Cambridge International Examinations
Cambridge International General Certificate of Secondary Education

CHEMISTRY **0620/12**

Paper 1 Multiple Choice (Core) **May/June 2017**

45 minutes

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

* 3 7 8 8 2 3 5 1 6 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 **14** printed pages and **2** blank pages.

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1 Four statements about the arrangement of particles are given.

1 Particles are packed in a regular arrangement.

2 Particles are randomly arranged.

3 Particles move over each other.

4 Particles vibrate about fixed points.

Which statements describe the particles in a solid?

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

2 A student needs to measure four different volumes of a solution accurately. The volumes are $10\,cm^3$, $25\,cm^3$, $50\,cm^3$ and $60\,cm^3$.

The apparatus available includes a $25\,cm^3$ pipette.

Which volumes could be measured using this pipette?

A $10\,cm^3$ and $25\,cm^3$

B $25\,cm^3$ and $50\,cm^3$

C $25\,cm^3$ only

D $50\,cm^3$ and $60\,cm^3$

3 Impurities change the melting and boiling points of substances.

Sodium chloride is added to a sample of pure water.

How does the addition of sodium chloride affect the melting point and boiling point of the water?

	melting point	boiling point
A	increases	increases
B	increases	decreases
C	decreases	increases
D	decreases	decreases

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4 The table shows the solubility of four substances, W, X, Y and Z, in ethanol and in water.

substance	solubility in ethanol	solubility in water
W	insoluble	insoluble
X	insoluble	soluble
Y	soluble	insoluble
Z	soluble	soluble

Two methods of separation are given.

- method 1: add the substance to ethanol and then filter
- method 2: add the substance to water and then filter

Which substances can be separated from each other by both method 1 and method 2?

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

5 Q and R are elements in the same period of the Periodic Table.

Q has 7 electrons in its outer shell and R has 2 electrons in its outer shell.

Which statement about Q and R is correct?

A Q is a metal and R is a non-metal.

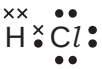
B Q and R have different numbers of electron shells.

C R is found to the right of Q in the Periodic Table.

D The proton number of R is less than the proton number of Q.

6 Which electron arrangement for the outer shell electrons in a covalent compound is correct?

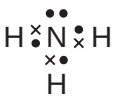
A



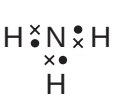
B



C



D



7 Which element does **not** form a stable ion with the same electronic structure as argon?

A aluminium

B chlorine

C phosphorus

D potassium

8 Graphite and diamond are both forms of the element carbon.

Which row shows the number of other carbon atoms that each carbon atom is covalently bonded to in graphite and diamond?

	graphite	diamond
A	3	3
B	3	4
C	4	3
D	4	4

9 When chlorine reacts with hot concentrated aqueous sodium hydroxide one of the products formed is sodium chlorate(V).

The formula of sodium chlorate(V) is $NaClO_3$.

What is the relative formula mass of sodium chlorate(V), $NaClO_3$?

A 52.0 **B** 74.5 **C** 106.5 **D** 223.5

10 Concentrated aqueous sodium chloride can be electrolysed.

Which statement is correct?

A Hydrogen gas is formed at the anode, and chlorine gas is formed at the cathode.

B Hydrogen gas is formed at the cathode, and chlorine gas is formed at the anode.

C Sodium metal is formed at the anode, and chlorine gas is formed at the cathode.

D Sodium metal is formed at the cathode, and chlorine gas is formed at the anode.

11 Which statement about fuels is correct?

A Heat energy can only be produced by burning fuels.

B Hydrogen is used as a fuel although it is difficult to store.

C Methane is a good fuel because it produces only water when burned.

D Uranium is burned in air to produce energy.

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12 Which statements about exothermic and endothermic reactions are correct?

1 During an exothermic reaction, heat is given out.

2 The temperature of an endothermic reaction goes up because heat is taken in.

3 Burning methane in the air is an exothermic reaction.

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

13 A gas is produced when calcium carbonate is heated.

Which type of change is this?

A chemical

B exothermic

C physical

D separation

14 X is a white solid which dissolves in water to give a blue solution.

What is X?

A anhydrous cobalt(II) chloride

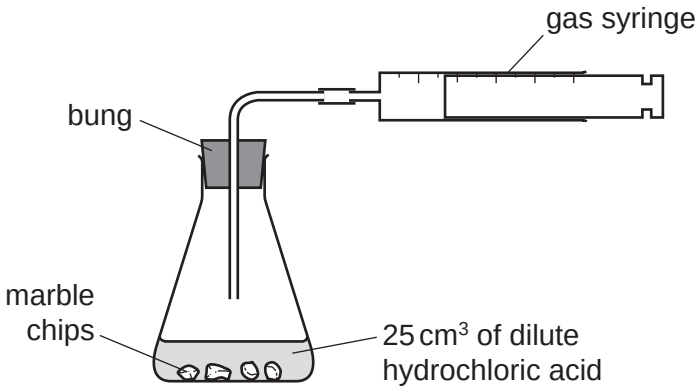
B anhydrous copper(II) sulfate

C hydrated cobalt(II) chloride

D hydrated copper(II) sulfate

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15 A student was investigating the reaction between marble chips and dilute hydrochloric acid.



Which changes slow down the rate of reaction?

	temperature of acid	concentration of acid	surface area of marble chips
A	decrease	decrease	decrease
B	decrease	decrease	increase
C	increase	decrease	decrease
D	increase	increase	increase

16 The reactions shown may occur in the air during a thunder-storm.

$N_2 + O_2 \rightarrow 2NO$

$2NO + O_2 \rightarrow 2NO_2$

$NO + O_3 \rightarrow NO_2 + O_2$

Which row shows what happens to the reactant molecules in each of these reactions?

	N_2	NO	O_3
A	oxidised	oxidised	oxidised
B	oxidised	oxidised	reduced
C	reduced	reduced	oxidised
D	reduced	reduced	reduced

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17 When compound P is added to sodium carbonate, carbon dioxide is produced.

When compound Q is added to ammonium chloride, ammonia is produced.

What are P and Q?

	P	Q
A	a base	a base
B	a base	an acid
C	an acid	a base
D	an acid	an acid

18 Which oxide is suitable for treating acidic soil?

A calcium oxide

B carbon dioxide

C phosphorus oxide

D silicon(IV) oxide

19 Which salt preparation uses a burette and a pipette?

A calcium nitrate from calcium carbonate and nitric acid

B copper(II) sulfate from copper(II) hydroxide and sulfuric acid

C potassium chloride from potassium hydroxide and hydrochloric acid

D zinc chloride from zinc and hydrochloric acid

20 Dilute sulfuric acid is added to two separate aqueous solutions, X and Y. The observations are shown.

solution X	white precipitate
solution Y	bubbles of a colourless gas

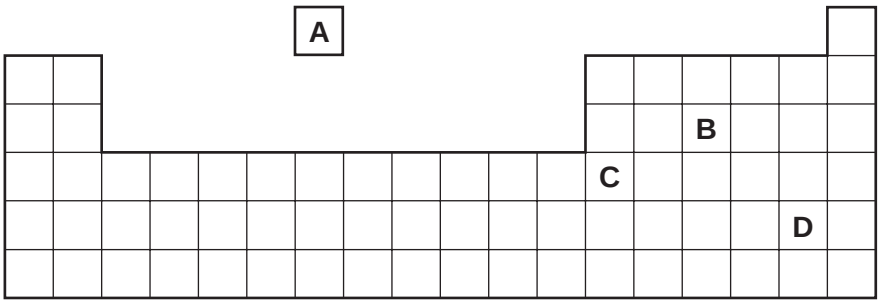
Which row shows the ions present in the solutions?

	solution X	solution Y
A	Ba^{2+}	CO_3^{2-}
B	Ca^{2+}	Cl^-
C	Cu^{2+}	CO_3^{2-}
D	Fe^{2+}	NO_3^-

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21 Part of the Periodic Table is shown.

Which element is a metal?



22 Which element is less reactive than the other members of its group in the Periodic Table?

A astatine

B caesium

C fluorine

D rubidium

23 An element has the following properties.

- It forms coloured compounds.
- It acts as a catalyst.
- It melts at 1539 °C.

In which part of the Periodic Table is the element found?

A Group I

B Group VII

C Group VIII

D transition elements

24 Why are weather balloons sometimes filled with helium rather than hydrogen?

A Helium is found in air.

B Helium is less dense than hydrogen.

C Helium is more dense than hydrogen.

D Helium is unreactive.

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25 Element E:

- forms an alloy
- has a basic oxide
- is below hydrogen in the reactivity series.

What is E?

A carbon

B copper

C sulfur

D zinc

26 Calcium, copper, iron and magnesium are metals. They can be placed in order of reactivity.

Which statement is correct?

A Copper reacts with dilute hydrochloric acid to form copper(II) chloride.

B Iron reacts with steam but magnesium does not.

C Iron(II) oxide cannot be reduced by heating strongly with carbon.

D Magnesium and calcium both react with hot water.

27 Steel is manufactured from the iron produced in a blast furnace.

Which statement about the manufacture of iron and steel is **not** correct?

A In a blast furnace, acidic impurities are removed by adding a basic oxide.

B In a blast furnace, calcium oxide is added to remove basic impurities.

C Oxygen is passed into the molten iron from a blast furnace to remove carbon impurities.

D The molten iron from a blast furnace contains traces of other elements such as phosphorus.

28 Stainless steel is an alloy of iron and other metals. It is strong and does not rust but it costs much more than normal steel.

What is **not** made from stainless steel?

A cutlery

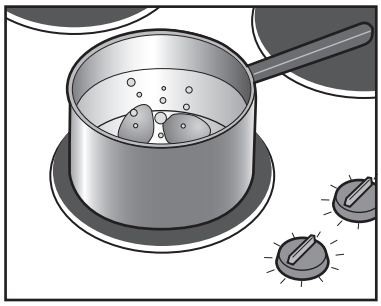
B pipes in a chemical factory

C railway lines

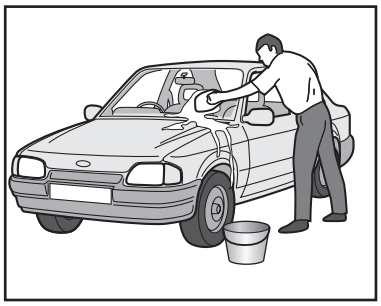
D saucepans

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29 The diagram shows some uses of water in the home.



1



2



3

For which uses is it important for the water to have been treated?

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

30 Which gas in the air is needed for iron to rust?

A argon

B carbon dioxide

C nitrogen

D oxygen

31 A solid fertiliser contains ammonium sulfate.

A sample of the fertiliser is shaken with water.

To show the presence of ammonium ions in the solution, ...1..... is added and the gas produced is tested with damp .....2..... litmus paper.

Which words complete gaps 1 and 2?

	1	2
A	aqueous sodium hydroxide	blue
B	aqueous sodium hydroxide	red
C	dilute hydrochloric acid	blue
D	dilute hydrochloric acid	red

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32 In which process is carbon dioxide **not** formed?

A burning of natural gas

B fermentation

C heating lime

D respiration

33 Statements about methods of manufacture and uses of calcium oxide are shown.

1 It is manufactured by reacting acids with calcium carbonate.

2 It is manufactured by heating calcium carbonate.

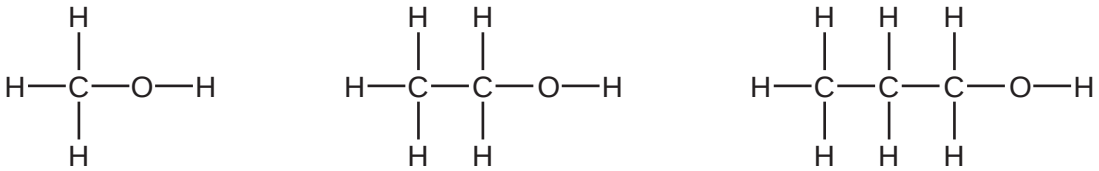
3 It is used to desulfurise flue gases.

4 It is used to treat alkaline soil.

Which statements are correct?

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

34 The structures of three substances are shown.



Why do these substances all belong to the same homologous series?

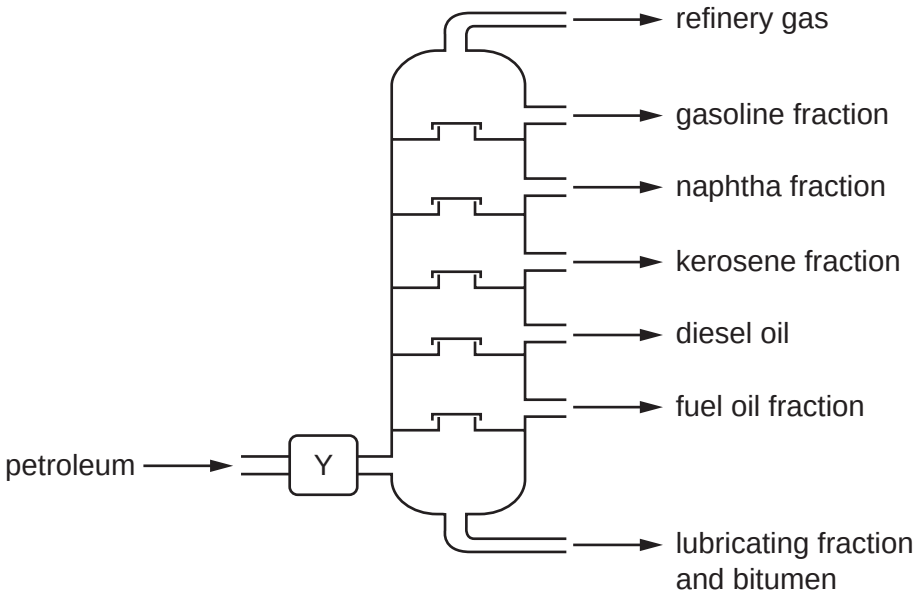
A They are all compounds.

B They are all saturated.

C They all contain oxygen.

D They all contain the same functional group.

35 The industrial fractional distillation of petroleum is shown.



Which process happens at Y?

A burning

B condensation

C cracking

D evaporation

36 Two reactions are shown.

1 butane → ethene

2 ethene → ethanol

Which terms describe reactions 1 and 2?

	1	2
A	cracking	addition
B	cracking	combustion
C	distillation	addition
D	distillation	combustion

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37 Ethene is a hydrocarbon.

Which row shows the type of bond between the carbon atoms in ethene, and the effect of ethene on aqueous bromine?

	type of bond	effect of ethene on aqueous bromine
A	single bond	colour changes from brown to colourless
B	single bond	colour changes from colourless to brown
C	double bond	colour changes from brown to colourless
D	double bond	colour changes from colourless to brown

38 Poly(ethene), nylon and *Terylene* are all polymers.

From which small units are all polymers made?

A alkenes

B monomers

C plastics

D proteins

39 Which property is a property of aqueous ethanoic acid?

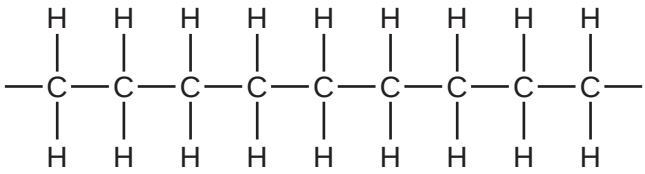
A It rapidly decolourises aqueous bromine.

B It has a sweet smell.

C It reacts with magnesium ribbon.

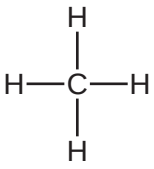
D It turns red litmus blue.

40 The diagram shows part of the molecule of a polymer.

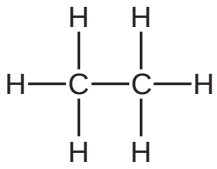


Which diagram shows the monomer from which this polymer could be manufactured?

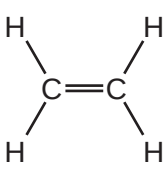
A



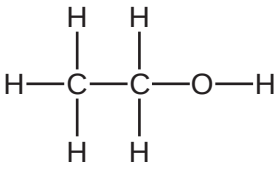
B



C



D



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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.).