

Cambridge Assessment International Education

Cambridge Ordinary Level

CHEMISTRY 5070/12

Paper 1 Multiple Choice October/November 2019

1 hour

Additional Materials: Multiple Choice Answer Sheet

Soft clean eraser

Soft pencil (type B or HB 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.

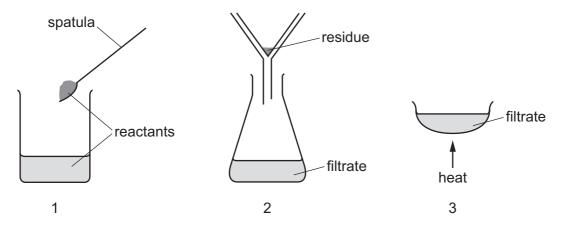
Electronic calculators may be used.



1 The concentration of aqueous sodium carbonate can be found by reaction with hydrochloric acid of known concentration. The indicator methyl orange is used.

Which items of equipment are needed?

- A burette, measuring cylinder, gas syringe
- **B** burette, measuring cylinder, thermometer
- C burette, pipette, conical flask
- **D** burette, pipette, stopwatch
- **2** The diagrams show three stages, 1, 2 and 3, used in the preparation of a salt.



Which row correctly shows the solubilities both of the reactants and of the salt formed in this preparation?

	solubility of reactants	solubility of salt formed
Α	both soluble	insoluble
В	both soluble	soluble
С	one soluble, one insoluble	insoluble
D	one soluble, one insoluble	soluble

3 The nucleon number of an atom is typically greater than its proton number. The difference between these two numbers indicates the number of1...... in the atom.

Atoms that have different nucleon numbers but the same proton number are called2......

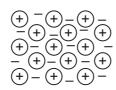
Which words correctly complete gaps 1 and 2?

	1	2
Α	electrons	isomers
В	electrons	isotopes
С	neutrons	isomers
D	neutrons	isotopes

- **4** Which three elements exist as diatomic molecules at room temperature?
 - A hydrogen, oxygen, helium
 - B nitrogen, chlorine, neon
 - C nitrogen, oxygen, fluorine
 - D oxygen, chlorine, helium
- **5** Which is a pure compound?
 - A dry air
 - **B** ethanol
 - C steel
 - **D** petrol (gasoline)

6 Which diagram best represents the structure of a solid metal?

Α



В

key

- a negative ion
- + a positive ion
- an electron

C



D

7 Hydrogen sulfide burns in an excess of oxygen according to the equation shown.

$$2H_2S(g) + 3O_2(g) \rightarrow 2H_2O(g) + 2SO_2(g)$$

48 dm³ of hydrogen sulfide is burned.

Which volume of sulfur dioxide will be formed at room temperature and pressure?

[All volumes are measured at the same temperature and pressure.]

 \mathbf{A} 24 dm³

 $\mathbf{B} \quad 36\,\text{dm}^3$

 \mathbf{C} 48 dm³

 \mathbf{D} 96 dm³

- 8 Which statement about electrical conductivity is correct?
 - **A** Covalent compounds, such as glucose, conduct when molten or dissolved in water.
 - **B** Dilute acids, such as sulfuric acid, conduct because all the ions are free to move.
 - **C** lonic compounds, such as sodium chloride, conduct due to movement of electrons.
 - **D** Metals, such as copper, conduct due to movement of positive ions.
- **9** Ammonia is manufactured from nitrogen and hydrogen by the Haber process.

$$N_2(g) + 3H_2(g) \rightleftharpoons 2NH_3(g)$$

What is the percentage yield when 60 kg of ammonia is produced from 60 kg of hydrogen?

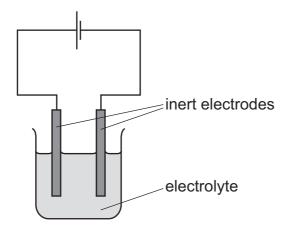
A 5.9%

B 17.6%

C 35.3%

D 50.0%

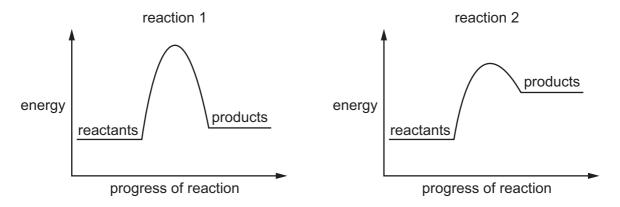
- **10** What is the ratio of the number of molecules in 71g of gaseous chlorine to the number of molecules in 2g of gaseous hydrogen?
 - **A** 1:1
- **B** 1:2
- **C** 2:1
- **D** 71:2
- 11 The diagram shows the apparatus for an electrolysis experiment.



Using the apparatus shown, which electrolyte would give colourless gases at both electrodes?

- A aqueous copper(II) sulfate
- B concentrated aqueous sodium chloride
- C dilute sulfuric acid
- D molten lead bromide
- 12 Which metal is most likely to be extracted from its molten chloride by the use of electrolysis?
 - A calcium
 - **B** copper
 - C iron
 - **D** silver

13 Two energy profile diagrams are shown. The scale on the *y*-axis is the same for both diagrams.



Which statement is correct?

- Both reactions are exothermic.
- В Only one reaction is endothermic.
- C The activation energy of reaction 1 is smaller than the activation energy of reaction 2.
- The enthalpy change of reaction 2 is larger than the enthalpy change of reaction 1.
- **14** Ammonium nitrate dissolves in water.

$$NH_4NO_3(s) \longrightarrow NH_4NO_3(aq)$$
 $\Delta H = +25 \text{ kJ/mol}$

Which statements are correct?

- The reaction is endothermic.
- The water gets colder during the reaction.
- 3 Heat energy is absorbed by the ammonium nitrate from the water.
- 1 and 2 only
- **B** 1 and 3 only **C** 2 and 3 only
- **D** 1, 2 and 3
- **15** Which statement about photosynthesis is correct?
 - **A** Chlorophyll is a reactant.
 - **B** Oxygen is a product.
 - **C** Sunlight is a reactant.
 - **D** Water is a product.

16 In which reaction is the underlined substance reduced?

A
$$\underline{C}(s) + CO_2(g) \rightarrow 2CO(g)$$

B
$$Cl_2(g) + 2I^-(aq) \rightarrow I_2(aq) + 2Cl^-(aq)$$

C
$$Mg(s) + CuO(s) \rightarrow MgO(s) + Cu(s)$$

D
$$Zn(s) + 2H^{+}(aq) \rightarrow Zn^{2+}(aq) + H_{2}(g)$$

17 Catalysts alter the rate of chemical reactions.

Which statements correctly describe the effect of adding a catalyst to a reaction?

- 1 All reactant particles have more energy and move faster.
- 2 The activation energy is lowered.
- 3 More reactant particles collide with enough energy to react.

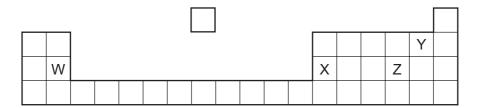
D 3 only

- **A** 1, 2 and 3 **B** 1 and 3 only **C** 2 and 3 only
- **18** Solution T has the following properties.
 - 1 It reacts with magnesium forming a gas.
 - 2 It reacts with calcium carbonate forming a gas.

Which statement about solution T is correct?

- **A** It contains more OH[−] ions than H⁺ ions.
- **B** It has pH 9.
- **C** Its reaction with calcium carbonate produces hydrogen.
- **D** It reacts with aqueous ammonia.
- 19 Which substance is soluble in water?
 - A copper(II) carbonate
 - **B** copper(II) oxide
 - **C** copper(II) hydroxide
 - **D** copper(II) nitrate
- 20 Which statement about ammonia is correct?
 - A It is a colourless, odourless gas.
 - **B** It is a gas that turns damp blue litmus paper red.
 - **C** It is formed when potassium nitrate is heated with aqueous sodium hydroxide and aluminium.
 - **D** It is manufactured using vanadium(V) oxide as a catalyst.

21 Part of the Periodic Table is shown with four elements, W, X, Y and Z. These are **not** the elements' actual symbols.



Some pairs of these elements may react to form compounds.

Which formulae are correct?

- A WX and YZ
- B WY₂ and WZ
- C WZ and XZ
- \mathbf{D} X_2Z_3 and YZ
- 22 The elements in Group I have similar chemical properties.

Which statement explains why this is true?

- A They all have metallic bonding.
- **B** They all have the same number of complete electron shells.
- **C** They all have the same number of electrons in their outer shell.
- **D** They are all stored under oil to prevent reactions with the air.
- 23 Helium and xenon are both noble gases.

What is true of both elements?

	they are chemically inert	the atoms have eight electrons in their outer shell
Α	✓	✓
В	✓	X
С	X	✓
D	X	X

24 The ions of metal X react with aqueous potassium iodide.

$$2X^{2^{+}}(aq)$$
 + $4I^{-}(aq)$ \rightarrow $2XI(s)$ + $I_{2}(aq)$ coloured

From this information, it can be deduced that X is most likely a1..... metal and the $X^{2+}(aq)$ ions are2.....

Which words correctly complete gaps 1 and 2?

	1	2
Α	Group II	oxidised
В	Group II	reduced
С	transition	oxidised
D	transition	reduced

25 Which substance is a metal?

	melting point	conducts electricity when solid	conducts electricity when molten
Α	high	X	✓
В	high	x	x
С	high	✓	✓
D	low	x	X

26 Which metal can be obtained from its oxide by using either carbon or hydrogen?

A Cu

B Fe

C Mg

D Zn

27 Metal carbonates decompose when heated.

Which carbonate is most stable to heat?

A calcium carbonate

B copper(II) carbonate

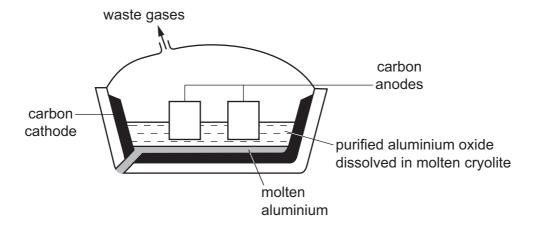
C lead(II) carbonate

D zinc carbonate

28 Iron is extracted from its ore in a blast furnace. Coke and limestone are also added to the blast furnace.

What is the purpose of the limestone?

- A to decompose to release oxygen to burn the coke
- B to decompose to release oxygen to oxidise the iron
- **C** to decompose to neutralise the acidic impurities
- **D** to react with coke to heat the blast furnace
- **29** Aluminium is extracted from aluminium oxide by electrolysis.



Which statement about this electrolysis is correct?

- **A** Aluminium ions gain electrons to form aluminium.
- **B** Cryolite increases the melting point of the electrolyte.
- **C** Cryolite reacts with impurities to form slag.
- **D** The carbon cathode has to be replaced regularly as it reacts with oxygen.
- **30** Steel is produced by blowing oxygen into impure molten iron.

A student suggests two reasons why this process is carried out.

- 1 The oxygen removes some of the carbon from the impure iron.
- 2 The oxygen oxidises iron(II) ions to iron(III) ions.

Which reasons are correct?

- A both 1 and 2
- B 1 only
- C 2 only
- **D** neither 1 nor 2

An	aqueous solution	on of	Z is acidic.				
Zis	s removed from	the e	exhaust gases in	a ca	atalytic converte	r by ı	reduction
Wh	nat is Z?						
Α	СО	В	N_2	С	H ₂ O	D	NO_2

32 A student investigates the properties of a colourless organic liquid.

31 Z is a pollutant gas that is formed in internal combustion engines.

Which observation shows that the liquid is unsaturated?

- **A** It decolourises aqueous bromine.
- **B** It has a sweet smell.
- **C** It is a good solvent for organic compounds.
- **D** It produces carbon dioxide when burned.

33 Alkanes are saturated compounds containing carbon and hydrogen only.

Structures 1, 2, 3 and 4 are saturated hydrocarbons.

H H H H C C C H

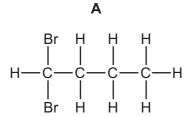
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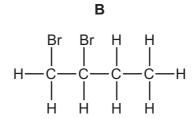
Which pair of structures are isomers?

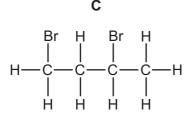
- **A** 1 and 2
- **B** 1 and 4
- **C** 2 and 3
- **D** 2 and 4

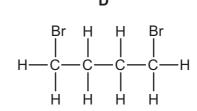
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34 When butene reacts with bromine, which compound could be made?









35 Which statement about propene is correct?

- A It can be formed by cracking butane.
- **B** It has the formula C₃H₈.
- **C** It is a saturated hydrocarbon.
- **D** It reacts with hydrogen to form ethane.

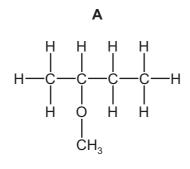
36 Which term describes the structure of *Terylene*?

- A polyalkene
- **B** polyamide
- C polyester
- **D** protein

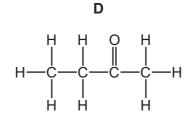
37 Which process is involved in the formation of ethanol from ethene?

- A addition
- **B** combustion
- **C** polymerisation
- **D** substitution

38 Which compound is an alcohol?



H H O | | || H—C—C—C—O—F



39 Which two compounds react together to form CH₃CH₂COOCH₃?

- A ethanoic acid and ethanol
- **B** methanoic acid and ethanol
- **C** methanoic acid and propanol
- **D** propanoic acid and methanol

40 Which compound might be suitable to flavour a soft drink?

- A CH₃CH₂CH₂COOCH₃
- B CH₃CH₂CH₂CH₂CH₂OH
- C CH₃CH₂CH₂COOH
- D CH₃CHCHCH₂CH₃

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The Periodic Table of Elements

	\	2 :	He	helium 4	10	Ne	neon 20	18	Ā	argon 40	36	궃	krypton 84	54	Xe	xenon 131	98	Ru	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	S	sulfur 32	34	Se	selenium 79	52	Те	tellurium 128	84	Ъ	polonium —	116		livermorium -
	>				7	z	nitrogen 14	15	۵	phosphorus 31	33	As	arsenic 75	51	Sp	antimony 122	83	<u>.</u>	bismuth 209			
	≥				9	ပ	carbon 12	14	Si	silicon 28	32	Ge	germanium 73	20	Sn	tin 119	82	Pp	lead 207	114	Εl	flerovium -
	≡				2	В	boron 11	13	Ν	aluminium 27	31	Ga	gallium 70	49	In	indium 115	81	lΊ	thallium 204			
								1			30	Zu	zinc 65	48	В О	cadmium 112	80	БĤ	mercury 201	112	S	copemicium –
											29	Cn	copper 64	47	Ag	silver 108	62	Au	gold 197	111	Rg	roentgenium -
dn											28	Z	nickel 59	46	Pq	palladium 106	78	귙	platinum 195	110	Ds	darmstadtium -
Group											27	ပိ	cobalt 59	45	格	rhodium 103	77	Ľ	iridium 192	109	¥	meitnerium -
		- :	I	hydrogen 1							26	Fe	iron 56	44	R	ruthenium 101	92	SO	osmium 190	108	Hs	hassium
					J						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	q	niobium 93	73	<u>n</u>	tantalum 181	105	op O	dubnium
					to	ato	rela				22	j	titanium 48	40	Zr	zirconium 91	72	茔	hafnium 178	104	弘	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	11	Na	sodium 23	19	¥	potassium 39	37	Rb	rubidium 85	55	Cs	caesium 133	87	뇬	francium -

22	58	59	90	61	62	63	64	65	99	67	99	69	7.0	7.1
La	Ce	Ą	PZ	Pm	Sm	Ē	P9	qL	Ò	운	ш	T	Υb	Γn
nthanum 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	98	96	6	98	66	100	101	102	103
Ac	H	Ра	\supset	dN	Pu	Am	CB	Ř	Ç	Es	Fm	Md	8	۲
ctinium	thorium	protactinium	uranium	neptunium	plutonium	americium	curium	berkelium	californium	einsteinium	fermium	mendelevium	nobelium	lawrencium
ı	232	231	238	ı	ı	ı	ı	ı	ı	ı	ı	ı	I	ı

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