



UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
International General Certificate of Secondary Education

CHEMISTRY

0620/12

Paper 1 Multiple Choice

October/November 2010

45 Minutes

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



READ THESE INSTRUCTIONS FIRST

Write in soft pencil.

Do not use staples, paper clips, highlighters, 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.

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.

You may use a calculator.

This document consists of **16** printed pages.



1 In which changes do the particles move further apart?



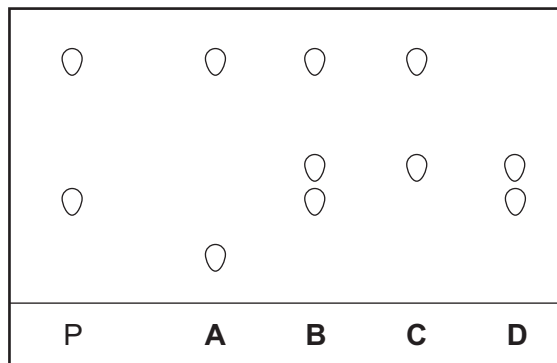
- A** W and X **B** W and Z **C** X and Y **D** Y and Z

2 A mixture of ethanol and methanol are separated by fractional distillation.

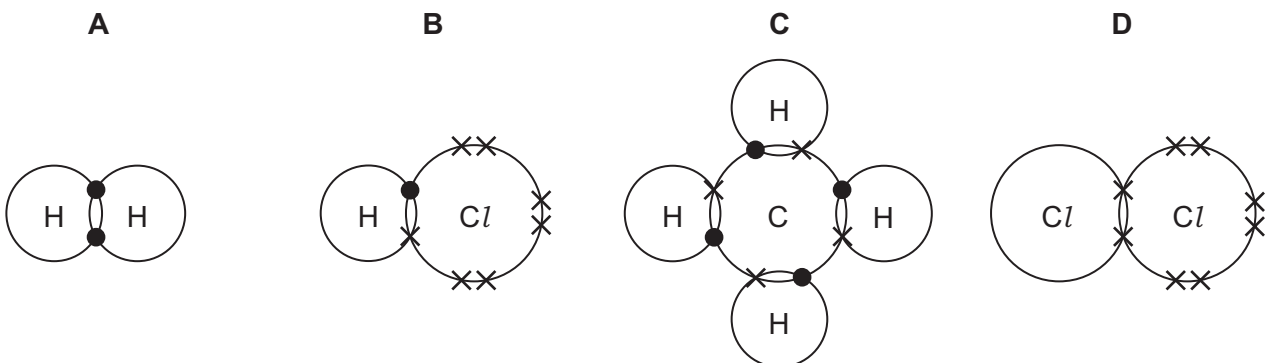
This method of separation depends on a difference in property X of these two alcohols.

What is property X?

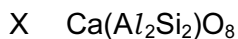
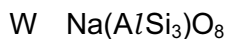
- A** boiling point
B colour
C melting point
D solubility
- 3 Chromatography is used to find out if a banned dye, P, is present in foodstuffs.
 The results are shown in the diagram.
 Which foodstuff contains P?



4 Which diagram does **not** show the outer shell electrons in the molecule correctly?



- 5 The chemical compositions of two substances, W and X, are given.

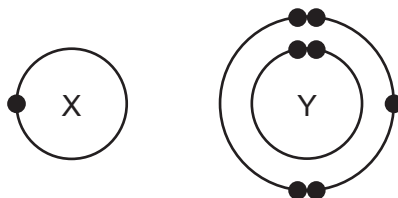


Which statements are correct?

- 1 W and X contain the same amount of oxygen.
- 2 W contains three times as much silicon as X.
- 3 X contains twice as much aluminium as W.

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

- 6 The electronic structures of atoms X and Y are shown.



X and Y form a covalent compound.

What is its formula?

- A** XY_5 **B** XY_3 **C** XY **D** X_3Y

- 7 Element X is shiny and can be formed into a sheet by hammering.

Which row correctly describes the properties of element X?

	conducts electricity	melts below 25°C
A	✓	✓
B	✓	x
C	x	✓
D	x	x

- 8 Two isotopes of hydrogen are ${}^1_1\text{H}$ and ${}^2_1\text{H}$.

Which diagram shows the arrangement of particles in the two isotopes?

	${}^1_1\text{H}$	${}^2_1\text{H}$	
A			key
B			⊖ = an electron
C			⊕ = a proton
D			⊖ = a neutron
			⊖ = a nucleus

- 9 The table shows the structure of different atoms and ions.

particle	proton number	nucleon number	number of protons	number of neutrons	number of electrons
Mg	12	24	12	W	12
Mg ²⁺	X	24	12	12	10
F	9	19	9	Y	9
F ⁻	9	19	9	10	Z

What are the values of W, X, Y and Z?

	W	X	Y	Z
A	10	10	9	9
B	10	12	10	9
C	12	10	9	10
D	12	12	10	10

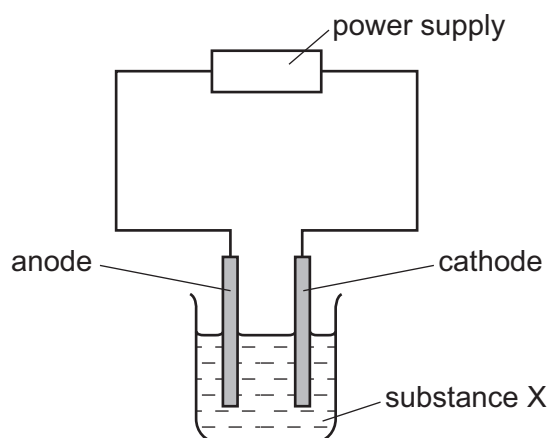
10 Element X has a nucleon (mass) number of 19 and a proton (atomic) number of 9.

To which group in the Periodic Table does it belong?

- A** I **B** III **C** VII **D** 0

11 Substance X was electrolysed in an electrolytic cell.

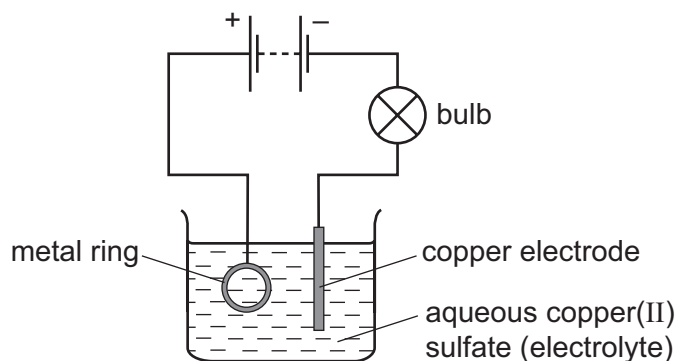
A coloured gas was formed at the anode and a metal was formed at the cathode.



What is substance X?

- A** aqueous sodium chloride
B molten lead bromide
C molten zinc oxide
D solid sodium chloride

12 The diagram shows apparatus used in an attempt to electroplate a metal ring with copper.

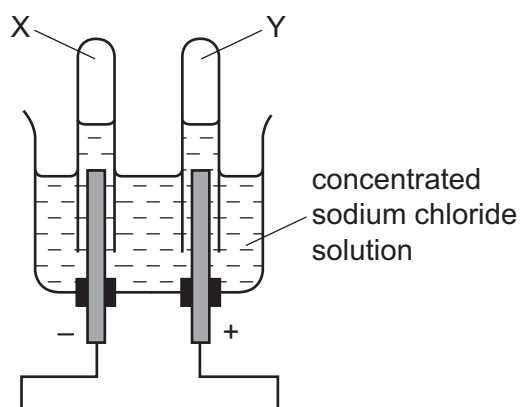


The experiment did not work.

What change is needed in the experiment to make it work?

- A Add solid copper(II) sulfate to the electrolyte.
- B Increase the temperature of the electrolyte.
- C Replace the copper electrode by a carbon electrode.
- D Reverse the connections to the battery.

13 When concentrated sodium chloride solution is electrolysed, elements X and Y are formed.



What are X and Y?

	X	Y
A	chlorine	hydrogen
B	hydrogen	chlorine
C	hydrogen	oxygen
D	oxygen	hydrogen

- 14** Calcium carbonate was reacted with hydrochloric acid in a conical flask. The flask was placed on a balance and the mass of the flask and contents was recorded as the reaction proceeded.

During the reaction, carbon dioxide gas was given off.

The reaction was carried out at two different temperatures.

Which row is correct?

	change in mass	temperature at which mass changed more quickly
A	decrease	higher temperature
B	decrease	lower temperature
C	increase	higher temperature
D	increase	lower temperature

- 15** Some barium iodide is dissolved in water.

Aqueous lead(II) nitrate is added to the solution until no more precipitate forms.

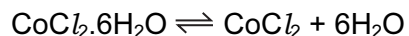
This precipitate, X, is filtered off.

Dilute sulfuric acid is added to the filtrate and another precipitate, Y, forms.

What are the colours of precipitates X and Y?

	X	Y
A	white	white
B	white	yellow
C	yellow	white
D	yellow	yellow

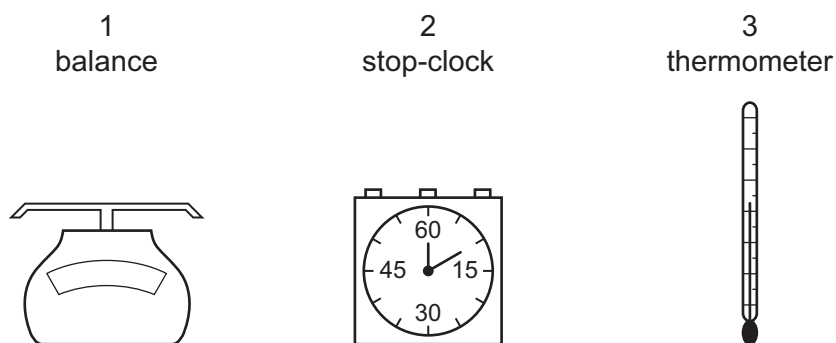
- 16 When pink crystals of cobalt(II) chloride are heated, steam is given off and the colour of the solid changes to blue.



What happens when water is added to the blue solid?

	colour	temperature
A	changes to pink	decreases
B	changes to pink	increases
C	remains blue	decreases
D	remains blue	increases

- 17 The diagrams show some pieces of laboratory equipment.



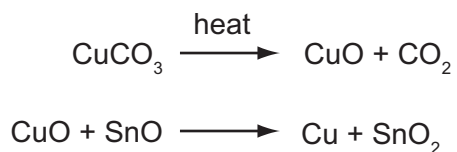
Which equipment is needed to find out whether dissolving salt in water is an endothermic process?

- A** 1 only **B** 1 and 3 **C** 2 and 3 **D** 3 only
- 18 Which reaction will result in a decrease in pH?
- A** adding calcium hydroxide to acid soil
B adding citric acid to sodium hydrogen carbonate solution
C adding sodium chloride to silver nitrate solution
D adding sodium hydroxide to hydrochloric acid

- 19 Which is an endothermic process?

- A** burning hydrogen
B distilling petroleum
C reacting potassium with water
D using petrol in a motor car engine

20 The red colour in some pottery glazes may be formed as a result of the reactions shown.



These equations show that1..... is oxidised and2..... is reduced.

Which substances correctly complete gaps 1 and 2 in the above sentence?

	1	2
A	CO ₂	SnO ₂
B	CuCO ₃	CuO
C	CuO	SnO
D	SnO	CuO

21 The table shows some reactions of the halogens.

Which reaction is the most likely to be explosive?

reaction	chlorine gas	bromine gas	iodine gas
reaction with hydrogen	A	B	C
reaction with iron	very vigorous	less vigorous	D

22 Which compound is likely to be coloured?

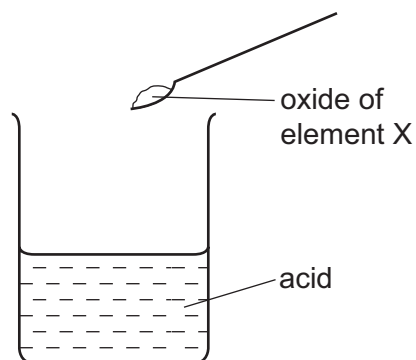
- A** KMnO₄ **B** KNO₃ **C** K₂CO₃ **D** K₂SO₄

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

How can the excess metal oxide be removed?

- A** chromatography
B crystallisation
C distillation
D filtration

24 The oxide of element X was added to an acid. It reacted to form a salt and water.



What is the pH of the acid before the reaction and what type of element is X?

	pH	type of element X
A	greater than 7	metal
B	greater than 7	non-metal
C	less than 7	metal
D	less than 7	non-metal

25 The table compares the properties of Group I elements with those of transition elements.

Which entry in the table is correct?

	property	Group I elements	transition elements
A	catalytic activity	low	high
B	density	high	low
C	electrical conductivity	low	high
D	melting point	high	low

26 The diagram shows the positions of elements P, Q, R, S and T in the Periodic Table.

These letters are not the chemical symbols for the elements.

P																		S	T
Q		R																	

Which statement about the properties of these elements is correct?

- A P reacts more vigorously with water than does Q.
- B P, Q and R are all metals.
- C T exists as diatomic molecules.
- D T is more reactive than S.

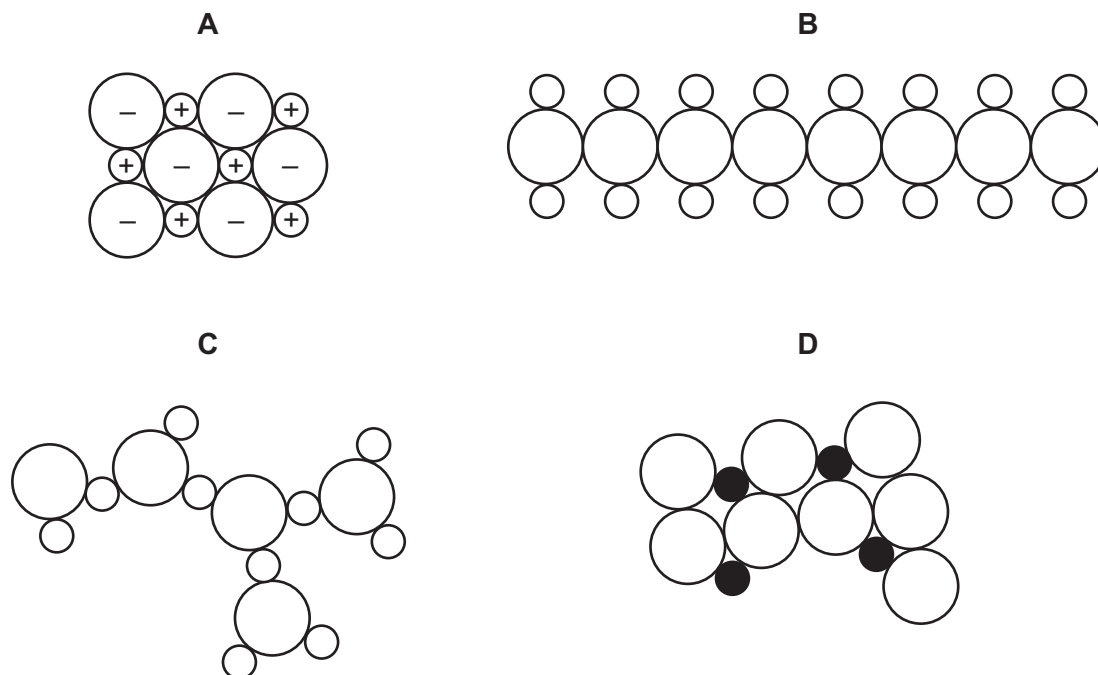
27 Some metals react readily with dilute hydrochloric acid.

Some metals can be extracted by heating their oxides with carbon.

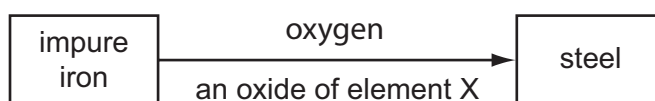
For which metal are **both** statements correct?

- A calcium
- B copper
- C iron
- D magnesium

28 Which diagram could represent the structure of an alloy?



29 The diagram shows the materials used in the production of steel from impure iron.



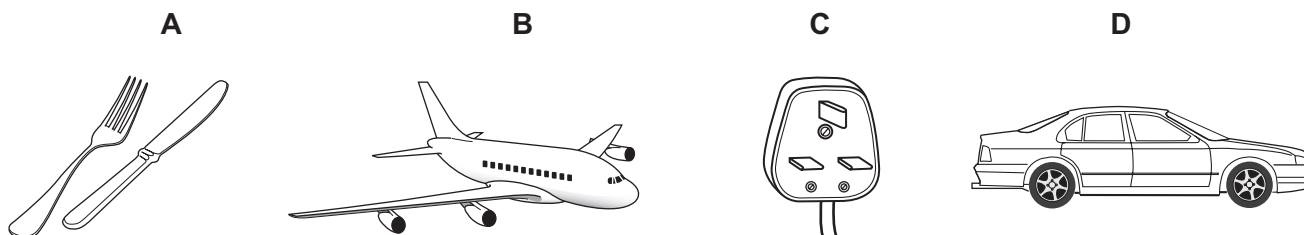
What could element X be?

- A** calcium
 - B** carbon
 - C** nitrogen
 - D** sulfur
- 30 Which property do **all** metals have?
- A** Their boiling points are low.
 - B** Their densities are low.
 - C** They conduct electricity.
 - D** They react with water.

31 Which pollutant, found in car exhaust fumes, does **not** come from the fuel?

- A carbon monoxide
- B hydrocarbons
- C lead compounds
- D nitrogen oxides

32 Which diagram shows a common use of stainless steel?

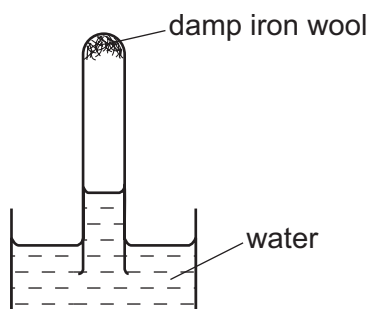


33 Why is chlorination used in water treatment?

- A to kill bacteria in the water
- B to make the water neutral
- C to make the water taste better
- D to remove any salt in the water

34 A test-tube containing damp iron wool is inverted in water.

After three days, the water level inside the test-tube has risen.



Which statement explains this rise?

- A Iron oxide has been formed.
- B Iron wool has been reduced.
- C Oxygen has been formed.
- D The temperature of the water has risen.

35 Which information about carbon dioxide and methane is correct?

		carbon dioxide	methane
A	formed when vegetation decomposes	✓	✗
B	greenhouse gas	✓	✓
C	present in unpolluted air	✗	✗
D	produced during respiration	✗	✓

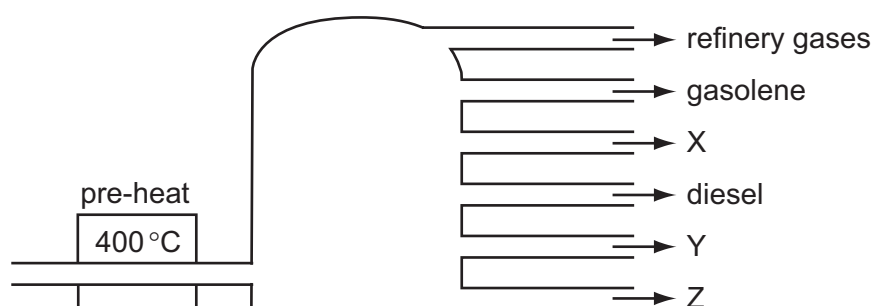
36 A bag of fertiliser 'Watch it grow' contains ammonium sulfate and potassium sulfate.

Which of the three elements N, P and K does 'Watch it grow' contain?

	N	P	K
A	✓	✓	✗
B	✓	✗	✓
C	✗	✓	✗
D	✗	✗	✓

37 In an oil refinery, crude oil is separated into useful fractions.

The diagram shows some of these fractions.



What are fractions X, Y and Z?

	X	Y	Z
A	fuel oil	bitumen	paraffin (kerosene)
B	fuel oil	paraffin (kerosene)	bitumen
C	paraffin (kerosene)	bitumen	fuel oil
D	paraffin (kerosene)	fuel oil	bitumen

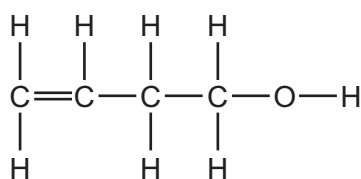
38 Ethene reacts with Y to produce ethanol.



What is Y?

- A hydrogen
- B oxygen
- C steam
- D yeast

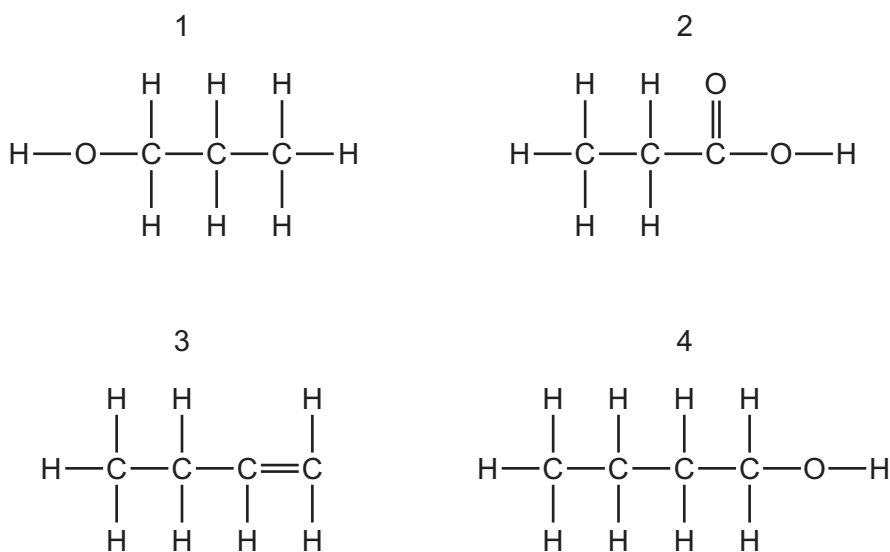
39 The diagram shows the structure of a compound.



To which classes of compound does this molecule belong?

	alkane	alkene	alcohol
A	no	no	no
B	no	yes	yes
C	yes	no	yes
D	yes	yes	yes

40 Which structures show compounds that are members of the same homologous series?



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

DATA SHEET
The Periodic Table of the Elements

		Group																																																					
I	II	III	IV	V	VI	VII	0																																																
		1 H Hydrogen 1										2 He Helium 2																																											
3 7 Li Lithium 4	4 9 Be Beryllium 4											5 11 B Boron 5																																											
11 23 Na Sodium 11	12 24 Mg Magnesium 12	13 27 Al Aluminium 13	14 28 Si Silicon 14	15 31 P Phosphorus 15	16 32 S Sulfur 16	17 35.5 Cl Chlorine 17	18 40 Ar Argon 18					19 35 F Fluorine 9																																											
19 39 K Potassium 19	20 40 Ca Calcium 20	21 45 Sc Scandium 21	22 48 Ti Titanium 22	23 51 V Vanadium 23	24 52 Cr Chromium 24	25 55 Mn Manganese 25	26 56 Fe Iron 26	27 59 Co Cobalt 27	28 59 Ni Nickel 28	29 64 Cu Copper 29	30 65 Zn Zinc 30	31 73 Ge Germanium 32	32 75 As Arsenic 33	33 79 Se Selenium 34	34 80 Br Bromine 35	35 84 Kr Krypton 36	36 84 Kr Krypton 36	37 85 Rb Rubidium 37	38 88 Sr Strontium 38	39 89 Y Yttrium 39	40 91 Zr Zirconium 40	41 93 Nb Niobium 41	42 96 Mo Molybdenum 42	43 98 Tc Technetium 43	44 101 Ru Ruthenium 44	45 103 Rh Rhodium 45	46 106 Pd Palladium 46	47 108 Ag Silver 47	48 112 Cd Cadmium 48	49 115 In Indium 49	50 119 Sn Tin 50	51 122 Sb Antimony 51	52 128 Te Tellurium 52	53 127 I Iodine 53	54 131 Xe Xenon 54	55 133 Cs Caesium 55	56 137 Ba Barium 56	57 139 La Lanthanum 57	58 178 Hf Hafnium 72	59 181 Ta Tantalum 73	60 184 W Tungsten 74	61 190 Os Osmium 76	62 192 Ir Iridium 77	63 195 Pt Platinum 78	64 197 Au Gold 79	65 201 Hg Mercury 80	66 204 Tl Thallium 81	67 207 Pb Lead 82	68 209 Bi Bismuth 83	69 210 Po Polonium 84	70 210 At Astatine 85	71 210 Rn Radon 86	72 226 Ra Radium 88	73 227 Ac Actinium 89	74 227 Fr Francium 87
												66 159 Dy Dysprosium 66	67 162 Ho Holmium 67	68 167 Er Erbium 68	69 173 Tm Thulium 69	70 175 Lu Lutetium 71	71 173 Yb Ytterbium 70	72 175 Lu Lutetium 71	73 175 Lu Lutetium 71	74 232 Th Thorium 90	75 232 Pa Protactinium 91	76 238 U Uranium 92	77 238 Np Neptunium 93	78 238 Pu Plutonium 94	79 238 Am Americium 95	80 238 Cm Curium 96	81 238 Bk Berkelium 97	82 238 Cf Californium 98	83 238 Es Einsteinium 99	84 238 Fm Fermium 100	85 238 Md Mendelevium 101	86 238 No Nobelium 102	87 238 Lr Lawrencium 103																						

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

a	X
b	

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

The volume of one mole of any gas is 24 dm³ at room temperature and pressure (r.t.p.).

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.

University of 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.