in a section of the Periodic Table.



Which statement about the reactivity of the elements is correct?

- A X is more reactive than Y, and W is more reactive than Z.
- **B** X is more reactive than Y, and Z is more reactive than W.
- **C** Y is more reactive than X, and W is more reactive than Z.
- **D** Y is more reactive than X, and Z is more reactive than W.

21	Some	properties	of	substances	are	listed.
----	------	------------	----	------------	-----	---------

- 1 They conduct electricity.
- 2 They have low densities.
- 3 They have high melting points.
- 4 They are malleable.

Which properties are shown by transition metals?

- **A** 1 and 3 only **B** 1 and 4 only **C** 1, 2 and 3 **D** 1, 3 and 4
- 22 Which statement about the noble gas argon is correct?
  - **A** It burns with a hot flame.
  - **B** It is used in airships because of its low density.
  - **C** It exists as diatomic molecules.
  - **D** It has eight electrons in its outermost shell.
- 23 Sodium is a Group I metal.

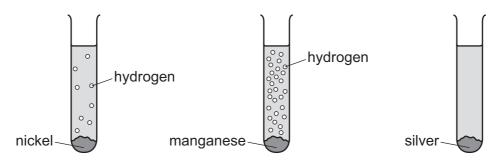
Which property, that is typical of most metals, is **not** shown by sodium?

- A conductor of heat
- **B** high melting point
- **C** malleable
- **D** shiny

# 24 Manganese, nickel and silver are all metals.

Samples of powdered manganese, nickel and silver were placed in separate test-tubes containing dilute hydrochloric acid.

The results are shown.



What is the order of reactivity of the metals, most reactive to least reactive?

- **A** manganese  $\rightarrow$  nickel  $\rightarrow$  silver
- **B** manganese  $\rightarrow$  silver  $\rightarrow$  nickel
- **C** silver  $\rightarrow$  manganese  $\rightarrow$  nickel
- **D** silver  $\rightarrow$  nickel  $\rightarrow$  manganese

#### 25 Which statement about aluminium is correct?

- A Aluminium is easy to extract from its ore because it is near the bottom of the reactivity series.
- **B** Aluminium is formed when aluminium oxide is heated with carbon.
- **C** Bauxite is an important ore of aluminium.
- **D** Hematite is an important ore of aluminium.

# 26 Some properties of aluminium are listed.

- 1 It conducts heat.
- 2 It has a low density.
- 3 It is strong.
- 4 It is resistant to corrosion.

Which of these properties make aluminium suitable for making food containers for chilled food products?

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

27 Water is treated at a waterworks to make it fit to drink.

What is present in the water when it leaves the waterworks?

- A bacteria only
- В bacteria and insoluble substances
- C chlorine compounds only
- chlorine compounds and soluble substances
- 28 Sulfur dioxide, carbon monoxide and oxides of nitrogen are common gaseous pollutants found in the air.

Which pollutants contribute to acid rain?

- carbon monoxide and sulfur dioxide
- В oxides of nitrogen and sulfur dioxide
- oxides of nitrogen only
- D sulfur dioxide only
- 29 Which methods prevent iron from rusting?

	coating with zinc	painting	washing with salt water	
Α	✓	✓	✓	key
В	x	✓	✓	✓ = prevents r
С	✓	✓	X	x = does not p
D	✓	X	X	

rusting

prevent rusting

**30** Fertilisers are mixtures of different compounds used to increase the growth of crops.

Which pair of substances contain the three essential elements for plant growth?

- ammonium nitrate and calcium phosphate Α
- В ammonium nitrate and potassium chloride
- C ammonium phosphate and potassium chloride
- D potassium nitrate and calcium carbonate

31	\//h	ich process does <b>no</b>	nt add	a greenhous	a nac to	the atmo	enhai	ura?
31		·	) auu	a greenhous	e gas it	o the atmo	Sprici	16:
	Α	burning methane						
	В	decomposition of v	egeta	tion				
	С	polymerisation						
	D	respiration						
32	Wh	y is sulfur dioxide us	sed as	a food prese	rvative	?		
	Α	It is a gas at room	tempe	erature.				
	В	It is used to make	-					
	С	It kills bacteria.						
	D	It reacts with alkalis	s					
		m reacte mar amain	<b>.</b>					
33	Wh	ich statements abou	ıt lime	(calcium oxid	de) and	limestone	(calc	cium carbonate) are correct?
		1 Limestone	is us	ed in the man	ufactur	e of iron.		
		2 Lime is ma	ade by	/ heating lime	stone.			
		3 Powdered	limes	tone is heate	d with c	lay in the	produ	uction of cement.
		4 Limestone	caus	es soil to be a	acidic.			
	Α	1 and 2 only B	2 an	d 3 only C	1, 2	and 3	D	1, 3 and 4
34	The	e formulae of two org	ganic (	compounds, F	o and C	), are show	vn.	
				P		(	)	
			CH₃CI	H <sub>2</sub> CH <sub>2</sub> OH		CH₃CH		:H <sub>3</sub>
	\//h	ich type of organic o			nd O2			
	VVII	ion type of organic o	отпро	dilus ale i a	iu Q:			
				Р		(	2	
			Α	alcoho	l	alk	ane	
			В	alcoho	l	alk	ene	
			С	carboxylic	acid	alk	ane	
			D	carboxylic	acid	alk	ene	

**35** Petroleum is an important raw material that is separated into useful products.

Which terms describe petroleum and the method used to separate it?

	description	separation method
Α	compound	cracking
В	compound	fractional distillation
С	mixture	cracking
D	mixture	fractional distillation

- 36 Which type of compound is a member of a homologous series?
  - A carbonate
  - B carboxylic acid
  - C halogen
  - **D** hydroxide
- **37** Which statements about propene are correct?
  - 1 Propene contains only single bonds.
  - 2 Propene decolourises bromine water.
  - 3 Propene is obtained by cracking.
  - 4 Propene is a hydrocarbon.
  - **A** 1 and 4 **B** 2, 3 and 4 **C** 2 and 4 only **D** 4 only
- **38** Which row describes the production of ethanol and its properties?

	can be made from glucose	can be made from ethene	is used as a fuel	is used as a solvent	
Α	✓	✓	✓	✓	key
В	✓	x	✓	✓	✓= yes
С	X	✓	✓	X	<b>x</b> = no
D	X	✓	X	✓	

39	Wh	ich	state	ments	abou	t ethanoic a	icid are c	orrect?		
			1	It con	tains	a carbon-c	xygen do	ouble bond.		
			2	It con	tains	two carbon	atoms.			
			3	It dec	olour	ises bromir	e water.			
			4	It con	itains	an –OH gro	oup.			
	A	1 a	and 2	only	В	1 and 3	С	1, 2 and 4	D	2, 3 and 4
40	Wh	ich	polyr	ners aı	re nat	ural polyme	ers?			
			1	carbo	hydra	ates				
			2	poly(	ethen	e)				
			3	prote	in					

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

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The Periodic Table of Elements

	\	2 :	He	helium 4	10	Ne	neon 20	18	Ā	argon 40	36	첫	krypton 84	54	Xe	xenon 131	98	R	radon			
	=				6	ш	fluorine 19	17	Cl	chlorine 35.5	35	ğ	bromine 80	53	П	iodine 127	85	¥	astatine -			
	5				80	0	oxygen 16	16	ഗ	sulfur 32	34	Se	selenium 79	52	Б	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	Si	silicon 28	32	Ge	germanium 73	20	Sn	tin 119	82	Ър	lead 207	114	Fl	flerovium
	≡				2	В	boron 11	13	Ν	aluminium 27	31	Ga	gallium 70	49	I	indium 115	81	lΊ	thallium 204			
											30	Zu	zinc 65	48	ပ္ပ	cadmium 112	80	БĤ	mercury 201	112	S	copernicium -
											29	Cn	copper 64	47	Ag	silver 108	62	Au	gold 197	111	Rg	roentgenium -
dn											28	Z	nickel 59	46	Pd	palladium 106	78	귙	platinum 195	110	Ds	darmstadtium -
Group											27	රි	cobalt 59	45	뫈	rhodium 103	77	'n	iridium 192	109	¥	meitnerium -
		- :	I	hydrogen 1							26	Fe	iron 56	44	Ru	ruthenium 101	9/	Os	osmium 190	108	Hs	hassium -
					1						25	Mn	manganese 55	43	ည	technetium -	75	Re	rhenium 186	107	Bh	bohrium —
						loc	SS				24		chromium 52		Mo	molybdenum 96	74	≥	tungsten 184	106	Sg	seaborgium -
				Key	atomic number	atomic symbo	name relative atomic mass				23	>	vanadium 51	41	g	niobium 93	73	ā	tantalum 181	105	Вb	dubnium –
						ato	rela				22	j	titanium 48	40	Zr	zirconium 91	72	士	hafnium 178	104	꿆	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	ഗ്	strontium 88	56	Ba	barium 137	88	Ra	radium -
	_				3	:=	lithium 7	1	Na	sodium 23	19	メ	potassium 39	37	ВВ	rubidium 85	55	Cs	caesium 133	87	Ŧ	francium —

	22	58	69	09	61	62	63	64	65	99	29	89	69		7.1
lanthanoids	La	Ce	Ŗ	ρN	Pm	Sm	En	ВĠ	Tp	D	운	Щ	T		Γn
	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	98	96	97	86	66	100	101		103
actinoids	Ac	Ч	Ра	$\supset$	ď	Pu	Am	CB	益	ర	Es	Fn	Md		۲
	actinium	thorium	protactinium	uranium	neptunium	plutonium	americium	curium	berkelium	californium	einsteinium	ferminm	mendelevium		lawrencium
	I	232	231	238	ı	ı	ı	ı	ı	I	ı	I	ı	I	ı
								1							

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