UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
International General Certificate of Secondary Education

CHEMISTRY **0620/13**

Paper 1 Multiple Choice **May/June 2010**

45 Minutes

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

* 1 1 5 0 1 3 4 8 9 7 *

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 **15** printed pages and **1** blank page.

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1 The diagram shows a cup of tea.

Which row describes the water particles in the air above the cup compared with the water particles in the cup?

	moving faster	closer together
A	✓	✓
B	✓	✗
C	✗	✓
D	✗	✗

2 Which row shows the change that takes place when element X gains the new particle shown?

	particle gained	change
A	electron	an isotope of element X is formed
B	electron	the element one place to the right of X in the Periodic Table is formed
C	proton	an isotope of element X is formed
D	proton	the element one place to the right of X in the Periodic Table is formed

3 The symbols of two atoms may be written as shown.

$$^{52}_{23}\mathrm{X} \qquad ^{52}_{24}\mathrm{Y}$$

Which statement about these atoms is correct?

A They are different elements because they have different numbers of neutrons.

B They are different elements because they have different numbers of protons.

C They are isotopes of the same element because they have the same nucleon number.

D They are isotopes of the same element because they have the same proton number.

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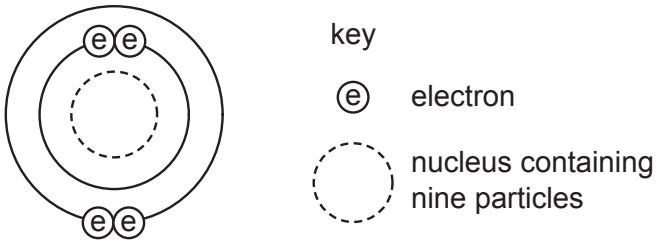
4 The diagram shows an atom.



What is the proton number and neutron number of the atom?

	proton number	neutron number
A	4	5
B	4	9
C	5	4
D	5	9

5 A fruit drink coloured orange contains a dissolved mixture of red and yellow colouring agents. One of these colouring agents is suspected of being illegal.

Which method could be used to show the presence of this illegal colouring agent?

A chromatography

B distillation

C evaporation

D filtration

6 A student carries out an experiment to find how fast 3 cm pieces of magnesium ribbon dissolve in 10 cm^3 samples of sulfuric acid at different temperatures.

Which piece of apparatus does the student **not** need?

A balance

B measuring cylinder

C stop-clock

D thermometer

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7 Three electrolysis cells are set up. Each cell has inert electrodes.

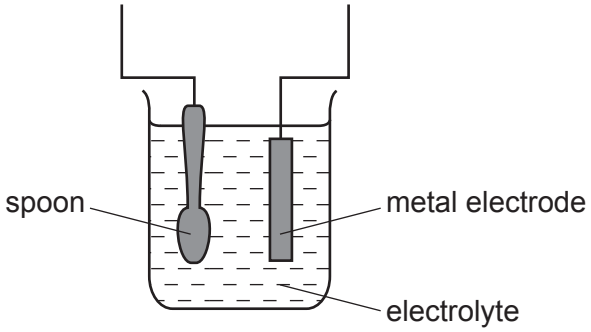
The electrolytes are listed below.

cell 1	aqueous sodium chloride
cell 2	concentrated hydrochloric acid
cell 3	molten lead(II) bromide

In which cells is a gas formed at **both** electrodes?

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

8 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 of the power supply.

9 Aqueous copper(II) sulfate solution is electrolysed using inert electrodes.

Copper(II) ions (Cu^{2+}), hydrogen ions (H^+), hydroxide ions (OH^-) and sulfate ions (SO_4^{2-}) are present in the solution.

To which electrodes are the ions attracted during this electrolysis?

	attracted to anode	attracted to cathode
A	Cu^{2+} and H^+	OH^- and SO_4^{2-}
B	Cu^{2+} and SO_4^{2-}	H^+ and OH^-
C	H^+ and OH^-	Cu^{2+} and SO_4^{2-}
D	OH^- and SO_4^{2-}	Cu^{2+} and H^+

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10 In which compounds are pairs of electrons shared between atoms?

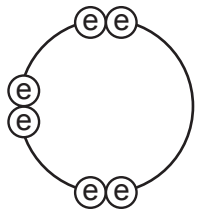
1 sodium chloride

2 methane

3 lead bromide

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

11 Element X has six electrons in its outer shell.



How could the element react?

A by gaining two electrons to form a positive ion

B by losing six electrons to form a negative ion

C by sharing two electrons with two electrons from another element to form two covalent bonds

D by sharing two electrons with two electrons from another element to form four covalent bonds

12 Hydrogen and chlorine react as shown.

1 molecule of hydrogen + 1 molecule of chlorine → 2 molecules of hydrogen chloride

What is the equation for this reaction?

A $2H + 2Cl \rightarrow 2HCl$

B $2H + 2Cl \rightarrow H_2Cl_2$

C $H_2 + Cl_2 \rightarrow 2HCl$

D $H_2 + Cl_2 \rightarrow H_2Cl_2$

13 Which name is given to mixtures of metals?

A alloys

B compounds

C ores

D salts

14 Iron is extracted from iron oxide using carbon monoxide as shown in the equation.

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

What does the equation show?

A Carbon monoxide is oxidised to carbon dioxide.

B Carbon monoxide is reduced to carbon dioxide.

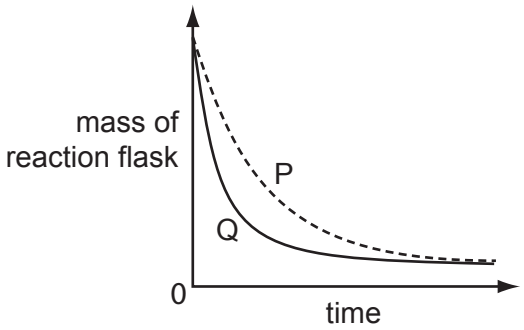
C Iron is oxidised to iron oxide.

D Iron oxide is oxidised to iron.

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

The loss in 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.

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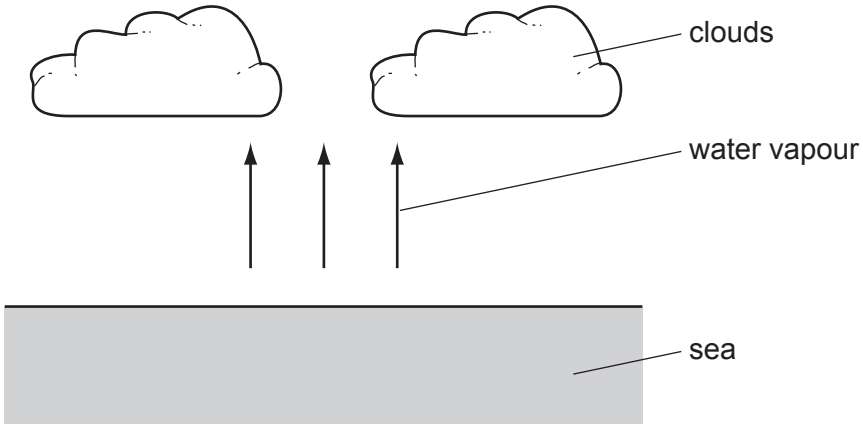
16 Clouds are formed when water vapour evaporates from the sea.



What is the energy change and what name is given to the type of change when water evaporates?

	energy change	type of change
A	energy given out	endothermic
B	energy given out	exothermic
C	energy taken in	endothermic
D	energy taken in	exothermic

17 Which process is **not** exothermic?

A burning a fossil fuel

B obtaining lime from limestone

C radioactive decay of ^{235}U

D reacting hydrogen with oxygen

18 When pink cobalt(II) sulfate crystals are heated, they form steam and a blue solid.

When water is added to the blue solid, it turns pink and becomes hot.

Which terms describe the pink cobalt(II) sulfate crystals and the reactions?

	pink cobalt sulfate	reactions
A	aqueous	irreversible
B	aqueous	reversible
C	hydrated	irreversible
D	hydrated	reversible

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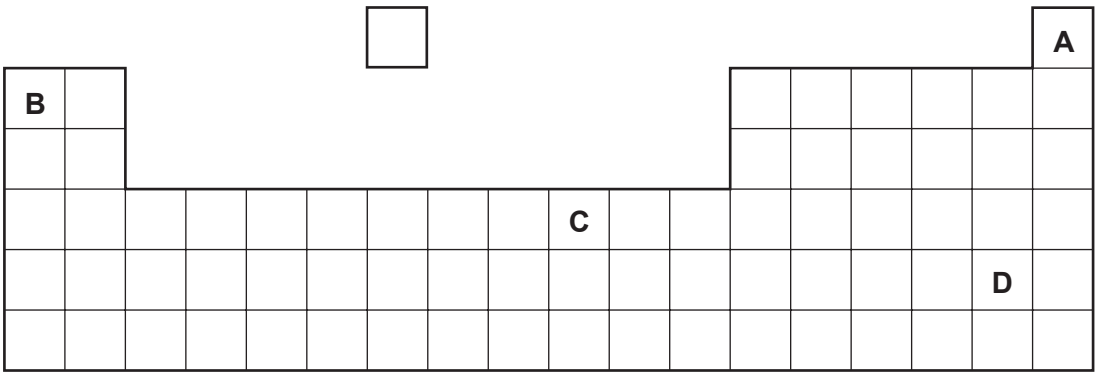
19 An element melts at 1455 °C, has a density of 8.90 g / cm^3 and forms a green chloride.

Where in the Periodic Table is this element found?



20 An excess of copper(II) oxide is added to dilute sulfuric acid to make crystals of hydrated copper(II) sulfate.

The processes listed may be used to obtain crystals of hydrated copper(II) sulfate.

1 concentrate the resulting solution

2 filter

3 heat the crystals

4 wash the crystals

Which processes are needed and in which order?

A 1, 2, 3 and 4

B 1, 2, 4 and 3

C 2, 1, 2 and 3

D 2, 1, 2 and 4

21 Which is **not** a property of Group I metals?

A They are soft and can be cut with a knife.

B They corrode rapidly when exposed to oxygen in the air.

C They produce an acidic solution when they react with water.

D They react rapidly with water producing hydrogen gas.

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22 Aqueous sodium hydroxide is added to a solid, X, and the mixture is heated.

A green precipitate is formed and an alkaline gas is given off.

Which ions are present in X?

A NH_4^+ and Fe^{2+}

B NH_4^+ and Fe^{3+}

C OH^- and Fe^{2+}

D OH^- and Fe^{3+}

23 An aqueous solution of the organic compound methylamine has a pH greater than 7.

Which statement about methylamine is correct?

A It neutralises an aqueous solution of sodium hydroxide.

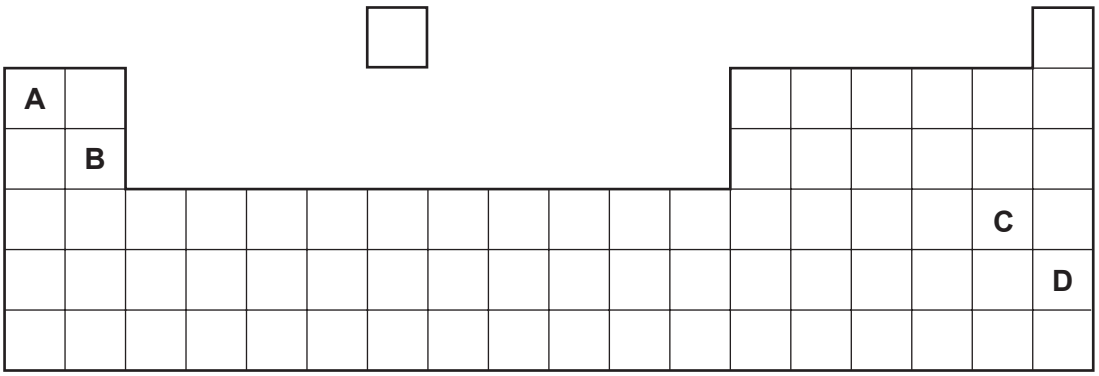
B It reacts with copper(II) carbonate to give carbon dioxide.

C It reacts with hydrochloric acid to form a salt.

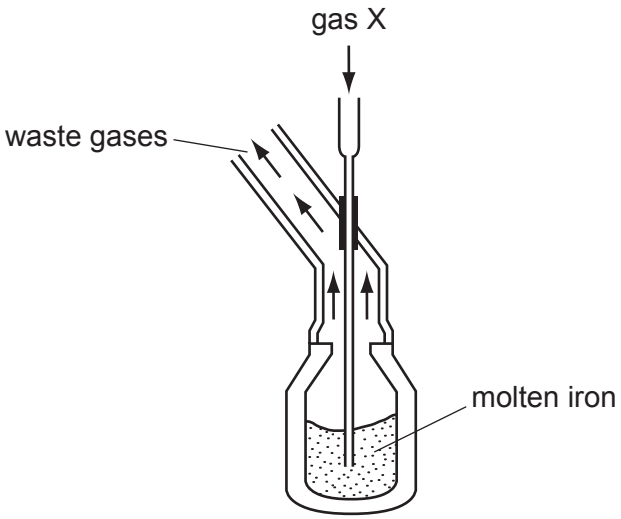
D It turns blue litmus red.

24 The positions in the Periodic Table of four elements are shown.

Which element is **most** likely to form an acidic oxide?



25 The diagram shows the manufacture of steel.



What is gas X?

A carbon dioxide

B chlorine

C hydrogen

D oxygen

26 A student added dilute hydrochloric acid to four metals and recorded the results.

Not all of the results are correct.

	results	
	metal	gas given off
1	copper	yes
2	iron	yes
3	magnesium	no
4	zinc	yes

Which two results are correct?

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

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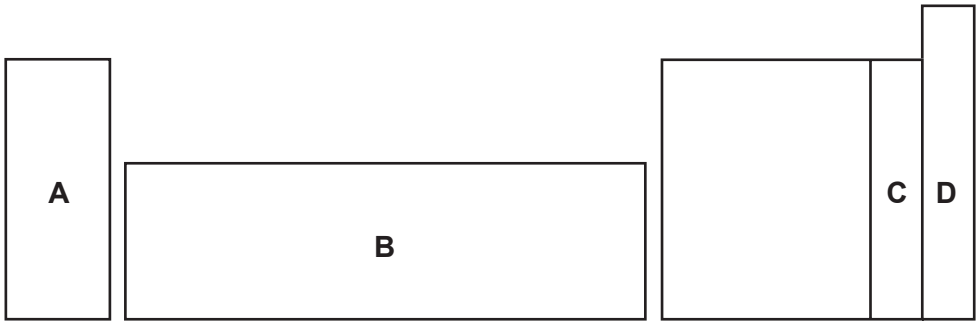
27 An element does not conduct electricity and exists as diatomic molecules.

In which area of the Periodic Table is the element to be found?



28 Copper, iron and zinc are all used as pure metals.

Which of these three metals are also used in alloys?

	copper	iron	zinc
A	✓	✓	✓
B	✓	✓	✗
C	✗	✓	✓
D	✗	✗	✓

29 Solutions of a halogen and a sodium halide are mixed.

Which mixture darkens in colour because a reaction occurs?

A bromine and sodium chloride

B bromine and sodium fluoride

C chlorine and sodium fluoride

D chlorine and sodium iodide

30 Some properties of four elements are shown in the table.

Which element is a metal?

	melting point / °C	electrical conductivity when liquid	electrical conductivity when solid
A	–7	low	low
B	801	high	low
C	1535	high	high
D	3550	low	low

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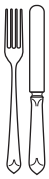
[Turn over

31 The diagram shows three types of item.



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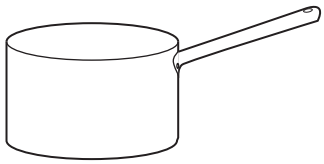
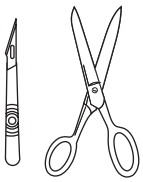


cooking pan



instruments used in hospitals

Which method of rust prevention can be used for all three types of item?

A coating with plastic

B covering with grease

C galvanising

D using stainless steel

32 Aluminium is an important metal with many uses.

Some of its properties are listed.

1 It is a good conductor of heat.

2 It is a reactive metal.

3 It has a low density.

4 It has an oxide layer that prevents corrosion.

Which set of properties help to explain the use of aluminium for cooking and storing food?

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

33 To grow roses, a fertiliser containing nitrogen, phosphorus and potassium is needed.

For the best flowers, the fertiliser should contain a high proportion of potassium.

Which fertiliser is best for roses?

fertiliser	proportion by mass		
	N	P	K
A	9	0	25
B	13	13	20
C	29	5	0
D	29	15	5

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34 Which statements about water are correct?

1 Water is treated with chlorine to kill bacteria.

2 Household water may contain salts in solution.

3 Water is used in industry for cooling.

4 Water for household use is filtered to remove soluble impurities.

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

35 Which statement about methane is **not** correct?

A It is a liquid produced by distilling petroleum.

B It is produced as vegetation decomposes.

C It is produced by animals such as cows.

D It is used as a fuel.

36 Which compound in polluted air can damage stonework and kill trees?

A carbon dioxide

B carbon monoxide

C lead compounds

D sulfur dioxide

37 Diesel, petrol and bitumen are all

A fuels.

B hydrocarbons.

C lubricants.

D waxes.

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38 A macromolecule is a very large molecule.

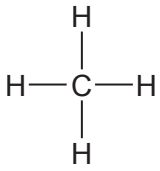
Macromolecules can be made by joining smaller molecules together. This is called polymerisation.

Which row in the table describes the formation of a polymer?

	monomer	polymer
A	ethane	poly(ethane)
B	ethene	poly(ethene)
C	ethane	poly(ethene)
D	ethene	poly(ethane)

39 Which structure shows a compound that belongs to a **different** homologous series to propane?

A



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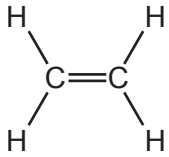

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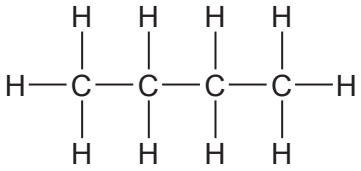

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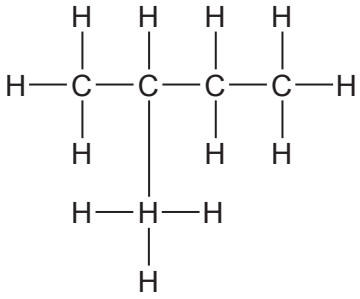
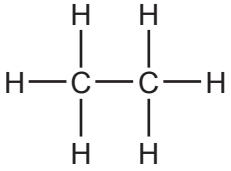
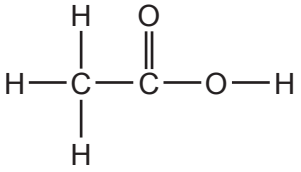


40 Which structure is **incorrect**?

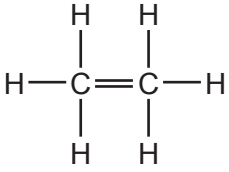
A



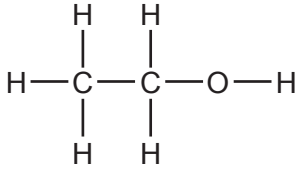
B



C



D



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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												
										11 B Boron 5	12 C Carbon 6	14 N Nitrogen 7	16 O Oxygen 8	19 F Fluorine 9	20 Ne Neon 10		
7 Li Lithium 3	9 Be Beryllium 4									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		
23 Na Sodium 11	24 Mg Magnesium 12									70 Ga Gallium 31	73 Ge Germanium 32	75 As Arsenic 33	79 Se Selenium 34	80 Br Bromine 35	84 Kr Krypton 36		
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	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
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 = 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.).

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