Cambridge International Examinations
Cambridge International General Certificate of Secondary Education

CHEMISTRY **0620/12**

Paper 1 Multiple Choice (Core) **October/November 2018**

45 minutes

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

* 1 7 7 1 4 3 5 3 5 6 *

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.

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1 A gas is heated. The pressure is kept constant.

Which statement describes the behaviour of the particles in the gas?

A The particles move faster and become closer together.

B The particles move faster and become further apart.

C The particles move slower and become closer together.

D The particles move slower and become further apart.

2 In which state does 1 dm^3 of methane contain the most particles?

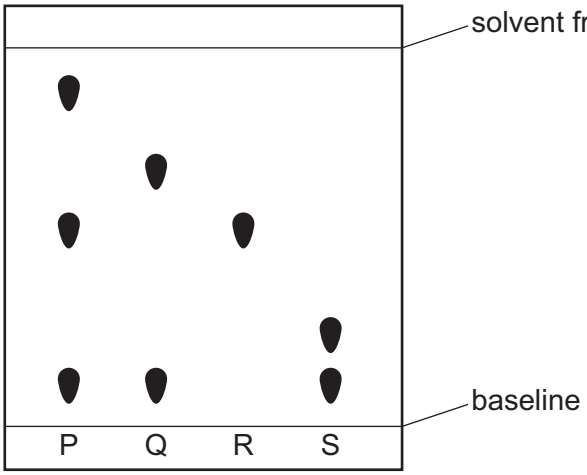
A gas at 100 °C

B gas at room temperature

C liquid

D solid

3 The chromatogram obtained from four mixtures of dyes, P, Q, R and S, is shown.



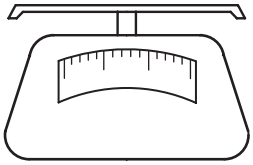
What is the total number of different dyes identified in the four mixtures?

A 3 **B** 4 **C** 5 **D** 8

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4 The diagrams show four pieces of laboratory equipment.

balance



pipette



stop-clock



thermometer



Which equipment is essential to find out if dissolving a salt in water is an exothermic process?

	balance	pipette	stop-clock	thermometer
A	✗	✗	✗	✓
B	✓	✗	✗	✓
C	✗	✓	✗	✓
D	✓	✗	✓	✗

5 How many neutrons are present in the atom $^{45}_{21}X$?

A 21 **B** 24 **C** 45 **D** 66

6 Strontium nitrate is an ionic compound.

Cyclohexane is a covalent compound.

Which row describes a property of each compound?

	strontium nitrate	cyclohexane
A	conducts electricity in aqueous solution	low boiling point
B	low melting point	insoluble in water
C	soluble in water	conducts electricity when solid
D	conducts electricity when solid	high melting point

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7 Ionic bonds are formed when elements from Group I and Group VII react together.

Which statement about ions or ionic compounds is **not** correct?

A Electrons from one atom are transferred to another atom to form ions.

B Group VII atoms gain electrons to form ions.

C Negative ions are formed when atoms lose electrons.

D Molten ionic compounds conduct electricity.

8 What is the relative formula mass of $Mg(OH)_2$?

A 21 **B** 30 **C** 42 **D** 58

9 Calcium carbonate, $CaCO_3$, reacts with dilute hydrochloric acid to produce carbon dioxide.

The equation for the reaction is shown. The relative formula mass of calcium carbonate is 100.

$$CaCO_3 + 2HCl \rightarrow CaCl_2 + H_2O + CO_2$$

10 g of calcium carbonate is reacted with an excess of dilute hydrochloric acid.

Which mass of carbon dioxide is produced?

A 2.2 g **B** 2.8 g **C** 4.4 g **D** 44 g

10 Concentrated hydrochloric acid and dilute sulfuric acid were electrolysed in separate experiments using carbon electrodes.

Which statement is correct for both electrolysis experiments?

A Chlorine gas is produced at the positive electrode.

B Hydrogen gas is produced at the positive electrode.

C Hydrogen gas is produced at the negative electrode.

D Oxygen gas is produced at the negative electrode.

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11 Aqueous nickel(II) sulfate is used as the electrolyte to electroplate a piece of steel with nickel.

Which materials are used as the negative electrode and positive electrode?

	negative electrode	positive electrode
A	carbon	steel
B	nickel	steel
C	platinum	nickel
D	steel	nickel

12 Which substance does **not** use oxygen to produce heat energy?

A coal

B hydrogen

C natural gas

D uranium

13 Equal volumes and concentrations of dilute hydrochloric acid and aqueous sodium hydroxide are mixed. The temperatures of the solutions are shown.

solution	temperature / °C
dilute hydrochloric acid	26
aqueous sodium hydroxide	26
mixture of dilute hydrochloric acid and aqueous sodium hydroxide	33

Which statement describes the reaction?

A Energy is released and the products have less energy than the reactants.

B Energy is released and the products have more energy than the reactants.

C Energy is absorbed and the products have less energy than the reactants.

D Energy is absorbed and the products have more energy than the reactants.

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[Turn over

14 A student heats hydrated copper(II) sulfate. The blue crystals change to a white powder.

How can the student reverse this reaction?

A Add anhydrous copper(II) sulfate to the white powder.

B Add water to the white powder.

C Cool the white powder.

D Reheat the white powder.

15 Which compound is written with the oxidation state (VII)?

A $CuSO_4$ **B** $FeSO_4$ **C** $Fe_2(SO_4)_3$ **D** $KMnO_4$

16 Magnesium powder reacts with an excess of dilute hydrochloric acid to produce hydrogen gas.

Which statements about this reaction are correct?

1 The smaller the particles of magnesium powder, the slower hydrogen is produced.

2 The higher the temperature, the faster the magnesium powder disappears.

3 The lower the concentration of dilute hydrochloric acid, the faster the rate of reaction.

4 The faster the magnesium powder disappears, the faster the rate of reaction.

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

17 In which row are the oxides correctly identified?

	acidic	basic
A	magnesium oxide, calcium oxide	sulfur dioxide, carbon dioxide
B	magnesium oxide, sulfur dioxide	carbon dioxide, calcium oxide
C	sulfur dioxide, carbon dioxide	calcium oxide, magnesium oxide
D	sulfur dioxide, magnesium oxide	calcium oxide, carbon dioxide

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18 The following steps are done to prepare solid magnesium sulfate.

1 filtration

2 measurement of 20 cm^3 of dilute sulfuric acid using a measuring cylinder

3 evaporation

4 addition of an excess of solid magnesium carbonate to dilute sulfuric acid

What is the correct order for these steps?

A $2 \rightarrow 4 \rightarrow 3 \rightarrow 1$

B $2 \rightarrow 4 \rightarrow 1 \rightarrow 3$

C $4 \rightarrow 2 \rightarrow 1 \rightarrow 3$

D $4 \rightarrow 2 \rightarrow 3 \rightarrow 1$

19 When dilute sulfuric acid is added to solid X, a colourless solution is formed and a gas is produced.

What is X?

A copper(II) oxide

B sodium oxide

C copper(II) carbonate

D sodium carbonate

20 A few drops of methyl orange are added to a reaction mixture.

During the reaction, a gas is produced and the methyl orange turns from red to orange.

What are the reactants?

A aqueous sodium hydroxide and ammonium chloride

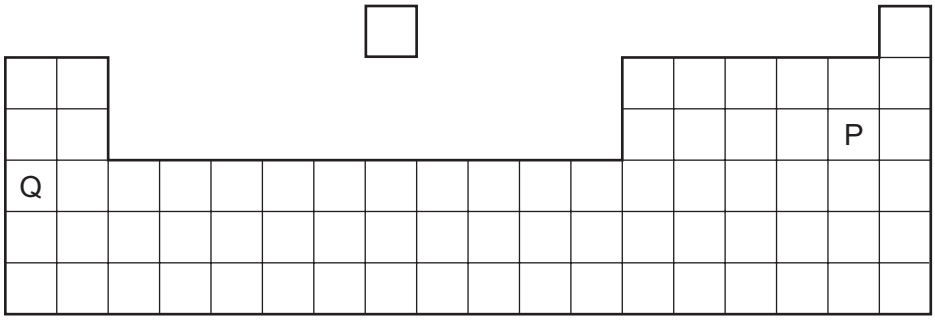
B aqueous sodium hydroxide and calcium carbonate

C dilute hydrochloric acid and magnesium

D dilute hydrochloric acid and aqueous sodium hydroxide

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21 The positions of two elements, P and Q, in the Periodic Table are shown.



P and Q react together to form a compound.

What is the formula of the compound?

A QP **B** Q_2P **C** Q_7P **D** QP_7

22 Elements in Group I of the Periodic Table react with water.

Which row describes the products made in the reaction and the trend in reactivity of the elements?

	products	trend in reactivity
A	metal hydroxide and hydrogen	less reactive down the group
B	metal hydroxide and hydrogen	more reactive down the group
C	metal oxide and hydrogen	less reactive down the group
D	metal oxide and hydrogen	more reactive down the group

23 The equation shows the reaction between a halogen and aqueous bromide ions.

$$X_2 + 2Br^- \rightarrow 2X^- + Br_2$$

.....1..... .....2..... .....3.....

Which words complete gaps 1, 2 and 3?

	1	2	3
A	chlorine	brown	colourless
B	chlorine	colourless	brown
C	iodine	brown	colourless
D	iodine	colourless	brown

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24 An inert gas R is used to fill weather balloons.

Which descriptions of R are correct?

	number of outer shell electrons in atoms of R	structure of gas R
A	2	diatomic molecules
B	2	single atoms
C	8	diatomic molecules
D	8	single atoms

25 Four metals, W, X, Y and Z, are separately reacted with water and dilute hydrochloric acid.

The results are shown.

	metal			
	W	X	Y	Z
reaction with water	fizzes	no reaction	fizzes vigorously	no reaction
reaction with dilute hydrochloric acid	fizzes	no reaction	fizzes violently	fizzes

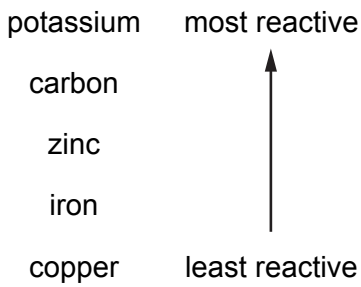
What is the order of reactivity of the four metals starting with the least reactive?

	least reactive → most reactive			
A	X	W	Z	Y
B	X	Z	W	Y
C	Y	W	Z	X
D	Y	Z	W	X

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[Turn over

26 Part of the reactivity series is shown.



Which metal must be extracted from its ore by electrolysis?

A copper

B iron

C potassium

D zinc

27 Which statement about the uses of metals is **not** correct?

A Aluminium is used in aircraft because of its strength and good electrical conductivity.

B Copper is used in electrical wiring because of its good electrical conductivity.

C Stainless steel resists corrosion and is used to make cutlery.

D Transition elements are often used as catalysts.

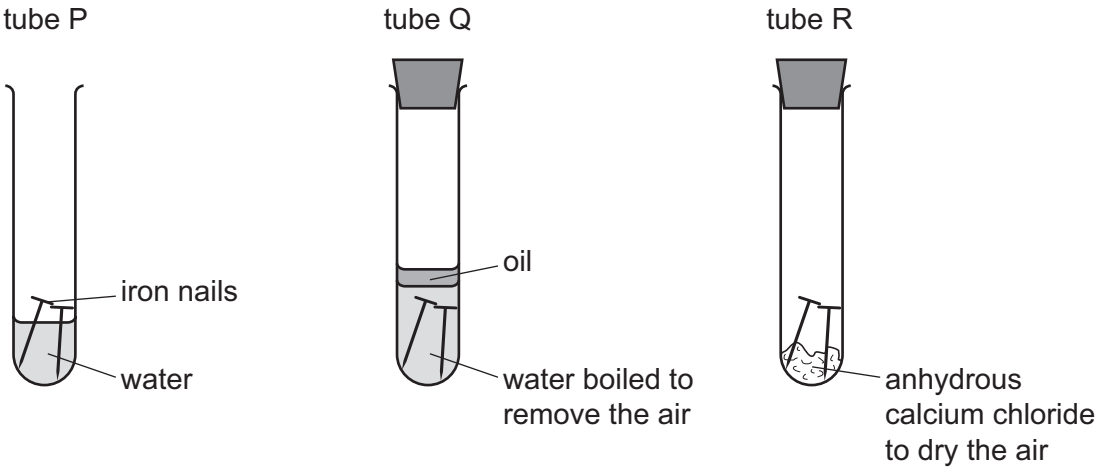
28 Argon is a noble gas used to fill light bulbs.

What is the approximate percentage of argon in air?

A 1% **B** 20% **C** 79% **D** 99%

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29 The diagrams show experiments involving the rusting of iron.



A student predicted the following results.

1 In tube P, the iron nails rust.

2 In tube Q, the iron nails do not rust.

3 In tube R, the iron nails do not rust.

Which predictions are correct?

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

30 Which statements about sulfur dioxide pollution are correct?

1 It increases the pH of rivers.

2 It damages limestone buildings.

3 It causes respiratory problems.

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

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31 The table describes three types of water.

water type	source of water	appearance before treatment	treatment	appearance after treatment
P	river	muddy	none	muddy
Q	river	muddy	filtration and chlorination	clear
R	well	clear	chlorination only	clear

Which statement is correct?

A Only Q and R are suitable for drinking, while P could be used for irrigation.

B Only Q and R are suitable for drinking, while P is unsuitable for any purpose.

C Only Q is suitable for drinking. R could be used for washing cars and P for irrigation.

D P, Q and R are suitable for irrigation and washing cars, but are not suitable for drinking.

32 Which compound would **not** be used as an important part of a garden fertiliser?

A $Ca_3(PO_4)_2$ **B** KNO_3 **C** $Mg(OH)_2$ **D** $(NH_4)_2SO_4$

33 Carbon dioxide and methane both contribute to climate change.

Which process produces both gases?

A complete combustion of natural gas

B farming cattle

C heating calcium carbonate

D respiration

34 What is **not** a use of lime?

A It is used as a bleach in the manufacture of wood pulp.

B It is used to desulfurise flue gases.

C It is used to neutralise acidic industrial waste.

D It is used to treat acidic soil.

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35 Petroleum is a mixture of different hydrocarbons.

Which process is used to separate the petroleum into groups of similar hydrocarbons?

A combustion

B cracking

C fractional distillation

D reduction

36 Which two compounds are molecules which both contain a double bond?

A ethane and ethanoic acid

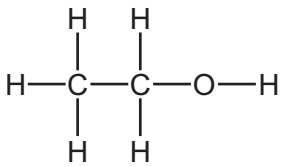
B ethane and ethanol

C ethene and ethanoic acid

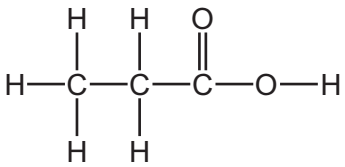
D ethene and ethanol

37 Which molecule does **not** belong to the alcohol homologous series?

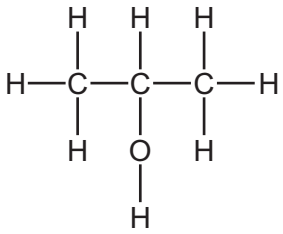
A



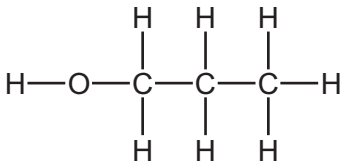
B



C



D



38 Ethanol can be formed by:

1 fermentation

2 reaction between steam and ethene.

Which of these processes use a catalyst?

	1	2
A	✓	✓
B	✓	✗
C	✗	✓
D	✗	✗

39 Ethanoic acid is a weak acid.

Which statements about ethanoic acid are correct?

1 It turns Universal Indicator purple.

2 It reacts with magnesium to form hydrogen gas.

3 It reacts with calcium carbonate to form carbon dioxide gas.

4 It decolourises aqueous bromine.

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

40 Which substance is a natural polymer?

A ethene

B glucose

C nylon

D protein

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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.).