UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
International General Certificate of Secondary Education

CHEMISTRY **0620/01**

Paper 1 Multiple Choice **May/June 2007**

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.

1 When there is no wind, the scent of flowers can be detected more easily on a warm evening than on a cold evening.

This is because the molecules of the scent ……1…… ……2…… than in colder conditions.

Which words correctly complete gaps 1 and 2?

	gap 1	gap 2
A	condense	nearer to the flowers
B	condense	further from the flowers
C	diffuse	nearer to the flowers
D	diffuse	further from the flowers

2 A student investigates if, at 30 °C, the concentration of acid affects how rapidly it reacts with a known mass of magnesium.

The student has a beaker, concentrated acid, water and the apparatus below.

P a balance

Q a clock

R a measuring cylinder

S a thermometer

Which of these pieces of apparatus does the student use?

A P, Q and R only

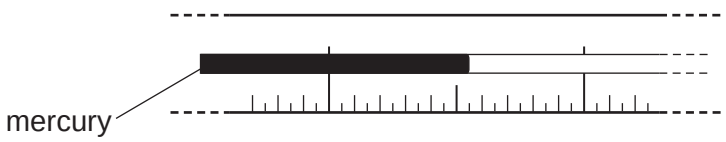
B P, Q and S only

C Q, R and S only

D P, Q, R and S

3 The boiling point of liquid X is lower than that of water. To test a student, a teacher covers up the numbers on a thermometer. The student places the thermometer in boiling liquid X.

The diagram represents part of the stem of this thermometer.



What could the temperature on the thermometer be?

A 75.5 °C **B** 84.5 °C **C** 104.5 °C **D** 105.5 °C

4 Which mixture can be separated by adding water, stirring and filtering?

A barium chloride and sodium chloride

B copper and magnesium

C diamond and graphite

D silver chloride and sodium nitrate

5 An atom has the symbol ${}^{p}_{q}\mathrm{X}$.

Which value determines the position of the element in the Periodic Table?

A p

B q

C $p - q$

D $p + q$

6 Element Y is in the second Period of the Periodic Table. An atom of element Z has six more protons than an atom of element Y.

Which statement **must** be correct?

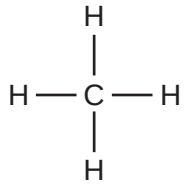
A Elements Y and Z are in the same Period.

B Elements Y and Z have the same number of electrons in the first shell.

C Element Z has six more electrons in its outer shell than element Y.

D The nucleon number of element Z is six more than that of element Y.

7 The diagram shows the structure of methane.



What is the total number of electrons used for bonding in this molecule?

A 2 **B** 4 **C** 8 **D** 10

8 The diagram shows the structure of a substance.

What is represented?

A diamond

B ethane

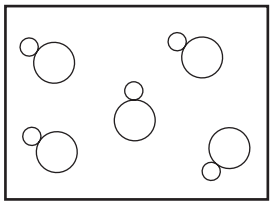
C graphite

D poly(ethene)

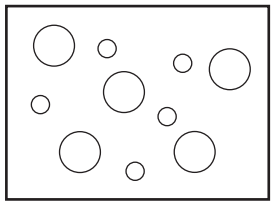
9 In the diagrams, circles of different sizes represent atoms of different elements.

Which diagram can represent hydrogen chloride gas?

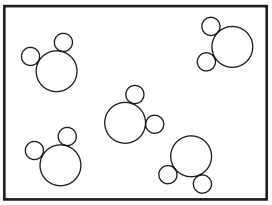
A



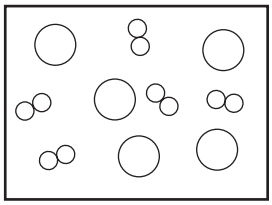
B



C



D



10 Boron, B, forms an oxide.

Which equation is correctly balanced?

A $2B + 3O_2 \rightarrow B_2O_3$

B $2B + 3O_2 \rightarrow 2B_2O_3$

C $4B + 2O_2 \rightarrow 2B_2O_3$

D $4B + 3O_2 \rightarrow 2B_2O_3$

11 Students are asked to state

- the number of atoms in one molecule of ethanoic acid,
- the relative molecular mass, M_r, of this acid.

Which line is correct?

	number of atoms	M_r
A	8	32
B	8	60
C	9	26
D	9	46

12 A molten compound is electrolysed. Two atoms of X are deposited at the negative electrode at the same time as three atoms of Y are deposited at the positive electrode.

These results show that:

X is a …1…;

Y is a …2…;

the formula of the compound is …3… .

How are gaps 1, 2 and 3 correctly completed?

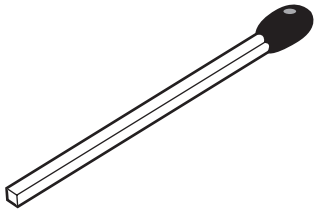
	1	2	3
A	metal	non-metal	X_3Y_2
B	metal	non-metal	X_2Y_3
C	non-metal	metal	X_3Y_2
D	non-metal	metal	X_2Y_3

13 In which electrolyses are chlorine, hydrogen and sodium hydroxide all produced?

	aqueous sodium chloride	molten sodium chloride
A	✓	✓
B	✓	✗
C	✗	✓
D	✗	✗

[Turn over

14 The diagram shows a match.



By striking the match, a chemical reaction takes place.

Which statements about the chemical reaction are correct?

	type of reaction	reason
A	endothermic	because energy is used to strike the match
B	endothermic	because energy is given out as the match burns
C	exothermic	because energy is used to strike the match
D	exothermic	because energy is given out as the match burns

15 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

16 Three reactions used in the manufacture of sulphuric acid are shown.

1 $S + O_2 \rightarrow SO_2$

2 $2SO_2 + O_2 \rightarrow 2SO_3$

3 $SO_3 + H_2O \rightarrow H_2SO_4$

Which of these reactions are redox reactions?

A 1 only

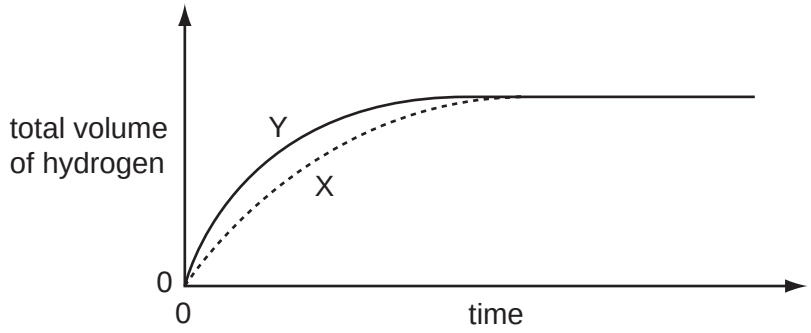
B 3 only

C 1 and 2 only

D 2 and 3 only

17 In an experiment using dilute acid and a metal, the speed at which hydrogen is released is measured (curve X on graph).

The experiment is repeated but with one of the conditions changed (curve Y on graph).



Which changes in condition could result in curve Y?

	increase in concentration of acid	increase in particle size of metal	increase in temperature
A	✓	✓	✓
B	✓	✓	✗
C	✓	✗	✓
D	✗	✓	✓

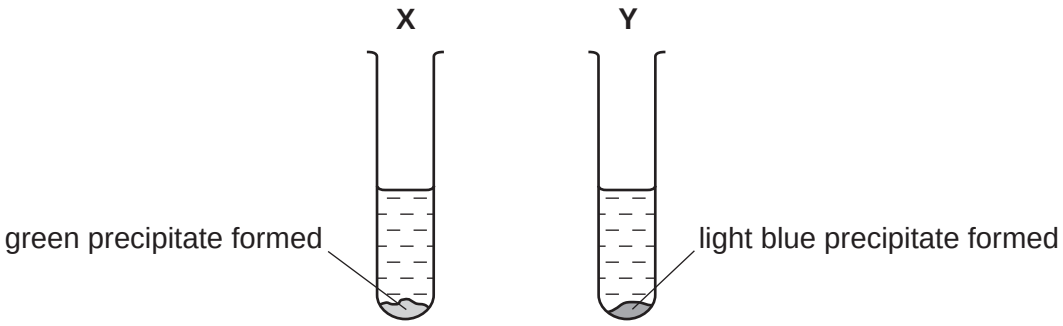
18 Aqueous sodium hydroxide and aqueous ammonia each give a white precipitate when added to aqueous zinc sulphate.

What happens when an excess of each of these reagents is added?

	excess NaOH(aq)	excess NH_3(aq)
A	precipitate dissolves	precipitate dissolves
B	precipitate dissolves	precipitate does not dissolve
C	precipitate does not dissolve	precipitate dissolves
D	precipitate does not dissolve	precipitate does not dissolve

[Turn over

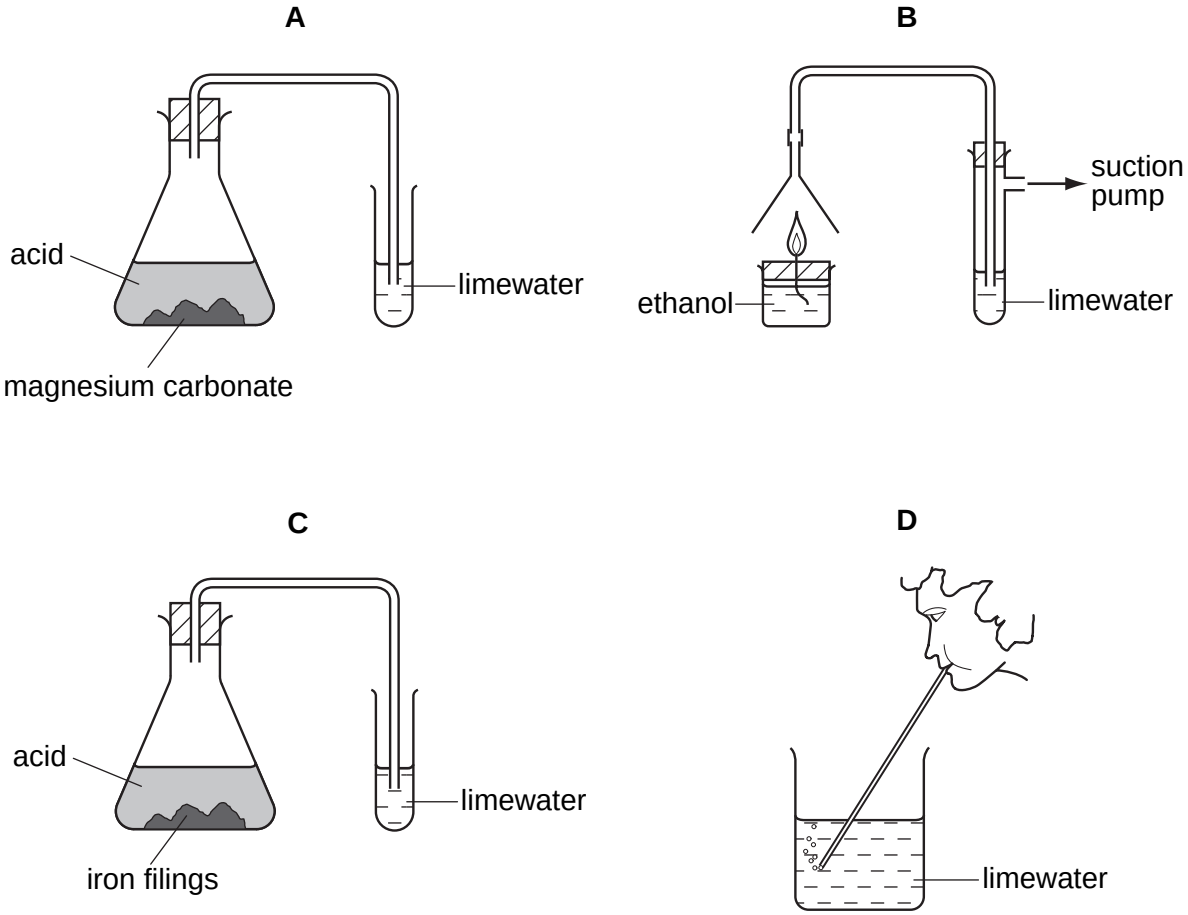
19 Aqueous sodium hydroxide is added to two different solutions with the results shown.



What are the cations present in **X** and **Y**?

	X	Y
A	copper(II)	iron(II)
B	copper(II)	iron(III)
C	iron(II)	copper(II)
D	iron(III)	copper(II)

20 In which experiment does the limewater **not** turn milky?



21 Two indicators, bromophenol blue and Congo red, show the following colours in acidic solutions and in alkaline solutions.

indicator	acid	alkali
bromophenol blue	yellow	blue
Congo red	violet	red

A few drops of each indicator are added to separate samples of a solution of pH 2.

What are the colours of the indicators in this solution?

	in a solution of pH 2	
	bromophenol blue is	Congo red is
A	blue	red
B	blue	violet
C	yellow	red
D	yellow	violet

22 Aqueous lead(II) nitrate is added to a solution containing iodide ions. Lead(II) iodide is formed.

Which type of reaction takes place?

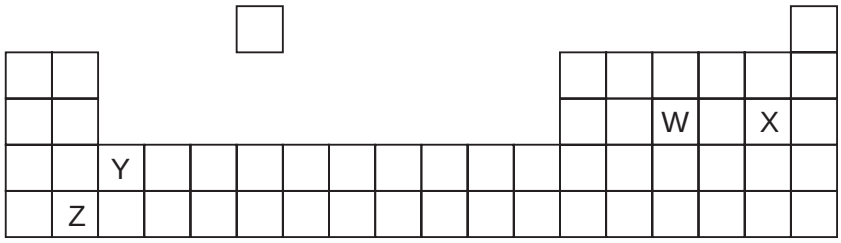
A neutralisation

B oxidation

C precipitation

D reduction

23 The diagram shows an outline of part of the Periodic Table.



Which two elements could form a covalent compound?

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

24 Which substances react with aqueous potassium bromide to form bromine?

	chlorine	iodine
A	✓	✓
B	✓	✗
C	✗	✓
D	✗	✗

25 Why are some weather balloons 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.

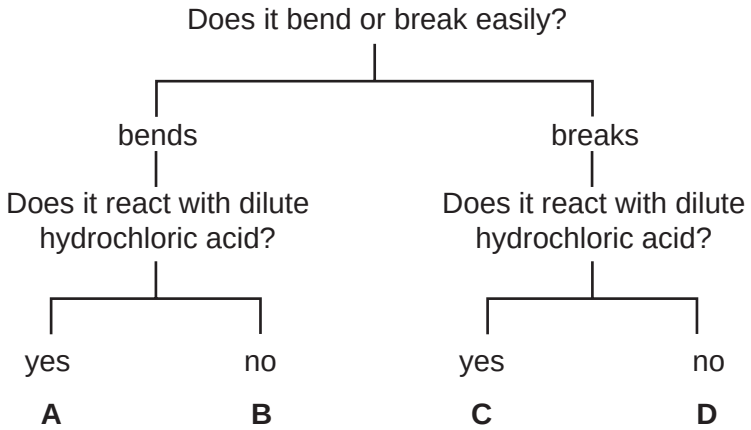
26 The table shows the densities of some Group I metals.

Which of these metals sinks in benzene (density = 0.88 g / cm^3) but floats in nitrobenzene (density = 1.2 g / cm^3)?

	metal	density, in g / cm^3
A	lithium	0.53
B	sodium	0.97
C	potassium	0.86
D	rubidium	1.53

27 The diagram shows the properties of four substances.

Which one could be magnesium?



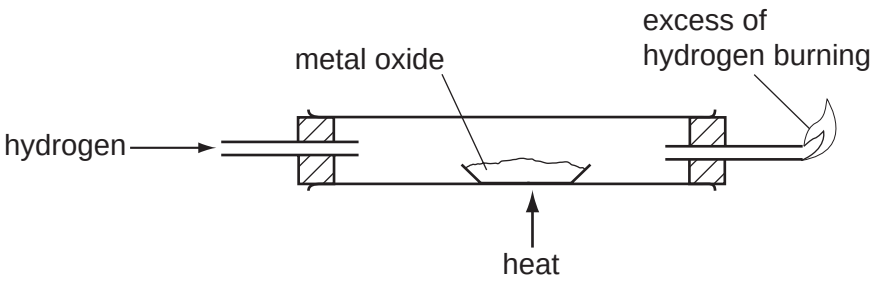
28 In 'native' copper, the element occurs as the metal, not as a compound.

Gold is below copper in the reactivity series.

Which can be deduced about the properties of gold?

	it occurs 'native'	it reacts with dilute sulphuric acid
A	✓	✓
B	✓	✗
C	✗	✓
D	✗	✗

29 The diagram shows a method for displacing a metal from its oxide.



Which metal can be displaced from its oxide by using this method?

A calcium

B copper

C magnesium

D potassium

30 Stainless steel is used to make cutlery. Aluminium is used to make food containers.

Which property do **both** metals have that makes them suitable for these uses?

A They are good conductors of electricity.

B They are good conductors of heat.

C They are resistant to corrosion.

D They are very strong.

31 Which process takes place in the conversion of iron into steel?

A Basic oxides are removed.

B Carbon is converted to carbon dioxide.

C Iron is oxidised.

D Iron oxide is reduced.

32 In which industrial process is the presence of water **not** essential?

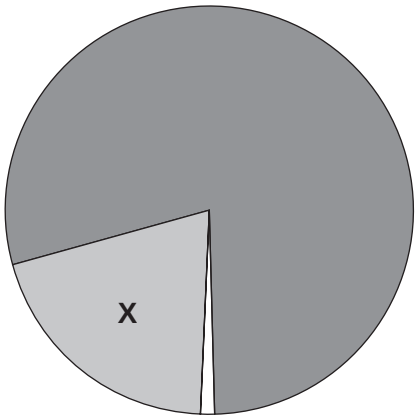
A the electrolytic purification of copper

B the production of ethanol from ethene

C the production of ethanol by fermentation

D the production of iron in the Blast Furnace

33 The pie chart represents the composition of air.



What is gas **X**?

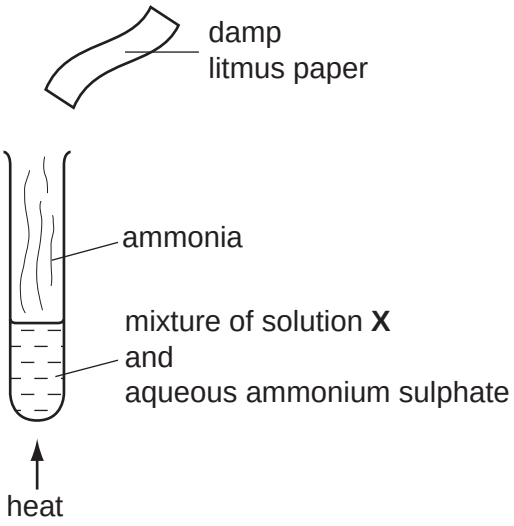
A carbon dioxide

B hydrogen

C nitrogen

D oxygen

34 The diagram shows an experiment in which ammonia is released.



Which line in the table is correct?

	solution **X**	final colour of litmus paper
A	aqueous sodium hydroxide	blue
B	aqueous sodium hydroxide	red
C	dilute sulphuric acid	blue
D	dilute sulphuric acid	red

35 A bag of fertiliser 'Watch it grow' contains ammonium sulphate and potassium sulphate.

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

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

[Turn over

36 When limestone is heated very strongly in air, lime is made.

What is the formula of limestone and of lime?

	limestone	lime
A	$CaCO_3$	CaO
B	$CaCO_3$	$Ca(OH)_2$
C	CaO	$CaCO_3$
D	$Ca(OH)_2$	$CaCO_3$

37 Bromine and steam each react with ethene.

Which of these reactions need a catalyst?

	Br_2 / ethene	steam / ethene
A	✓	✓
B	✓	✗
C	✗	✓
D	✗	✗

38 What are formed when glucose is fermented?

A ethanol and carbon dioxide

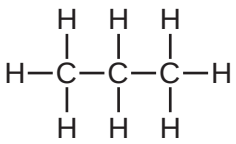
B ethanol and oxygen

C ethene and carbon dioxide

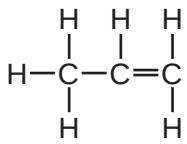
D ethene and oxygen

39 Which formula represents a compound that dissolves in water to form an acidic solution?

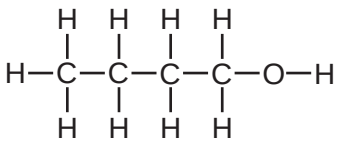
A



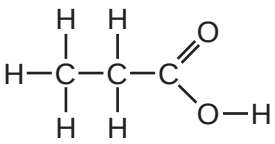
B



C



D



40 Butane reacts as shown.

$$\text{butane} \xrightarrow[\text{and heat}]{\text{catalyst}} \text{butene} + \text{hydrogen}$$

What is this type of reaction?

A combustion

B cracking

C polymerisation

D reduction

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** Sulphur 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.).