Cambridge International Examinations
Cambridge International General Certificate of Secondary Education

CHEMISTRY **0620/12**

Paper 1 Multiple Choice **February/March 2015**

45 Minutes

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

8505533334

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.

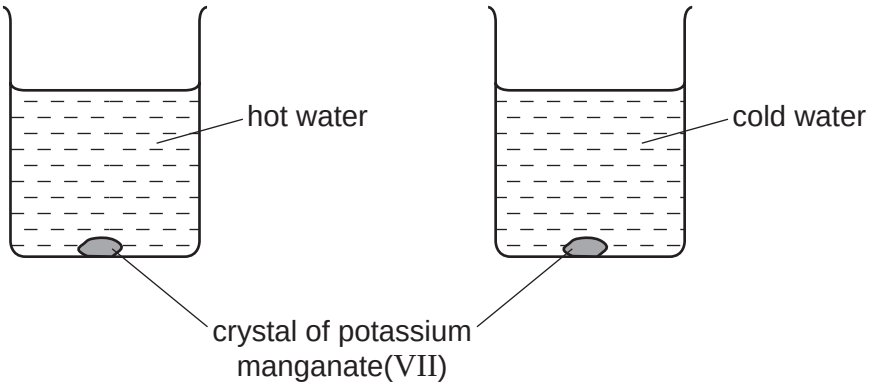
Read the instructions on the Answer Sheet very carefully.

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.

1 A crystal of purple potassium manganate(VII) was added to each of the beakers shown in the diagram.



One beaker contained hot water and the other beaker contained cold water.

In both beakers the purple colour of the potassium manganate(VII) spreads out.

Which result and explanation are correct?

	result	explanation
A	colour spreads faster in cold water	particles move faster at a higher temperature
B	colour spreads faster in cold water	particles move slower at a higher temperature
C	colour spreads faster in hot water	particles move faster at a higher temperature
D	colour spreads faster in hot water	particles move slower at a higher temperature

2 During a reaction, the following changes take place.

1 The temperature rises.

2 A gas is given off.

Which apparatus is required to measure the rate of this reaction?

A balance and burette

B balance and gas syringe

C gas syringe and burette

D gas syringe and stopclock

3 Which statement about bonding is **not** correct?

A Carbon can form four single covalent bonds.

B Chlorine atoms react to gain a noble gas electronic structure.

C Covalent bonding involves losing and gaining electrons.

D Hydrogen molecules have the formula H_2.

4 The table shows the numbers of particles present in the nuclei of four atoms or ions.

	protons	neutrons	electronic structure
1	18	22	2,8,8
2	19	20	2,8,8
3	19	21	2,8,8,1
4	20	20	2,8,8,2

Which two particles belong to the same element?

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

5 Which substance is an ionic compound?

	volatility	electrical conductivity when molten	solubility in water
A	high	good	soluble
B	high	poor	insoluble
C	low	good	soluble
D	low	poor	insoluble

6 Covalent bonds are formed when electrons are ……1…… .

Most covalent compounds have ……2…… electrical conductivity.

Which words correctly complete gaps 1 and 2?

	1	2
A	shared	high
B	shared	low
C	transferred	high
D	transferred	low

7 Which equation for the reaction between sodium carbonate and dilute hydrochloric acid is correct?

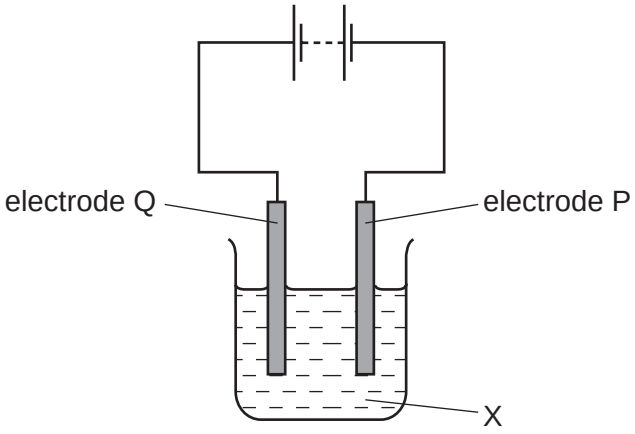
A $Na_2CO_3(s) + HCl(aq) \rightarrow NaCl(aq) + CO_2(g) + H_2O(l)$

B $Na_2CO_3(s) + HCl(aq) \rightarrow Na_2Cl(aq) + CO_2(g) + H_2O(l)$

C $Na_2CO_3(s) + 2HCl(aq) \rightarrow NaCl(aq) + CO_2(g) + H_2O(l)$

D $Na_2CO_3(s) + 2HCl(aq) \rightarrow 2NaCl(aq) + CO_2(g) + H_2O(l)$

8 The diagram shows an electrolysis experiment.

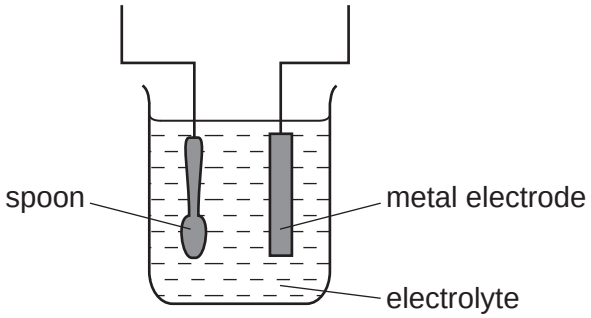


During the electrolysis, sodium was formed at electrode P and chlorine at electrode Q.

Which row correctly identifies P, Q and X?

	P	Q	X
A	anode	cathode	concentrated solution of sodium chloride in water
B	anode	cathode	molten sodium chloride
C	cathode	anode	concentrated solution of sodium chloride in water
D	cathode	anode	molten sodium chloride

9 The diagram shows apparatus for plating a spoon with silver.



Which statement is **not** correct?

A Silver would stick to the spoon because it is a very reactive metal.

B The electrolyte would be a silver salt dissolved in water.

C The metal electrode would be made from silver.

D The spoon would be connected to the negative terminal of the power supply.

10 Limestone can be changed into slaked lime in two chemical reactions.

1 When limestone, $CaCO_3$, is heated it decomposes into lime, CaO.

2 Water is slowly dripped onto the cooled lime. The lime appears to expand and steam is produced. Slaked lime, $Ca(OH)_2$, is formed.

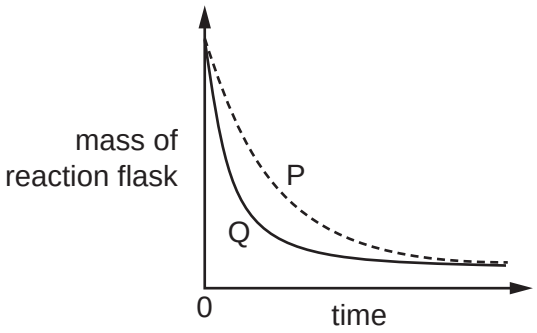
Which row shows the correct description of each of the chemical reactions?

	reaction 1	reaction 2
A	endothermic	endothermic
B	endothermic	exothermic
C	exothermic	endothermic
D	exothermic	exothermic

11 A student investigates the rate of reaction between marble chips and hydrochloric acid.

The mass of the reaction flask is measured.

The graph shows the results of two experiments, P and Q.



Which change explains the difference between P and Q?

A A catalyst is added in P.

B A higher temperature is used in P.

C Bigger marble chips are used in Q.

D Hydrochloric acid is more concentrated in Q.

12 Hydrated cobalt(II) chloride decomposes on heating.

The equation for the reaction is

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

The reaction is reversed by adding water.

Which row describes the colour change and the type of reaction for the **reverse** reaction?

	colour change	type of reaction
A	blue to pink	endothermic
B	blue to pink	exothermic
C	pink to blue	endothermic
D	pink to blue	exothermic

13 When copper is heated in air a black coating forms on the copper.

What happens to the copper in this reaction?

A The copper catches fire.

B The copper decomposes.

C The copper gains oxygen.

D The copper loses oxygen.

14 Three chemicals, P, Q and R, were each dissolved in water. The table shows some of the reactions of these solutions.

solution	reaction when solid sodium carbonate is added	reaction when heated with solid ammonium chloride
P	gas evolved	no reaction
Q	no reaction	gas evolved
R	no reaction	no reaction

The pH of the three solutions was also measured.

What are the correct pH values of these solutions?

	P	Q	R
A	2	7	13
B	2	13	7
C	7	2	13
D	13	7	2

15 The oxide of element X forms a solution with pH 4.

The oxide of element Y forms a solution that turns Universal Indicator blue.

Which row correctly classifies elements X and Y?

	element X	element Y
A	metal	metal
B	metal	non-metal
C	non-metal	metal
D	non-metal	non-metal

16 Which two processes are involved in the preparation of magnesium sulfate from dilute sulfuric acid and an excess of magnesium oxide?

A neutralisation and filtration

B neutralisation and oxidation

C thermal decomposition and filtration

D thermal decomposition and oxidation

17 Which statement about aqueous sodium hydroxide is correct?

A When it is added to a solution containing sulfate ions, a white precipitate is formed.

B When it is added to a solution of copper(II) ions, a blue precipitate is formed which dissolves in excess to give deep blue solution.

C When it is added to a solution of iron(II) ions, a green precipitate is formed which does not dissolve in excess.

D When it is added to ammonium chloride, a gas is produced which turns blue litmus red.

18 Which pair of elements will react together most violently?

A chlorine and lithium

B chlorine and potassium

C iodine and lithium

D iodine and potassium

19 The table shows some information about elements in Group VII of the Periodic Table.

name	state at room temperature	colour
chlorine	gas	yellow-green
bromine	liquid	brown
iodine	?	?
astatine	solid	black

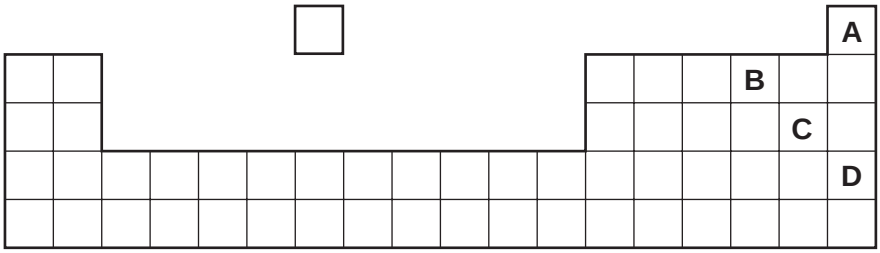
Which information about iodine completes the table?

	state	colour
A	liquid	black
B	liquid	green
C	solid	grey
D	solid	yellow

20 The diagram shows a section of the Periodic Table.

Which element is described below?

'A colourless, unreactive gas that is denser than air.'



21 Which is **not** a characteristic property of transition metals?

A act as catalysts

B form coloured compounds

C high melting point

D low density

22 Which statement is correct for **all** metals?

A conduct electricity when molten

B gain electrons when they form ions

C have a low density

D have a low melting point

23 Metal X lies between zinc and iron in the reactivity series.

Which statements about metal X are correct?

1 It reacts with steam to produce hydrogen gas.

2 It does not react with steam but will produce hydrogen with dilute acid.

3 The metal can be obtained from its oxide by heating strongly with charcoal.

4 The metal oxide cannot be reduced using carbon.

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

24 Which of these gases is an atmospheric pollutant?

1 carbon monoxide

2 nitrogen dioxide

3 sulfur dioxide

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

25 Molten iron from the blast furnace contains impurities.

The process of turning the impure iron into steel involves blowing oxygen into the molten iron and adding calcium oxide.

What are the reasons for blowing in oxygen and adding calcium oxide?

	blowing in oxygen	adding calcium oxide
A	carbon is removed by reacting with oxygen	reacts with acidic impurities making slag
B	carbon is removed by reacting with oxygen	reacts with slag and so removes it
C	iron reacts with the oxygen	reacts with acidic impurities making slag
D	iron reacts with the oxygen	reacts with slag and so removes it

26 Some properties of aluminium are listed.

1 It has mechanical strength.

2 It is resistant to corrosion.

3 It has a low density.

4 It conducts heat.

Which **three** properties make aluminium useful for making the bodies of aircraft?

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

27 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.

28 A sample of air from a town centre was analysed and found to contain mainly nitrogen and oxygen, but also traces of the four gases below.

Which of these gases is a pollutant?

A argon

B carbon dioxide

C sulfur dioxide

D water vapour

29 Which elements does an NPK fertiliser contain?

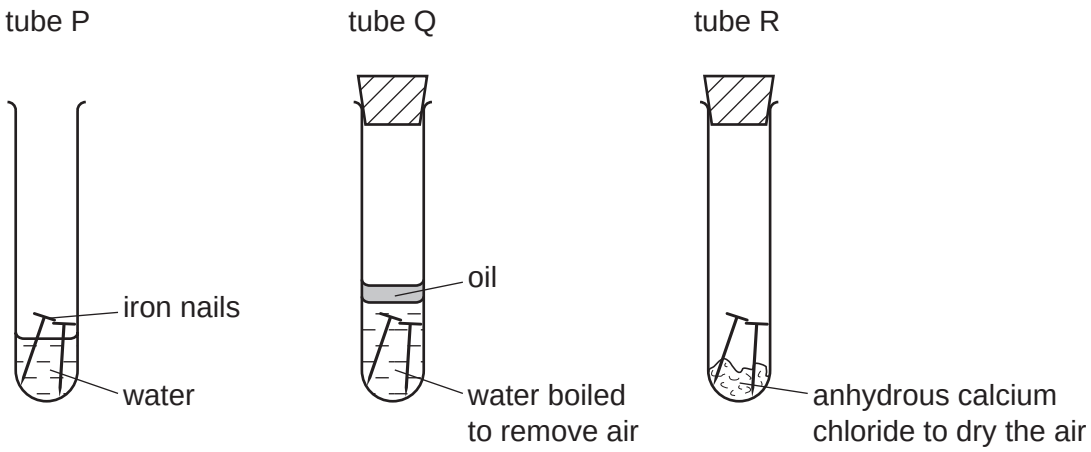
A nickel, phosphorus, potassium

B nickel, potassium, calcium

C nitrogen, phosphorus, potassium

D nitrogen, potassium, calcium

30 The diagram shows experiments involving the rusting of iron.



The following results were suggested.

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 results are correct?

A 1 and 2 only

B 1 and 3 only

C 2 and 3 only

D 1, 2 and 3

31 Gas X is a waste gas from digestion in animals.

Gas Y is formed when gas X is burnt with a small amount of oxygen.

Gas Z is formed when gas X is burnt with an excess of oxygen.

What are X, Y and Z?

	X	Y	Z
A	carbon dioxide	methane	carbon monoxide
B	carbon monoxide	methane	carbon dioxide
C	methane	carbon dioxide	carbon monoxide
D	methane	carbon monoxide	carbon dioxide

32 The list gives four experiments carried out with calcium carbonate.

1 acid added

2 alkali added

3 heated strongly

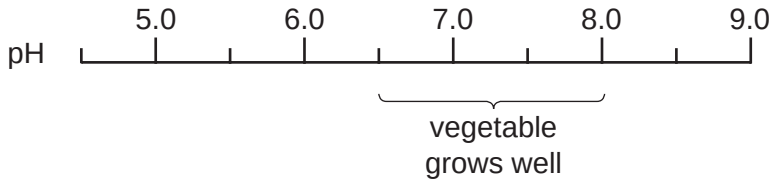
4 water added

Which experiments produce carbon dioxide?

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

33 The diagram shows the soil pH range over which a vegetable grows well.

The pH of the soil to be used is 5.5.



Why is lime added to the soil before planting the vegetable?

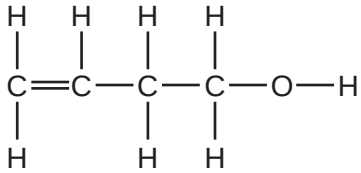
A The lime acts as a catalyst.

B The lime changes the soil acidity.

C The lime is an indicator.

D The lime supplies nitrogen.

34 The diagram shows the structure of a compound.



Which functional groups does this molecule contain?

	carboxylic acid	alkene	alcohol
A	no	no	no
B	no	yes	yes
C	yes	no	yes
D	yes	yes	yes

35 Petroleum is separated into useful fractions by fractional distillation.

Separation occurs in a fractionating column.

Some properties of three of these fractions are shown.

fraction	boiling point range / °C	number of carbon atoms in the molecules
1		5–10
2	320–350	16–24
3	120–210	

Which statement is correct?

A Fraction 1 has a higher boiling point range than fraction 2.

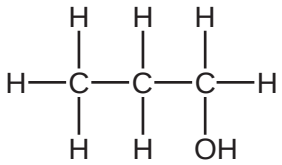
B Fraction 2 is removed from a higher point in the fractioning tower than fraction 1.

C Molecules in fraction 3 have shorter chains than those in fraction 2.

D None of the fractions is liquid at room temperature.

36 The structures of four molecules are shown.

1



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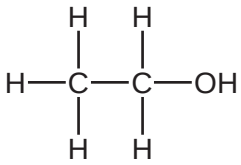

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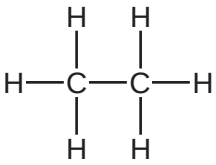

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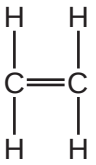

Which molecules belong to the same homologous series?

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

37 Which statement about alkanes is correct?

A Ethane has one more carbon atom and one more hydrogen atom than methane.

B They are converted to alcohols by reaction with steam.

C They contain carbon-carbon double bonds.

D They form carbon dioxide and water on combustion.

38 Which statement about alkenes is **not** correct?

A They are hydrocarbons.

B They are saturated.

C They contain a C=C bond.

D They form polymers.

39 Ethene reacts with Y to produce ethanol.

$$\text{ethene} + Y \rightarrow \text{ethanol}$$

What is Y?

A hydrogen

B oxygen

C steam

D yeast

40 Which description of ethanoic acid is correct?

A a clear, colourless and odourless liquid

B a colourless liquid with a distinctive odour

C a soft white solid with a distinctive odour

D a transparent solid with a low melting point

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DATA SHEET
The Periodic Table of the Elements

Group																	
I	II									III	IV	V	VI	VII	0
															4 **He** Helium 2
					1 **H** Hydrogen 1										
7 **Li** Lithium 3	9 **Be** Beryllium 4									11 **B** Boron 5	12 **C** Carbon 6	14 **N** Nitrogen 7	16 **O** Oxygen 8	19 **F** Fluorine 9	20 **Ne** Neon 10
23 **Na** Sodium 11	24 **Mg** Magnesium 12									27 **Al** Aluminium 13	28 **Si** Silicon 14	31 **P** Phosphorus 15	32 **S** Sulfur 16	35.5 **Cl** Chlorine 17	40 **Ar** Argon 18
39 **K** Potassium 19	40 **Ca** Calcium 20	45 **Sc** Scandium 21	48 **Ti** Titanium 22	51 **V** Vanadium 23	52 **Cr** Chromium 24	55 **Mn** Manganese 25	56 **Fe** Iron 26	59 **Co** Cobalt 27	59 **Ni** Nickel 28	64 **Cu** Copper 29	65 **Zn** Zinc 30	70 **Ga** Gallium 31	73 **Ge** Germanium 32	75 **As** Arsenic 33	79 **Se** Selenium 34	80 **Br** Bromine 35	84 **Kr** Krypton 36
85 **Rb** Rubidium 37	88 **Sr** Strontium 38	89 **Y** Yttrium 39	91 **Zr** Zirconium 40	93 **Nb** Niobium 41	96 **Mo** Molybdenum 42	**Tc** Technetium 43	101 **Ru** Ruthenium 44	103 **Rh** Rhodium 45	106 **Pd** Palladium 46	108 **Ag** Silver 47	112 **Cd** Cadmium 48	115 **In** Indium 49	119 **Sn** Tin 50	122 **Sb** Antimony 51	128 **Te** Tellurium 52	127 **I** Iodine 53	131 **Xe** Xenon 54
133 **Cs** Caesium 55	137 **Ba** Barium 56	139 **La** Lanthanum 57 *	178 **Hf** Hafnium 72	181 **Ta** Tantalum 73	184 **W** Tungsten 74	186 **Re** Rhenium 75	190 **Os** Osmium 76	192 **Ir** Iridium 77	195 **Pt** Platinum 78	197 **Au** Gold 79	201 **Hg** Mercury 80	204 **Tl** Thallium 81	207 **Pb** Lead 82	209 **Bi** Bismuth 83	**Po** Polonium 84	**At** Astatine 85	**Rn** Radon 86
Fr Francium 87	226 **Ra** Radium 88	227 **Ac** Actinium 89 †															

140 **Ce** Cerium 58	141 **Pr** Praseodymium 59	144 **Nd** Neodymium 60	**Pm** Promethium 61	150 **Sm** Samarium 62	152 **Eu** Europium 63	157 **Gd** Gadolinium 64	159 **Tb** Terbium 65	162 **Dy** Dysprosium 66	165 **Ho** Holmium 67	167 **Er** Erbium 68	169 **Tm** Thulium 69	173 **Yb** Ytterbium 70	175 **Lu** Lutetium 71
232 **Th** Thorium 90	**Pa** Protactinium 91	238 **U** Uranium 92	**Np** Neptunium 93	**Pu** Plutonium 94	**Am** Americium 95	**Cm** Curium 96	**Bk** Berkelium 97	**Cf** Californium 98	**Es** Einsteinium 99	**Fm** Fermium 100	**Md** Mendelevium 101	**No** Nobelium 102	**Lr** Lawrencium 103

*58-71 Lanthanoid series
†90-103 Actinoid series

Key

a
X
b

a = relative atomic mass
X = atomic symbol
b = proton (atomic) number

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