Cambridge International Examinations
Cambridge International General Certificate of Secondary Education

CHEMISTRY **0620/12**

Paper 1 Multiple Choice (Core) **February/March 2016**

45 Minutes

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

* 0 4 0 3 0 9 3 8 0 3 *

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.

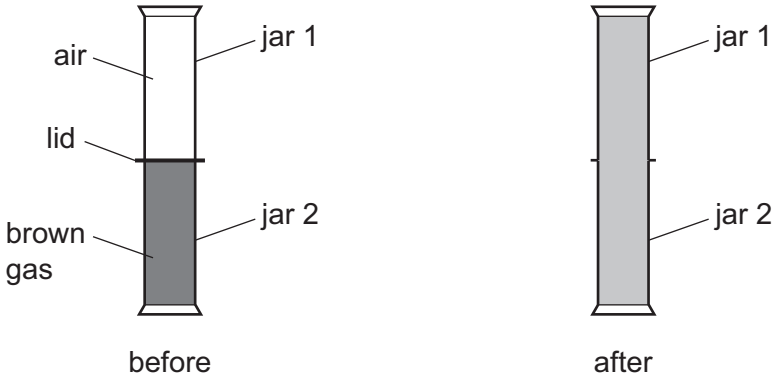
Each correct answer will score one mark. A mark will not be deducted for a wrong answer.
Any rough working should be done in this booklet.
A copy of the Periodic Table is printed on page 16.
Electronic calculators may be used.

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 Two gas jars are set up as shown.



The lid is removed and the gas jars are left to stand. After some time the contents of both gas jars are brown.

Which process causes this to happen?

A condensation

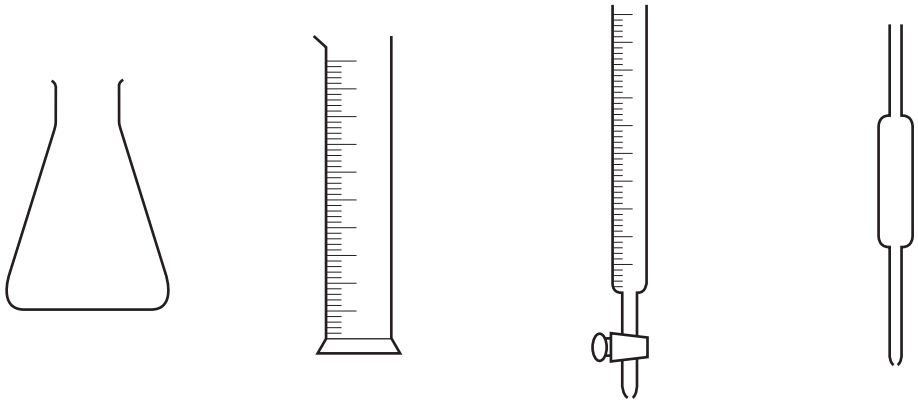
B diffusion

C evaporation

D filtration

2 Which piece of apparatus is used to measure variable quantities of liquid in a titration?

A **B** **C** **D**



3 Which method separates a mixture of sugar and glass?

A dissolve, filter and evaporate

B distil and filter

C fractionally distil

D use chromatography

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4 In which row are the substances correctly classified?

	element	compound	mixture
A	brass	sulfur	water
B	sulfur	brass	water
C	sulfur	water	brass
D	water	sulfur	brass

5 Element Q has 4 electrons in its outer shell and has 69 neutrons. Q conducts electricity.

What is Q?

A carbon (C)

B lead (Pb)

C thulium (Tm)

D tin (Sn)

6 Which statement describes positive ions?

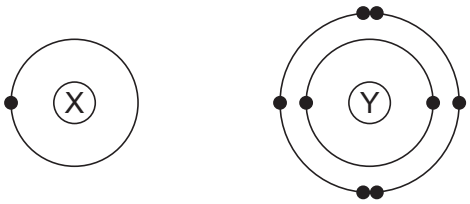
A Positive ions have more electrons than neutrons.

B Positive ions have more protons than neutrons.

C Positive ions have more electrons than protons.

D Positive ions have more protons than electrons.

7 The electronic structures of atoms X and Y are shown.



X and Y form a covalent compound.

What is its formula?

A X_2Y **B** XY **C** XY_2 **D** XY_6

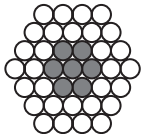
8 The compound magnesium nitrate has the formula $Mg(NO_3)_2$.

What is the relative formula mass of magnesium nitrate?

A 86 **B** 134 **C** 148 **D** 172

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9 The diagram shows, in cross-section, the arrangement of aluminium and steel wires in an electric power cable.



key

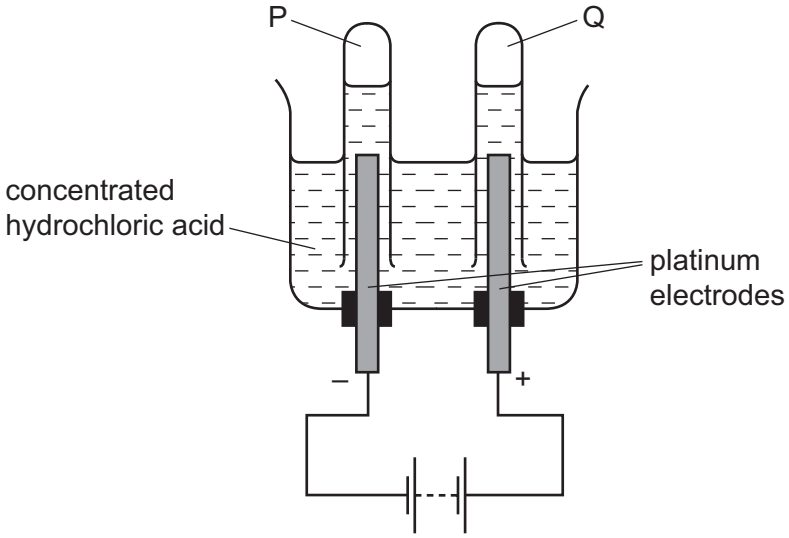
○ = aluminium

● = steel

Which metal wire is the better conductor and which metal wire has the greater mechanical strength?

	better conductor	greater mechanical strength
A	aluminium	aluminium
B	aluminium	steel
C	steel	aluminium
D	steel	steel

10 When concentrated hydrochloric acid is electrolysed, gases P and Q are formed.



What are P and Q?

	P	Q
A	chlorine	hydrogen
B	chlorine	oxygen
C	hydrogen	chlorine
D	hydrogen	oxygen

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11 Which substance could **not** be used as a fuel to heat water in a boiler?

A ethanol

B hydrogen

C methane

D oxygen

12 Which statement about reactions that produce heat is **not** correct?

A Burning magnesium produces heat energy.

B The overall reaction is exothermic.

C The products have more energy than the reactants.

D The temperature of the surroundings increases.

13 Which changes increase the rate of reaction?

1 increasing the concentration of the reactants

2 increasing the particle size of a solid reactant

3 increasing the temperature

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

14 Two reactions involving water are shown.

X anhydrous cobalt(II) chloride + water $\rightarrow$ hydrated cobalt(II) chloride

Y iron + oxygen + water $\rightarrow$ rust

Which reactions are reversible by heating?

	X	Y
A	✓	✓
B	✓	✗
C	✗	✓
D	✗	✗

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15 Iron is extracted from iron oxide using carbon monoxide as shown.

$$\text{iron oxide} + \text{carbon monoxide} \rightarrow \text{iron} + \text{carbon dioxide}$$

Which statement is correct?

A Carbon monoxide is oxidised to carbon dioxide.

B Carbon monoxide is reduced to carbon dioxide.

C Iron is oxidised to iron oxide.

D Iron oxide is oxidised to iron.

16 Four different solutions, W, X, Y and Z, are tested with Universal Indicator.

solution	W	X	Y	Z
colour with Universal Indicator	green	red	purple	orange

Which solutions are acidic?

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

17 Methyl orange turns red in the solution formed when substance R reacts with water.

What is R?

A calcium oxide

B potassium oxide

C sodium oxide

D sulfur dioxide

18 A salt is made by adding an excess of an insoluble metal oxide to an acid.

How is the excess metal oxide removed from the mixture?

A chromatography

B crystallisation

C distillation

D filtration

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19 A substance is heated with aluminium foil in aqueous sodium hydroxide. A gas is produced which turns damp, red litmus paper blue.

Which anion is present in the substance?

A carbonate

B iodide

C nitrate

D sulfate

20 An element does not conduct electricity and exists as diatomic molecules.

Where in the Periodic Table is the element found?



21 In the Periodic Table, how does the metallic character of the elements vary from left to right across a period?

A It decreases.

B It increases.

C It increases then decreases.

D It stays the same.

22 The elements in a group of the Periodic Table show the following trends.

1 The element with the lowest proton number has the lowest reactivity.

2 All the elements in the group form basic oxides.

3 The density of the elements increases down the group.

4 The melting point of the elements decreases down the group.

In which group are the elements found?

A I **B** IV **C** VI **D** VII

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23 Which element is a transition metal?

	melting point in °C	density in g / cm^3	colour of oxide
A	98	1.0	white
B	328	11.3	yellow
C	651	1.7	white
D	1240	7.4	black

24 Uranium is a radioactive element but it is also a typical metal.

What is **not** a property of uranium?

A It can be hammered into shape.

B It conducts heat.

C It is used as a source of energy.

D It forms covalent compounds.

25 Which metal reacts with steam but **not** with cold water?

A calcium

B copper

C sodium

D zinc

26 Iron is extracted from hematite in the blast furnace.

The hematite contains silicon(IV) oxide (sand) as an impurity.

What reacts with this impurity to remove it?

A calcium oxide

B carbon

C carbon dioxide

D slag

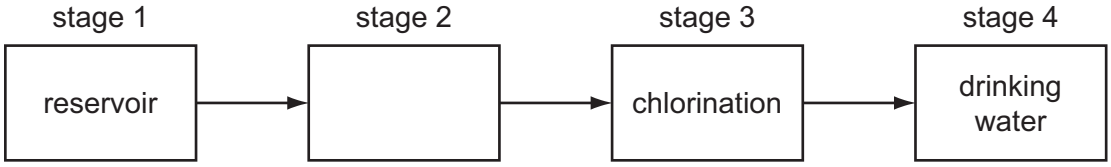
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27 The bodies of aircraft are often made using aluminium.

Which two properties of aluminium make it suitable for this use?

	property 1	property 2
A	good conductor of electricity	good conductor of heat
B	good conductor of electricity	strong
C	good conductor of heat	low density
D	strong	low density

28 The diagram shows how water is treated to make it suitable for drinking.



What happens in stage 2?

A condensation

B distillation

C evaporation

D filtration

29 Pure air contains nitrogen, oxygen and small amounts of other gases. The noble gases have been left out of the table.

Which row shows the composition of dry, unpolluted air?

	nitrogen / %	oxygen / %	other gases
A	21	78	small amount of carbon dioxide
B	21	78	small amount of carbon monoxide
C	78	21	small amount of carbon dioxide
D	78	21	small amount of carbon monoxide

30 Which pollutant gas can be produced as a result of incomplete combustion of octane, C_8H_{18}?

A carbon

B carbon dioxide

C carbon monoxide

D methane

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[Turn over

31 Fertilisers are used to provide three elements needed to increase the yield of crops.

Which two compounds would provide all three of these elements?

A ammonium nitrate and calcium phosphate

B ammonium nitrate and potassium sulfate

C potassium nitrate and calcium phosphate

D potassium nitrate and potassium sulfate

32 Which statement describes a disadvantage of sulfur dioxide?

A It can be used as a bleach in making wood pulp.

B It can be used to kill bacteria in food.

C It can be used to manufacture sulfuric acid.

D It can dissolve the limestone in statues.

33 Why does a farmer put lime (calcium oxide) on the soil?

A to act as a fertiliser

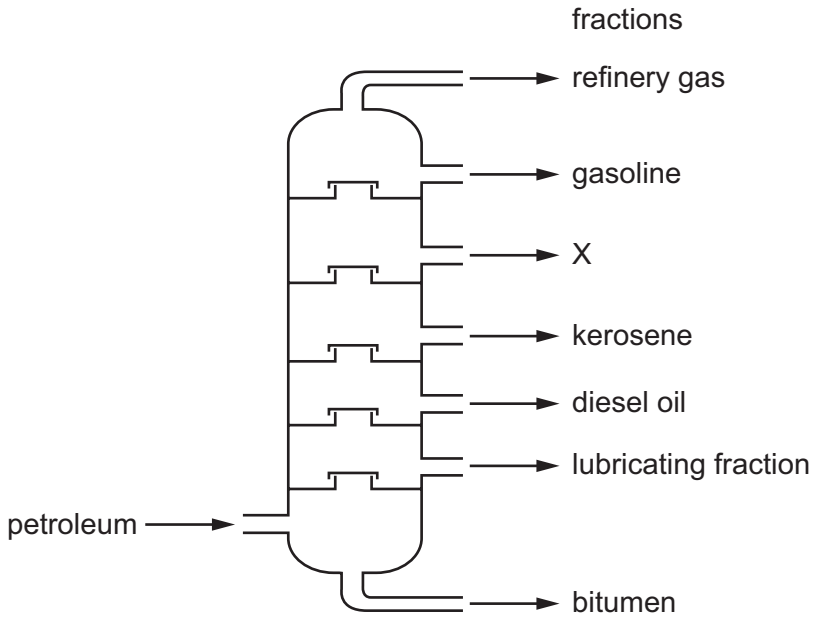
B to kill pests

C to make the soil less acidic

D to make the soil less alkaline

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34 What is the name of fraction X?



A alcohol

B fuel oil

C naphtha

D paraffin

35 Which pair of molecules are hydrocarbons?

A ethane and ethanol

B ethane and ethene

C ethanoic acid and ethene

D ethanol and ethanoic acid

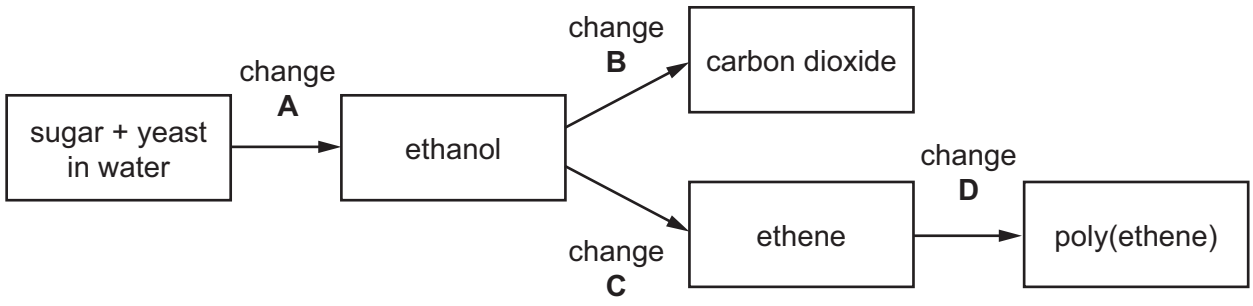
36 Which bond is **not** present in the structure of ethanol, CH_3CH_2OH?

A C–C **B** H–H **C** H–O **D** O–C

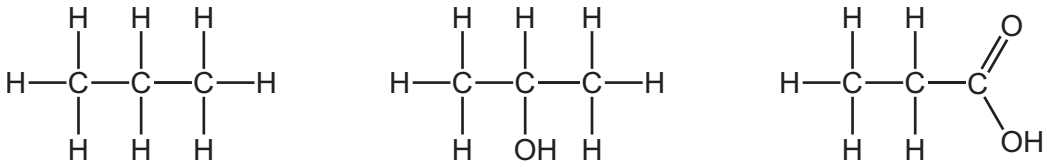
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37 Which change on the diagram involves combustion?

Some of the reaction products are not shown on the diagram.



38 The structures of three molecules are shown.



Which homologous series is **not** represented?

A alcohols

B alkanes

C alkenes

D carboxylic acids

39 Information about four hydrocarbons is shown.

hydrocarbon	number of carbon atoms in the molecule	reaction with bromine water
W	1	no reaction
X	2	no reaction
Y	3	decolourises it
Z	4	decolourises it

Which statement is correct?

A Hydrocarbon W has the formula CH_4 and can be polymerised.

B Hydrocarbon X has the formula C_2H_4 and can be polymerised.

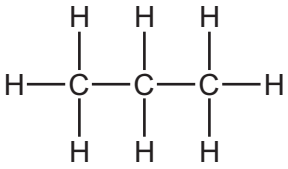
C Hydrocarbon Y has the formula C_3H_6 and can be polymerised.

D Hydrocarbon Z has the formula C_4H_{10} and can be polymerised.

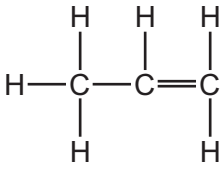
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40 Which structure represents a compound that dissolves in water to form an acidic solution?

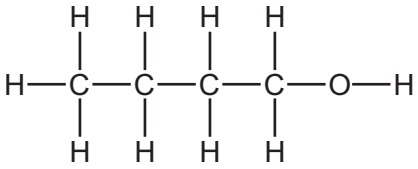
A



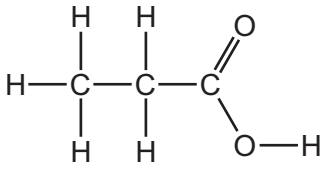
B



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.)