Cambridge International Examinations
Cambridge International General Certificate of Secondary Education

CHEMISTRY **0620/13**

Paper 1 Multiple Choice **October/November 2015**

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, 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 Level 1/Level 2 Certificate.

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

1 In which process do particles move closer together but remain in motion?

A condensation

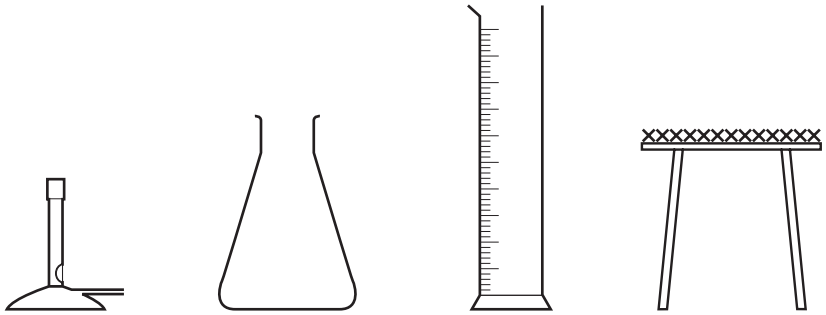
B diffusion

C evaporation

D freezing

2 A student was asked to measure the rate of reaction between dilute hydrochloric acid and marble chips at different temperatures.

Some of the apparatus used is shown.



Which two other pieces of apparatus would be needed?

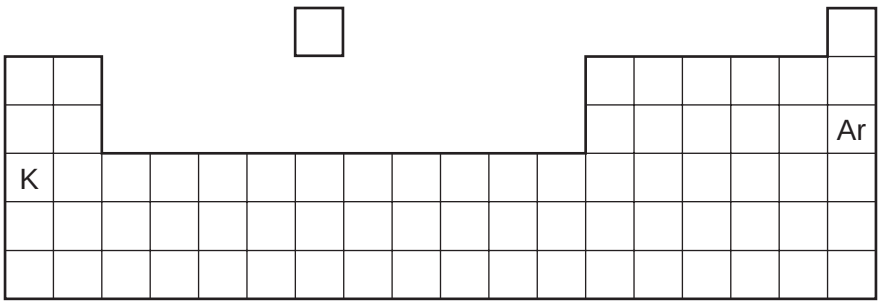
A balance and pipette

B balance and stopclock

C beaker and stopclock

D burette and pipette

3 Argon, Ar, has a higher relative atomic mass than potassium, K, but appears before it in the Periodic Table.



Why is argon listed before potassium in the Periodic Table?

A Argon has fewer neutrons than potassium.

B Argon has fewer protons than potassium.

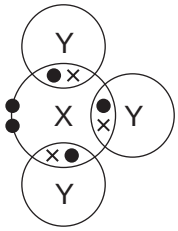
C Argon has more neutrons than potassium.

D Argon has more protons than potassium.

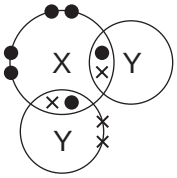
4 In the following diagrams, X and Y are atoms of different elements.

Which diagram correctly shows the arrangement of outer electrons in a molecule of methane?

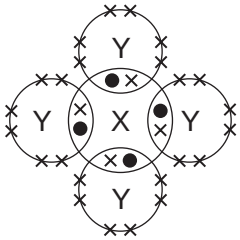
A



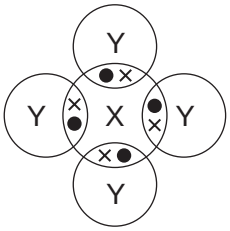
B



C



D



5 What do the nuclei of $^{1}_{1}H$ hydrogen atoms contain?

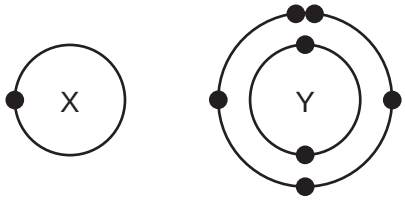
A electrons and neutrons

B electrons and protons

C neutrons only

D protons only

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 Copper(II) oxide reacts with ammonia.

The left hand side of the balanced equation for this reaction is:

$$3CuO + 2NH_3 \rightarrow$$

What completes the equation?

A $3Cu + 2HNO_3$

B $3Cu + 2N + 3H_2O$

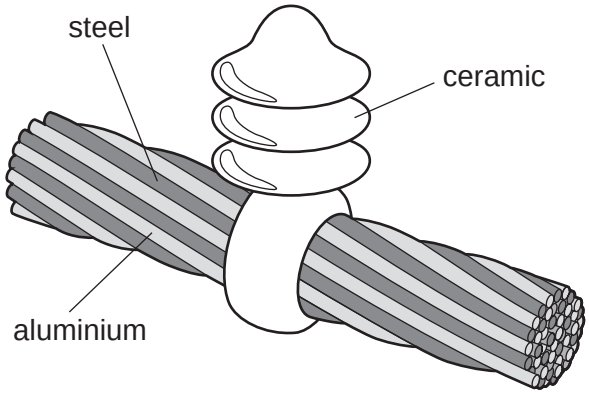
C $3Cu + N_2 + 3H_2O$

D $3Cu + 2NO + 3H_2O$

8 What are the electrode products when molten silver iodide is electrolysed between inert electrodes?

	cathode	anode
A	hydrogen	iodine
B	iodine	silver
C	silver	iodine
D	silver	oxygen

9 The diagram shows a section of an overhead power cable.



Which statement explains why a particular substance is used?

A Aluminium has a low density and is a good conductor of electricity.

B Ceramic is a good conductor of electricity.

C Steel can rust in damp air.

D Steel is more dense than aluminium.

10 Which reaction is endothermic?

A the burning of magnesium ribbon

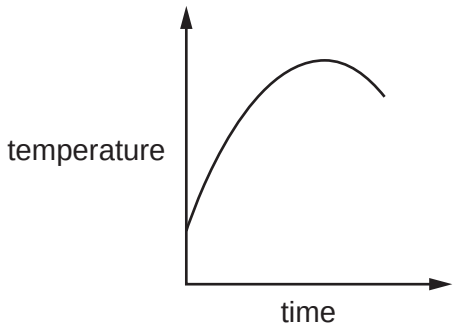
B the combustion of methane

C the decomposition of calcium carbonate

D the reaction of water with anhydrous copper(II) sulfate

11 A metal reacts with an aqueous solution.

The graph shows the temperature before, during and after the reaction.



Which row describes the reaction?

	reaction	energy change
A	combustion	endothermic
B	combustion	exothermic
C	thermal decomposition	endothermic
D	thermal decomposition	exothermic

12 Which of the following changes decreases the rate of the reaction between magnesium and dilute hydrochloric acid?

1 diluting the acid

2 using larger pieces of magnesium

3 cooling the mixture

A 1, 2 and 3

B 1 and 2 only

C 1 and 3 only

D 2 and 3 only

13 The element vanadium, V, forms several oxides.

In which change is oxidation taking place?

A $VO_2 \rightarrow V_2O_3$

B $V_2O_5 \rightarrow VO_2$

C $V_2O_3 \rightarrow VO$

D $V_2O_3 \rightarrow V_2O_5$

14 If anhydrous copper(II) sulfate is added to water, which colour change is observed?

A blue to pink

B blue to white

C pink to blue

D white to blue

15 Element X is in Group I of the Periodic Table.

Which row shows the type of oxide and whether element X is metallic or non-metallic?

	type of oxide	metallic or non-metallic
A	acidic	metallic
B	acidic	non-metallic
C	basic	metallic
D	basic	non-metallic

16 Three liquids, P, Q and R, are added to a mixture of hydrochloric acid and Universal Indicator solution.

The following observations are made.

P the colour of the indicator turns purple.

Q the colour of the indicator does not change.

R there is effervescence and the indicator turns blue.

What are P, Q and R?

	P	Q	R
A	sodium carbonate solution	water	sodium hydroxide solution
B	sodium hydroxide solution	water	sodium carbonate solution
C	water	sodium carbonate solution	sodium hydroxide solution
D	water	sodium hydroxide solution	sodium carbonate solution

17 Which property is **not** characteristic of a base?

A It reacts with a carbonate to form carbon dioxide.

B It reacts with an acid to form a salt.

C It reacts with an ammonium salt to form ammonia.

D It turns universal indicator paper blue.

18 Zinc sulfate is a soluble salt and can be prepared by reacting excess zinc carbonate with dilute sulfuric acid.

Which piece of equipment would **not** be required in the preparation of zinc sulfate crystals?

A beaker

B condenser

C evaporating dish

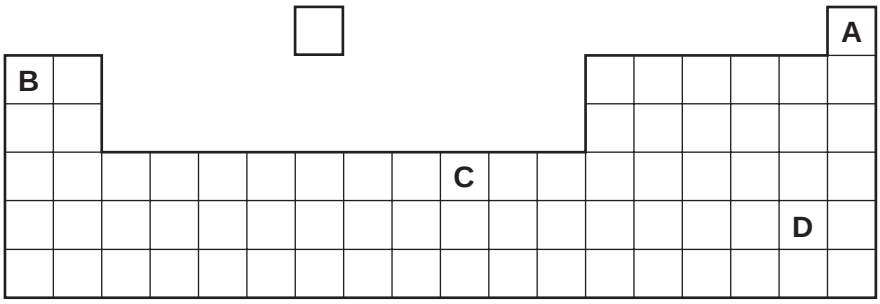
D filter funnel

19 An element, X, is a dark grey crystalline solid at room temperature.

It has a melting point of 114 °C and a density of 4.9 g / cm^3.

When heated gently it forms a purple vapour.

Where in the Periodic Table is X found?



20 J and K are two elements from the same period in the Periodic Table.

The table gives some properties of J and K.

	J	K
appearance	shiny grey	dull yellow
electrical conductivity when solid	good	poor
malleability	malleable	brittle

Which statement about J and K is correct?

A J forms an acidic oxide.

B J is found to the left of K in the Periodic Table.

C K forms positive ions when it reacts.

D K is more metallic than J.

21 The table gives information about four elements.

Which element is a transition metal?

	electrical conductivity	density in g/cm^3	melting point in °C
A	good	0.97	98
B	good	7.86	1535
C	poor	2.33	1410
D	poor	3.12	–7

22 Hydrogen and helium have both been used to fill balloons.

Which property of helium makes it the preferred choice to hydrogen?

A easily compressed into a gas cylinder

B forms monatomic molecules

C lower density

D unreactive

23 Which statement is true for **all** metals?

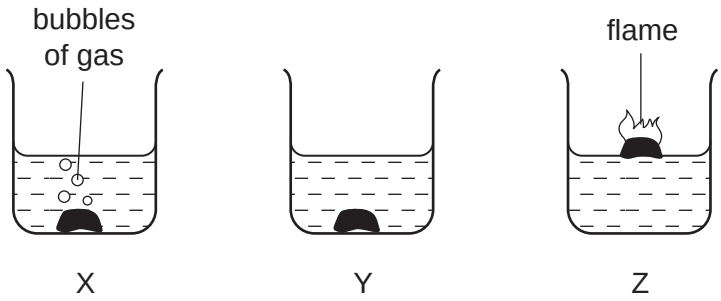
A Their atoms lose one or more electrons when they react.

B They are brittle.

C They do not conduct electricity when solid.

D They melt at low temperatures when they are heated.

24 The diagrams show what happens when three different metals are added to water.



What are X, Y and Z?

	X	Y	Z
A	calcium	copper	potassium
B	copper	calcium	potassium
C	potassium	calcium	copper
D	potassium	copper	calcium

25 The table show three uses of aluminium and a reason why aluminium is used for that purpose.

	use	reason
1	aircraft manufacture	high tensile strength
2	overhead electricity cables	low density
3	food containers	resistance to corrosion

Which reasons explain the use?

A 1, 2 and 3

B 1 and 2 only

C 1 and 3 only

D 2 and 3 only

26 Which conditions are necessary to make mild steel from iron?

A add calcium oxide and blow oxygen through it

B heat with calcium oxide

C heat with carbon and limestone

D heat with nickel and chromium

27 Which statements about water are correct?

1 Household water may contain salts in solution.

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

3 Water is treated with chlorine to kill bacteria.

4 Water is used in industry for cooling.

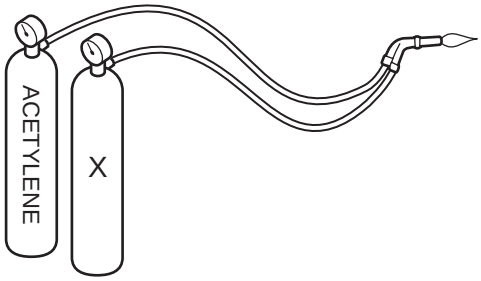
A 1, 2, 3 and 4

B 1, 2 and 3 only

C 1, 3 and 4 only

D 2, 3 and 4 only

28 The diagram shows the flame produced from burning a hydrocarbon, acetylene, in a welding torch.



Which gas is X?

A hydrogen

B methane

C nitrogen

D oxygen

29 Carbon monoxide is an air pollutant produced when petrol is burned in a car engine.

Why is carbon monoxide considered to be an air pollutant?

A It causes climate change.

B It causes the corrosion of buildings.

C It is a significant greenhouse gas.

D It is poisonous.

30 Which compound is **not** a fertiliser?

A ammonium sulfate, $(NH_4)_2SO_4$

B calcium hydroxide, $Ca(OH)_2$

C potassium chloride, KCl

D urea, $CO(NH_2)_2$

31 In which reaction is carbon dioxide **not** produced?

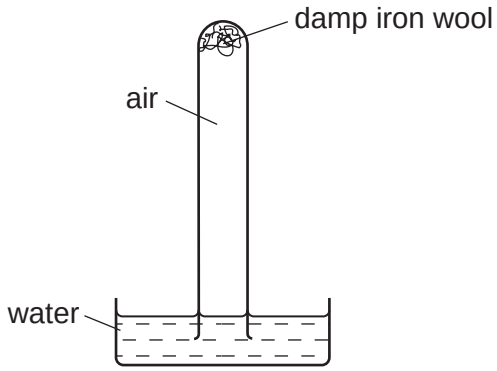
A complete combustion of petrol

B hydrochloric acid reacting with magnesium

C respiration

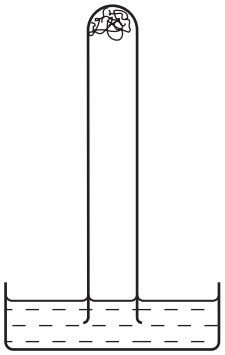
D thermal decomposition of limestone

32 The apparatus shown is set up and left for a week.

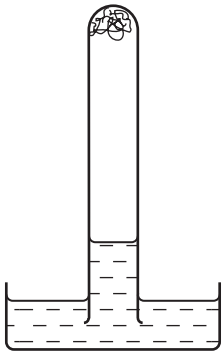


Which diagram shows the level of the water at the end of the week?

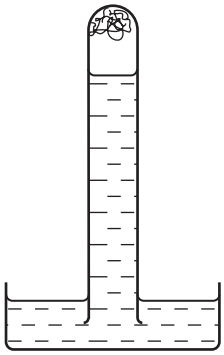
A



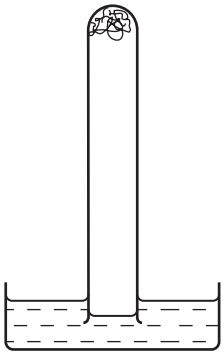
B



C



D



33 Unwanted vegetation is sometimes placed in a bin where it decays to form compost. This compost can be used to fertilise soils.

Which gas is likely to be present in a higher percentage inside the bin than in the air outside the bin?

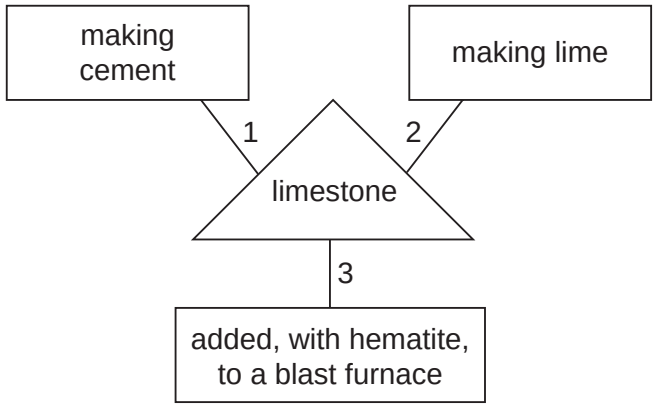
A carbon monoxide

B methane

C oxygen

D sulfur dioxide

34 A student is asked to draw a diagram showing the uses of limestone.



Which numbered lines show a correct use of limestone?

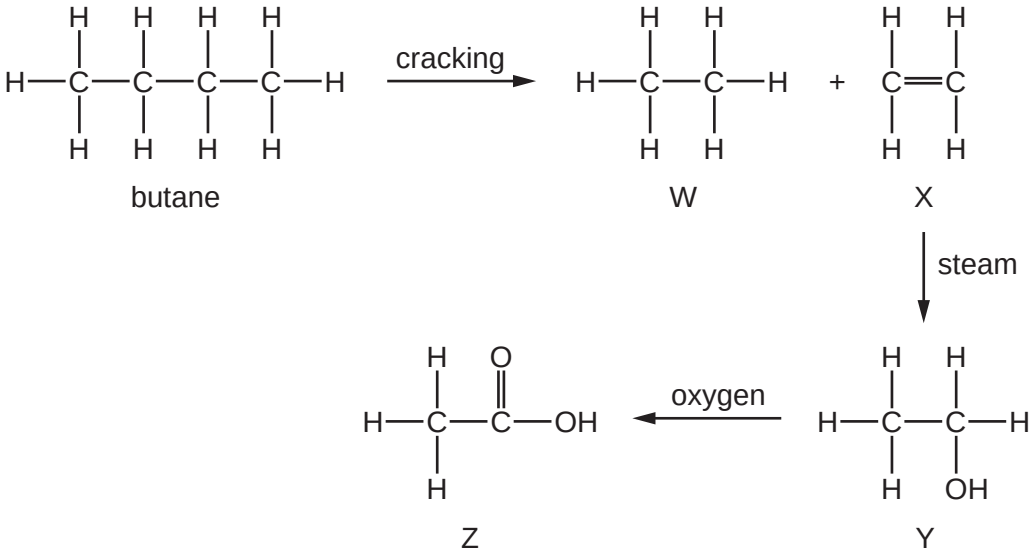
A 1, 2 and 3

B 1 and 2 only

C 1 and 3 only

D 2 and 3 only

35 What are the names of the compounds shown in the reaction scheme below?



	W	X	Y	Z
A	ethane	ethene	ethanol	ethanoic acid
B	ethane	ethene	ethanoic acid	ethanol
C	ethene	ethane	ethanol	ethanoic acid
D	ethene	ethane	ethanoic acid	ethanol

36 Which row describes the formation of a polymer?

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

37 Which row shows the correct use of a fraction obtained by the fractional distillation of petroleum?

	fraction	use
A	bitumen	making waxes and polishes
B	fuel oil	aircraft fuel
C	kerosene	fuel for ships
D	naphtha	making chemicals

38 Ethanol can be formed by

1 fermentation

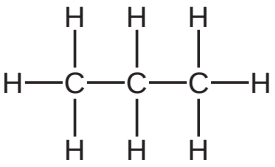
2 reaction between steam and ethene

Which of these processes uses a catalyst?

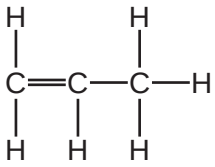
	1	2
A	✓	✓
B	✓	✗
C	✗	✓
D	✗	✗

39 The structures of four compounds are shown.

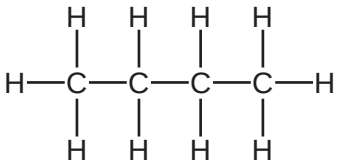
W



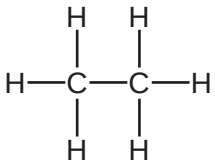
X



Y



Z



Which are members of the same homologous series?

A W, X, Y and Z

B W and X only

C W, Y and Z only

D X and Z only

40 During the process of cracking hydrocarbons, an ..... 1 ..... is converted into an ..... 2 ..... .

The presence of an ..... 3 ..... can be shown by a visible reaction with ..... 4 ..... .

Which words complete gaps 1, 2, 3 and 4?

	1	2	3	4
A	alkane	alkene	alkene	bromine
B	alkane	alkene	alkene	steam
C	alkene	alkane	alkane	bromine
D	alkene	alkane	alkane	steam

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.).