Cambridge International Examinations
Cambridge International General Certificate of Secondary Education

CHEMISTRY **0620/12**

Paper 1 Multiple Choice (Core) **May/June 2018**

45 minutes

Additional Materials: Multiple Choice Answer Sheet
Soft clean eraser
Soft pencil (type B or HB is recommended)

8053932751

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 **15** printed pages and **1** blank page.

© UCLES 2018

1 When iodine is heated it turns from a solid to a gas.

When liquid ammonia is cooled it turns into a solid.

When ice is heated it turns into water.

Which terms describe these changes of state?

	when iodine is heated	when liquid ammonia is cooled	when ice is heated
A	boiling	freezing	melting
B	freezing	sublimation	boiling
C	sublimation	condensation	freezing
D	sublimation	freezing	melting

2 Which piece of apparatus **cannot** be used to collect and measure the volume of gas produced in an experiment?

A burette

B gas syringe

C measuring cylinder

D pipette

3 Pure ethanol has a melting point of –114 °C and a boiling point of 78 °C.

What are the melting and boiling points of a sample of ethanol with glucose dissolved in it?

	melting point / °C	boiling point / °C
A	–116	77
B	–116	79
C	–112	77
D	–112	79

4 Which atom has an equal number of protons, neutrons and electrons?

A ^{40}Ar **B** ^{1}H **C** ^{23}Na **D** ^{14}N

© UCLES 2018

5 Which description of brass is correct?

A alloy

B compound

C element

D non-metal

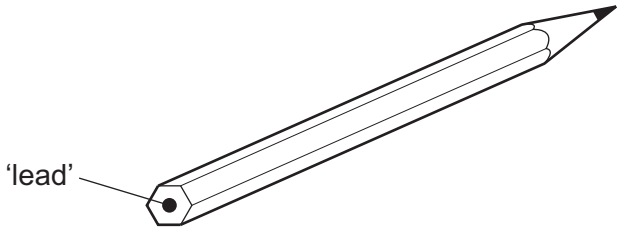
6 The bonding between elements X and Y in compound XY_2 is shown.

$$Y = X = Y$$

Which row shows the type of bond in XY_2 and the type of element X?

	type of bond	type of element X
A	covalent	metal
B	covalent	non-metal
C	ionic	metal
D	ionic	non-metal

7 The 'lead' in a pencil is made of a mixture of graphite and clay.



When the percentage of graphite is increased, the pencil slides across the paper more easily.

Which statement explains this observation?

A Graphite has a high melting point.

B Graphite is a form of carbon.

C Graphite is a lubricant.

D Graphite is a non-metal.

8 The equation for the reaction between magnesium and dilute sulfuric acid is shown.

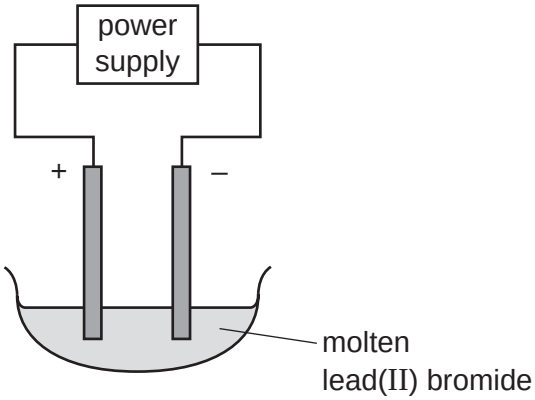
The M_r of $MgSO_4$ is 120.

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

Which mass of magnesium sulfate is formed when 12 g of magnesium completely reacts with dilute sulfuric acid?

A 5 g **B** 10 g **C** 60 g **D** 120 g

9 The electrolysis of molten lead(II) bromide is shown.



Which statement describes what happens at the negative electrode?

A Bromide ions gain electrons to form bromine molecules.

B Bromine molecules gain electrons to form bromide ions.

C Lead atoms lose electrons to form lead ions.

D Lead ions gain electrons to form lead atoms.

10 Which statement about the combustion of fuels is correct?

A It always produces carbon dioxide.

B It always produces carbon monoxide.

C It is always endothermic.

D It is always exothermic.

© UCLES 2018

11 Which statement about chemical reactions is correct?

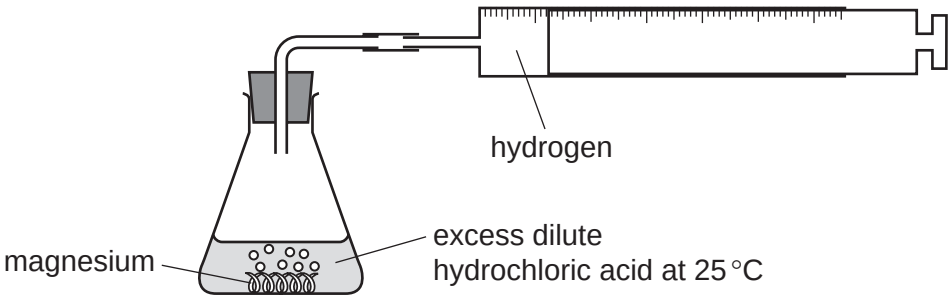
A Endothermic reactions show a temperature decrease because energy is absorbed from the surroundings.

B Endothermic reactions show a temperature increase because energy is released into the surroundings.

C Exothermic reactions show a temperature increase because energy is absorbed from the surroundings.

D Exothermic reactions show a temperature decrease because energy is released into the surroundings.

12 The diagram shows a rate of reaction experiment.



Increasing the concentration of the acid and increasing the temperature both affect the rate of reaction.

Which row is correct?

	increase the concentration of acid	increase the temperature
A	decrease rate of reaction	decrease rate of reaction
B	decrease rate of reaction	increase rate of reaction
C	increase rate of reaction	decrease rate of reaction
D	increase rate of reaction	increase rate of reaction

© UCLES 2018

[Turn over

13 Reaction X shows a test for water. Reaction Y occurs in the blast furnace for extracting iron.

reaction X $CoCl_2 + 6H_2O \rightleftharpoons CoCl_2.6H_2O$

reaction Y $C + CO_2 \rightarrow 2CO$

Reaction X is .....1..... . In reaction Y, the oxide CO_2 is .....2..... .

Which words correctly complete gaps 1 and 2?

	1	2
A	irreversible	oxidised
B	irreversible	reduced
C	reversible	oxidised
D	reversible	reduced

14 Which equation shows an oxidation reaction?

A $C + O_2 \rightarrow CO_2$

B $CaCO_3 \rightarrow CaO + CO_2$

C $CaO + 2HCl \rightarrow CaCl_2 + H_2O$

D $N_2O_4 \rightarrow 2NO_2$

15 Which two gases each give the same result for the test shown?

	test	gas 1	gas 2
A	damp blue litmus paper	ammonia	chlorine
B	damp blue litmus paper	ammonia	oxygen
C	lighted splint	hydrogen	chlorine
D	lighted splint	hydrogen	oxygen

16 Which statement about oxides is correct?

A A solution of magnesium oxide has a pH less than pH 7.

B A solution of sulfur dioxide has a pH greater than pH 7.

C Magnesium oxide reacts with nitric acid to make a salt.

D Sulfur dioxide reacts with hydrochloric acid to make a salt.

© UCLES 2018

17 Which methods are suitable for preparing **both** zinc sulfate and copper(II) sulfate?

1 reacting the metal oxide with warm dilute aqueous sulfuric acid

2 reacting the metal with dilute aqueous sulfuric acid

3 reacting the metal carbonate with dilute aqueous sulfuric acid

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

18 Two separate tests are done on separate solutions of compound X.

1 Addition of aqueous sodium hydroxide forms a green precipitate that dissolves in an excess of aqueous sodium hydroxide.

2 Addition of dilute nitric acid and aqueous silver nitrate forms a white precipitate.

What is compound X?

A chromium(III) carbonate

B chromium(III) chloride

C iron(II) carbonate

D iron(II) chloride

19 Which statement about the Periodic Table is correct?

A Elements in the same group have the same number of electron shells.

B It contains elements arranged in order of increasing proton number.

C Metals are on the right and non-metals are on the left.

D The most reactive elements are at the bottom of every group.

20 Chlorine, bromine and iodine are elements in Group VII of the Periodic Table.

Which statement about these elements is **not** correct?

A The colour gets darker down the group.

B The density increases down the group.

C They are all gases at room temperature and pressure.

D They are all non-metals.

© UCLES 2018

21 Which row describes the properties of a transition element?

	property 1	property 2
A	forms colourless compounds	acts as a catalyst
B	forms colourless compounds	low electrical conductivity
C	high density	acts as a catalyst
D	high density	low electrical conductivity

22 Which statement about the elements in Group VIII is correct?

A They all form diatomic molecules.

B They all have eight electrons in their outer shells.

C They all react with oxygen to form oxides.

D They are all gases at room temperature.

23 Stainless steel is an alloy of iron, carbon and other metals.

Which row is correct?

	stainless steel is harder than pure iron	stainless steel resists corrosion better than pure iron
A	✓	✓
B	✓	✗
C	✗	✓
D	✗	✗

© UCLES 2018

24 A student is given metal Z and its oxide.

The student does some experiments to find out the position of metal Z in the reactivity series.

The results are shown.

- Metal Z reacted slowly with dilute hydrochloric acid.
- Metal Z reacted slowly with steam but not with water.
- The oxide of metal Z reacted when heated with carbon.

Which statement about the position of metal Z in the reactivity series is correct?

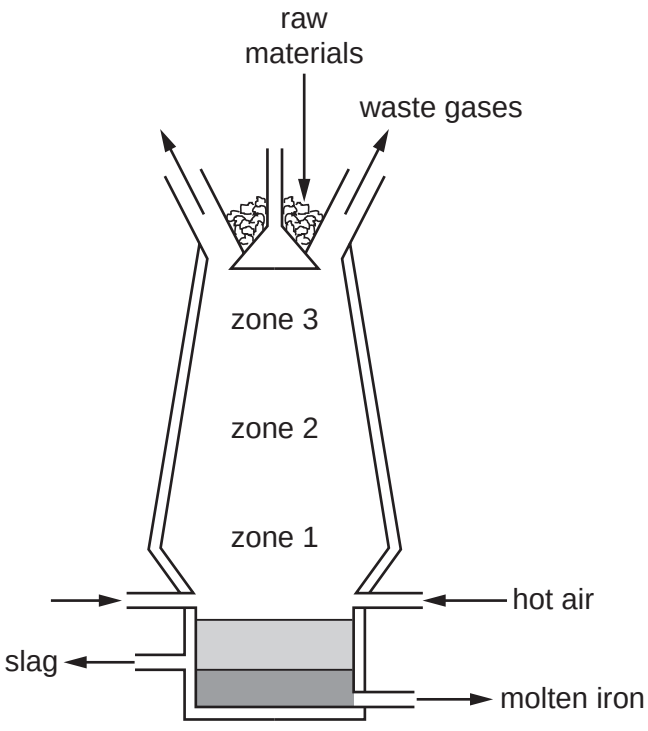
A It is between calcium and sodium.

B It is between copper and hydrogen.

C It is between hydrogen and iron.

D It is between magnesium and calcium.

25 Iron is produced from iron ore in a blast furnace.



Which equation represents the main reaction that happens in zone 1?

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

B $C(s) + O_2(g) \rightarrow CO_2(g)$

C $Fe_2O_3(s) + 3CO(g) \rightarrow 2Fe(l) + 3CO_2(g)$

D $Fe_3O_4(s) + CO(g) \rightarrow 3FeO(s) + CO_2(g)$

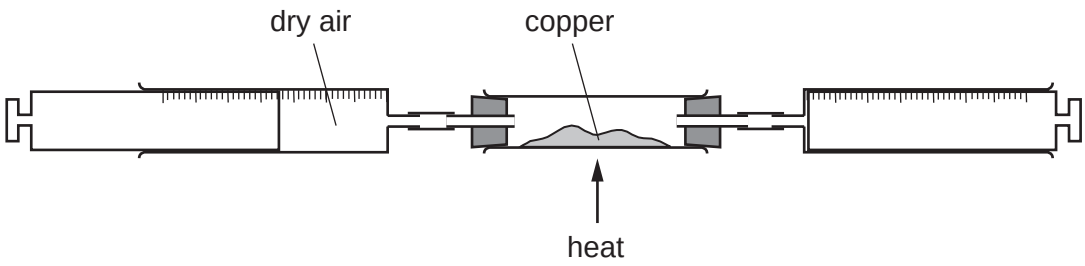
© UCLES 2018

[Turn over

26 Which row describes the use of an alloy and the property upon which the use depends?

	alloy	use	property
A	mild steel	cutlery	resistant to corrosion
B	mild steel	machinery	strong
C	stainless steel	cutlery	low density
D	stainless steel	machinery	good conductor of electricity

27 Dry air is passed over hot copper until all the oxygen has reacted.



The volume of gas at the end of the reaction is 120 cm^3.

What is the starting volume of dry air?

A 132 cm^3 **B** 152 cm^3 **C** 180 cm^3 **D** 570 cm^3

28 A steel bicycle which had been left outdoors for several months was starting to rust.

What would **not** reduce the rate of corrosion?

A Remove the rust and paint the bicycle.

B Remove the rust and store the bicycle in a dry shed.

C Remove the rust and wipe the bicycle with a clean, damp cloth.

D Remove the rust and wipe the bicycle with an oily cloth.

© UCLES 2018

29 Which statements about water are correct?

1 Household water contains dissolved salts.

2 Water for household use is filtered to remove soluble impurities.

3 Water is treated with chlorine to kill bacteria.

4 Water is used in industry for cooling.

A 1, 2, 3 and 4

B 1, 2 and 3 only

C 1, 3 and 4 only

D 2, 3 and 4 only

30 Ammonium nitrate is a common fertiliser used by farmers to increase the yield of their crops.

Which compound reacts with ammonium nitrate to form ammonia?

A calcium hydroxide

B potassium nitrate

C sodium chloride

D sodium phosphate

31 Which process does **not** release a greenhouse gas?

A digestion of food in cows

B reaction between zinc and hydrochloric acid

C respiration by animals

D thermal decomposition of calcium carbonate

32 Which row describes the uses of sulfur and sulfur dioxide?

	sulfur	sulfur dioxide
A	extraction of aluminium	food preservative
B	extraction of aluminium	water treatment
C	manufacture of sulfuric acid	food preservative
D	manufacture of sulfuric acid	water treatment

© UCLES 2018

[Turn over

33 Limestone is used in many industrial processes.

In which process is it **not** used?

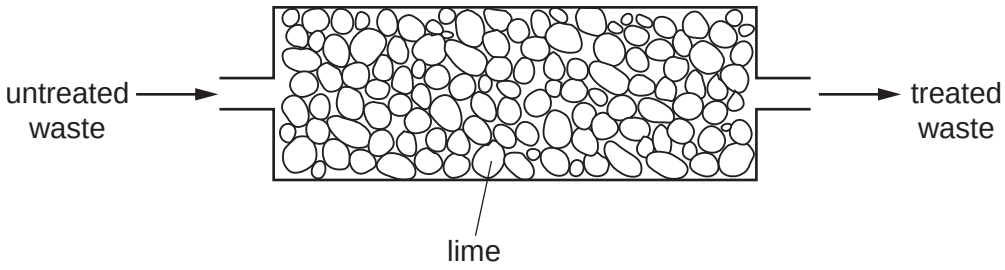
A manufacture of alkenes

B manufacture of cement

C manufacture of iron

D manufacture of lime

34 Lime is used to treat an industrial waste.



Which change occurs in the treatment?

	untreated waste		treated waste
A	acidic	→	neutral
B	alkaline	→	acidic
C	alkaline	→	neutral
D	neutral	→	acidic

35 What is **not** the correct use of the fraction named?

	name of fraction	use
A	fuel oil	making waxes
B	gas oil	fuel in diesel engines
C	kerosene	jet fuel
D	naphtha	making chemicals

© UCLES 2018

36 Four organic compounds are listed.

ethane

ethanoic acid

ethanol

ethene

Which bond do all four compounds contain?

A C–C **B** C–H **C** C–O **D** O–H

37 Which compounds belong to the same homologous series?

A ethane and propane

B ethanoic acid and ethanol

C methane and ethene

D propene and ethanoic acid

38 Which substances can be obtained by cracking hydrocarbons?

A ethanol and ethene

B ethanol and hydrogen

C ethene and hydrogen

D ethene and poly(ethene)

39 The equations for two important processes used to manufacture ethanol are shown.

process 1 $C_6H_{12}O_6 \rightarrow 2C_2H_5OH + 2CO_2$

process 2 $C_2H_4 + H_2O \rightarrow C_2H_5OH$

Which statement is **not** correct?

A Both processes require a catalyst.

B Both processes use a starting material obtained from petroleum.

C Process 1 shows the production of a renewable fuel.

D Process 2 is an addition reaction.

© UCLES 2018

40 Part of the label on the packet of a potato product is shown.

This potato product contains: starch ethanoic acid sodium chloride sugar

Which constituent is a natural polymer?

A ethanoic acid

B sodium chloride

C starch

D sugar

© UCLES 2018

BLANK PAGE

Permission to reproduce items where third-party owned material protected by copyright is included has been sought and cleared where possible. Every reasonable effort has been made by the publisher (UCLES) to trace copyright holders, but if any items requiring clearance have unwittingly been included, the publisher will be pleased to make amends at the earliest possible opportunity.

To avoid the issue of disclosure of answer-related information to candidates, all copyright acknowledgements are reproduced online in the Cambridge International Examinations Copyright Acknowledgements Booklet. This is produced for each series of examinations and is freely available to download at www.cie.org.uk after the live examination series.

Cambridge International Examinations is part of the Cambridge Assessment Group. Cambridge Assessment is the brand name of University of Cambridge Local Examinations Syndicate (UCLES), which is itself a department of the University of Cambridge.

© UCLES 2018

The Periodic Table of Elements

Group																	
I	II											III	IV	V	VI	VII	VIII
							1 H hydrogen 1										2 He helium 4
3 Li lithium 7	4 Be beryllium 9											5 B boron 11	6 C carbon 12	7 N nitrogen 14	8 O oxygen 16	9 F fluorine 19	10 Ne neon 20
11 Na sodium 23	12 Mg magnesium 24											13 Al aluminium 27	14 Si silicon 28	15 P phosphorus 31	16 S sulfur 32	17 Cl chlorine 35.5	18 Ar argon 40
19 K potassium 39	20 Ca calcium 40	21 Sc scandium 45	22 Ti titanium 48	23 V vanadium 51	24 Cr chromium 52	25 Mn manganese 55	26 Fe iron 56	27 Co cobalt 59	28 Ni nickel 59	29 Cu copper 64	30 Zn zinc 65	31 Ga gallium 70	32 Ge germanium 73	33 As arsenic 75	34 Se selenium 79	35 Br bromine 80	36 Kr krypton 84
37 Rb rubidium 85	38 Sr strontium 88	39 Y yttrium 89	40 Zr zirconium 91	41 Nb niobium 93	42 Mo molybdenum 96	43 Tc technetium –	44 Ru ruthenium 101	45 Rh rhodium 103	46 Pd palladium 106	47 Ag silver 108	48 Cd cadmium 112	49 In indium 115	50 Sn tin 119	51 Sb antimony 122	52 Te tellurium 128	53 I iodine 127	54 Xe xenon 131
55 Cs caesium 133	56 Ba barium 137	57–71 lanthanoids	72 Hf hafnium 178	73 Ta tantalum 181	74 W tungsten 184	75 Re rhenium 186	76 Os osmium 190	77 Ir iridium 192	78 Pt platinum 195	79 Au gold 197	80 Hg mercury 201	81 Tl thallium 204	82 Pb lead 207	83 Bi bismuth 209	84 Po polonium –	85 At astatine –	86 Rn radon –
87 Fr francium –	88 Ra radium –	89–103 actinoids	104 Rf rutherfordium –	105 Db dubnium –	106 Sg seaborgium –	107 Bh bohrium –	108 Hs hassium –	109 Mt meitnerium –	110 Ds darmstadtium –	111 Rg roentgenium –	112 Cn copernicium –		114 Fl flerovium –		116 Lv livermorium –		

Key

atomic number
atomic symbol
name
relative atomic mass

lanthanoids	57 La lanthanum 139	58 Ce cerium 140	59 Pr praseodymium 141	60 Nd neodymium 144	61 Pm promethium –	62 Sm samarium 150	63 Eu europium 152	64 Gd gadolinium 157	65 Tb terbium 159	66 Dy dysprosium 163	67 Ho holmium 165	68 Er erbium 167	69 Tm thulium 169	70 Yb ytterbium 173	71 Lu lutetium 175
actinoids	89 Ac actinium –	90 Th thorium 232	91 Pa protactinium 231	92 U uranium 238	93 Np neptunium –	94 Pu plutonium –	95 Am americium –	96 Cm curium –	97 Bk berkelium –	98 Cf californium –	99 Es einsteinium –	100 Fm fermium –	101 Md mendelevium –	102 No nobelium –	103 Lr lawrencium –

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