Cambridge International Examinations
Cambridge International General Certificate of Secondary Education

COMBINED SCIENCE **0653/23**

Paper 2 Multiple Choice (Extended) **May/June 2018**

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.

IB18 06_0653_23/2RP

1 Which structure found in plant cells traps light energy for photosynthesis?

A cell wall

B chloroplast

C nucleus

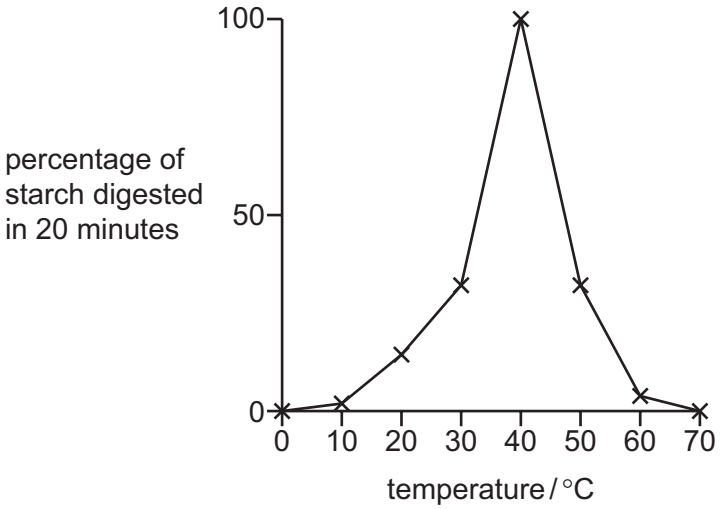
D vacuole

2 Amylase is an enzyme that digests starch.

Identical mixtures of starch and amylase are kept at different temperatures.

The percentage of starch digested in 20 minutes is recorded.

The results are shown in the graph.



The mixtures that were kept at 0 °C and 70 °C are then kept at a temperature of 40 °C for one hour.

What are the results after this hour?

	percentage of starch digested	
	sample originally kept at 0 °C	sample originally kept at 70 °C
A	0	0
B	0	100
C	100	0
D	100	100

3 Which substance is broken down to produce lactic acid during the manufacture of yoghurt?

A glucose

B lactose

C protein

D starch

4 Which two chemical substances are required for photosynthesis?

A carbon dioxide and glucose

B glucose and oxygen

C oxygen and water

D water and carbon dioxide

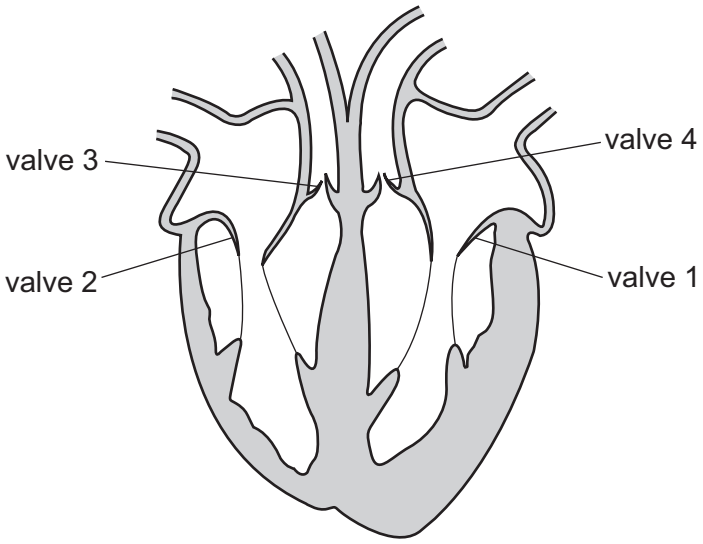
5 A person eats a diet high in carbohydrate and fat and low in fibre.

What might be the long-term consequences of this diet?

	constipation	obesity	starvation
A	✗	✓	✓
B	✓	✗	✓
C	✗	✗	✗
D	✓	✓	✗

[Turn over

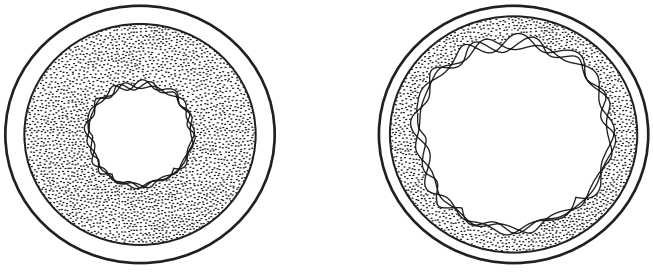
6 The diagram shows a section through the human heart.



What happens to the valves as blood is being pumped to the lungs?

	valve 1	valve 2	valve 3	valve 4
A	closed	closed	open	closed
B	closed	closed	open	open
C	open	open	closed	closed
D	open	open	closed	open

7 The diagram shows cross-sections of two different blood vessels.



P **Q**

What type of blood vessel is **Q** and what is the relative blood pressure in **Q** compared with **P**?

	blood vessel **Q**	relative blood pressure in **Q**
A	artery	higher
B	artery	lower
C	vein	higher
D	vein	lower

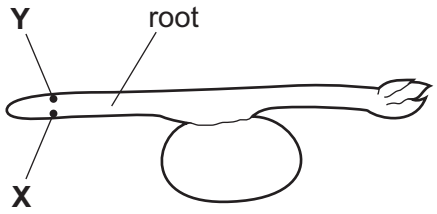
8 What is the maximum number of carbon dioxide molecules produced when four glucose molecules are used in aerobic respiration?

A 6 **B** 12 **C** 24 **D** 48

9 What are the functions of the cilia and mucus in the gas exchange system?

	cilia	mucus
A	make mucus	trap pathogens
B	make mucus	move cilia
C	move mucus	trap pathogens
D	move mucus	move cilia

10 The diagram shows a seedling with its root horizontal.



Gravity is the stimulus acting on the seedling.

Where will the greatest concentration of auxin be found in the root and what effect will this have on the rate of cell elongation?

	greatest concentration of auxin	effect of auxin on rate of cell elongation
A	**X**	decreases
B	**X**	increases
C	**Y**	decreases
D	**Y**	increases

11 The table shows some features of flowers.

Which features are typical of wind-pollinated flowers?

	petals	position of anther	nectaries
A	large	inside flower	absent
B	large	outside flower	present
C	small	inside flower	present
D	small	outside flower	absent

12 What is a **disadvantage** of breast-feeding compared with bottle-feeding using formula milk?

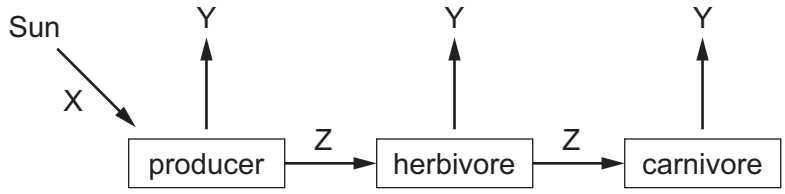
A difficult to measure the amount of milk given

B milk contains antibodies

C milk is always immediately available

D milk is at the optimum temperature

13 The diagram shows how energy flows through a food chain.

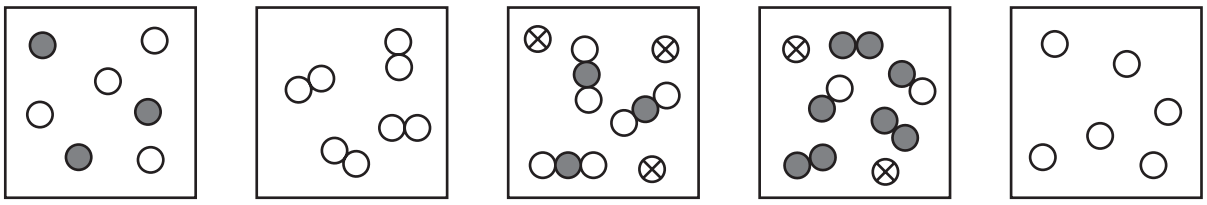


What are the main energy transfers shown by arrows X, Y and Z?

	X	Y	Z
A	chemical → chemical	chemical → heat	chemical → light
B	chemical → chemical	chemical → light	chemical → light
C	light → chemical	chemical → heat	chemical → chemical
D	light → chemical	chemical → light	chemical → chemical

14 The diagrams represent different substances.

P Q R S T



Which row describes the substances?

	only separate atoms	only molecules	mixture of atoms and molecules
A	P	Q	S
B	Q	T	R
C	T	P	R
D	T	Q	P

15 A mixture of salt water and sand is filtered.

Which statement is correct?

A The salt and the sand are trapped by the filter paper.

B The salt is dissolved in the water and passes through the filter paper.

C The sand is insoluble in water and passes through the filter paper.

D The sand is trapped by the filter paper and pure water is obtained.

16 Which process is **not** a chemical change?

A the electrolysis of molten lead bromide

B the fractional distillation of petroleum

C the oxidation of copper

D the rusting of iron

17 Chromium oxide contains chromium ions, Cr^{3+}, and oxide ions, O^{2-}.

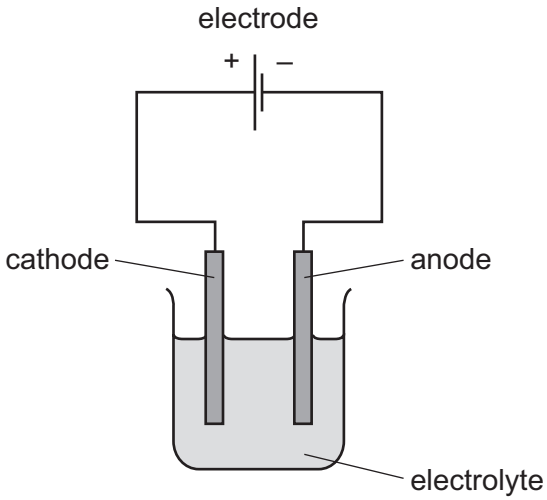
What is the formula of chromium oxide?

A CrO **B** CrO_2 **C** Cr_2O_3 **D** Cr_3O_2

[Turn over

18 The diagram shows apparatus for electrolysis.

Only one label is correct.



Which label on the diagram is correct?

A anode

B cathode

C electrode

D electrolyte

19 Molten calcium chloride is electrolysed.

What happens at the negative electrode?

A Calcium atoms lose electrons to form calcium ions.

B Calcium ions gain electrons to form calcium atoms.

C Chloride ions lose electrons to form chlorine molecules.

D Chlorine molecules gain electrons to form chloride ions.

20 Which change **must** take place in an endothermic reaction?

A Bubbles of gas are released.

B The mass decreases.

C The temperature decreases.

D The temperature increases.

21 Dilute hydrochloric acid is reacted with calcium carbonate at 20 °C.

The reaction is repeated at 30 °C.

Which statement about the second reaction is correct?

A It is faster because there are fewer collisions per second between reacting particles.

B It is faster because there are more collisions per second between reacting particles.

C It is slower because there are fewer collisions per second between reacting particles.

D It is slower because there are more collisions per second between reacting particles.

22 Which reaction is a redox reaction?

A $2HCl + CaCO_3 \rightarrow CaCl_2 + CO_2 + H_2O$

B $AgNO_3 + KCl \rightarrow AgCl + KNO_3$

C $Ca(OH)_2 + CO_2 \rightarrow CaCO_3 + H_2O$

D $2H_2 + O_2 \rightarrow 2H_2O$

23 What is the trend shown by the elements across a period in the Periodic Table, from left to right?

A metals → non-metals

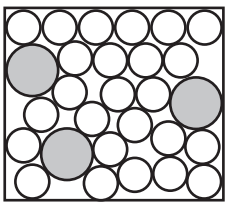
B metals → non-metals → metals

C non-metals → metals

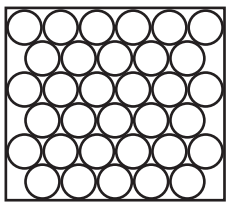
D non-metals → metals → non-metals

24 Which diagram represents the arrangement of atoms in an alloy?

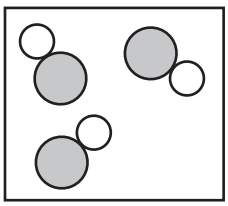
A



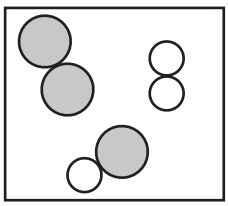
B



C



D



25 Which reaction does **not** take place in the blast furnace?

A calcium carbonate → calcium oxide + carbon dioxide

B calcium oxide + silicon dioxide → calcium silicate

C iron oxide + carbon monoxide → iron + carbon dioxide

D iron oxide + carbon dioxide → iron + carbon monoxide

[Turn over

26 Which process produces a gas that contributes to climate change?

A the electrolysis of molten lead(II) bromide

B the reaction of calcium with water

C the reaction of copper oxide with dilute sulfuric acid

D the thermal decomposition of calcium carbonate

27 Which statement about hydrocarbons is **not** correct?

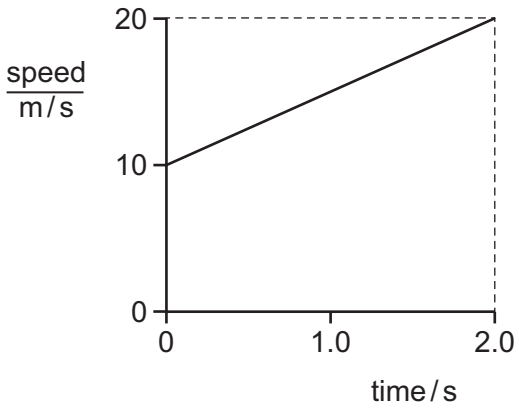
A Alkenes are made by cracking alkanes.

B Butene decolourises bromine.

C C_2H_4 is an alkene.

D Ethanol is an alkane.

28 The diagram shows a speed-time graph for a falling object.

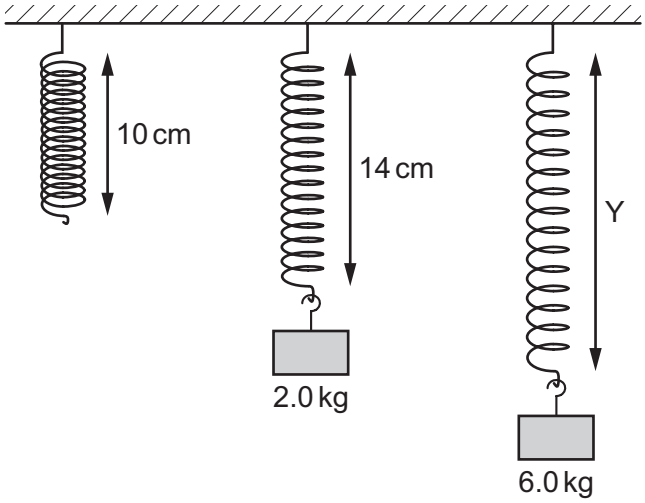


How far does the object fall in 2.0 seconds?

A 5.0 m **B** 20 m **C** 30 m **D** 40 m

29 An unstretched spring obeys Hooke's law and has a length of 10 cm. A load with a mass of 2.0 kg is hung from it, and its length becomes 14 cm.

The load is now increased to 6.0 kg, and the new length of the spring is Y. The limit of proportionality is not reached.



What is Y?

A 22 cm **B** 26 cm **C** 30 cm **D** 42 cm

30 A copper block is pulled down a rough slope at a constant speed.

Which form of energy of the block increases?

A chemical

B gravitational

C kinetic

D thermal

31 A weightlifter lifts 150 kg through a distance of 2.0 m in a time of 1.5 s.

The acceleration of free fall *g* is 10 m / s^2.

How much power does she produce?

A 200 W **B** 450 W **C** 2000 W **D** 4500 W

[Turn over

32 On a summer's day, hot air rises above hot roofs.

What is the name of this process?

A concentration

B condensation

C conduction

D convection

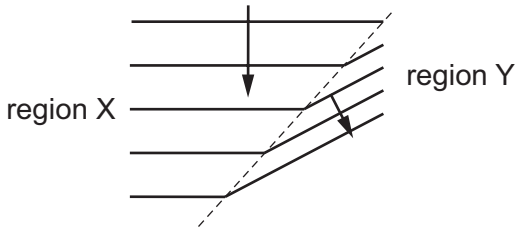
33 The diagram shows part of the electromagnetic spectrum. Two regions are labelled P and Q.

infra-red waves	P	ultraviolet waves	Q	gamma rays

What type of radiation is P, and which radiation has the lower frequency, P or Q?

	radiation P	lower frequency
A	visible light	P
B	visible light	Q
C	X-rays	P
D	X-rays	Q

34 The diagram represents a water wave moving into a region where the depth of water is different.

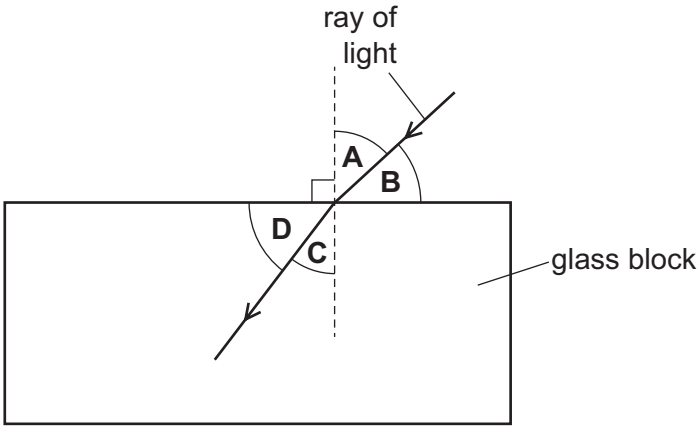


How do the speed and wavelength of the waves in region Y compare with their values in region X?

	speed in Y	wavelength in Y
A	greater	smaller
B	greater	the same
C	smaller	smaller
D	smaller	the same

35 The diagram shows a ray of light as it enters a glass block.

Which labelled angle is the angle of refraction?



36 A student writes two sentences about sound waves.

'A sound wave travels through the air as compressions and .....X..... .'

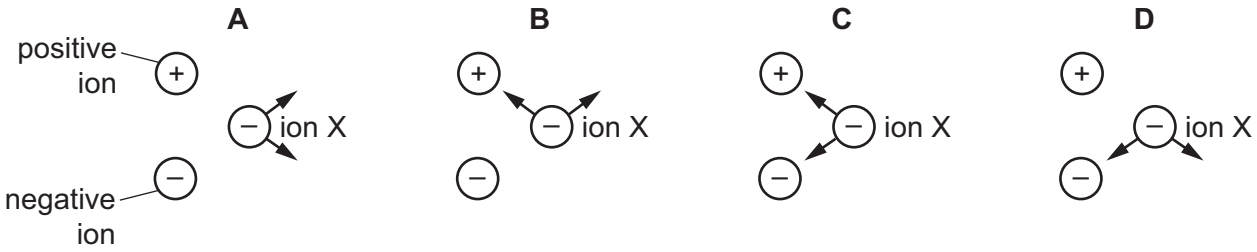
'The air at the compressions has a different .....Y..... from the air at .....X..... .'

What are the missing words, X and Y?

	X	Y
A	rarefactions	density
B	rarefactions	state
C	refractions	density
D	refractions	state

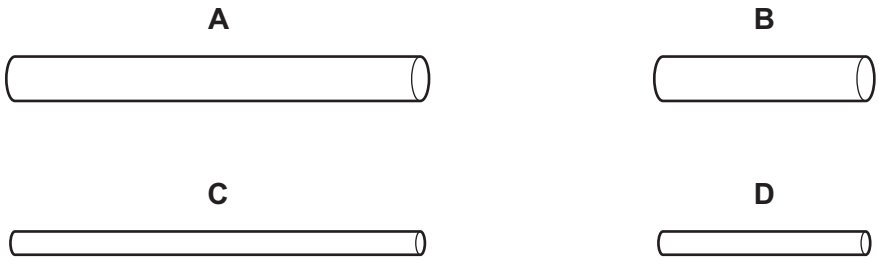
37 A negative ion X is close to a positive ion and another negative ion. Electrical forces act on ion X because of the charges in the other two ions.

Which diagram shows the directions of the two forces acting on ion X?

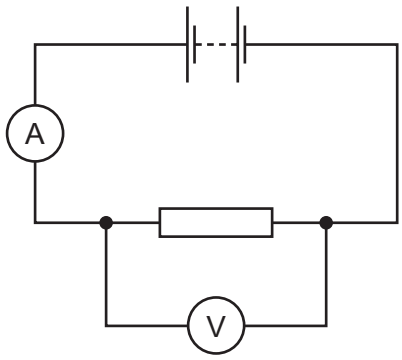


38 The diagram shows four wires at the same temperature, made from the same metal. The diagram is drawn to scale.

Which wire has the least electrical resistance between its ends?



39 A resistor is connected in a circuit as shown.

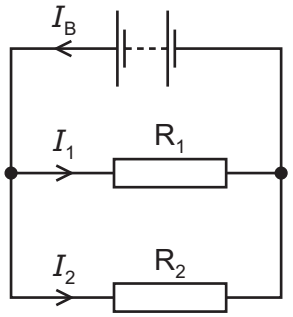


The reading on the ammeter is 2.0 A and the reading on the voltmeter is 4.0 V.

What is the power produced in the resistor?

A 0.50 W **B** 2.0 W **C** 6.0 W **D** 8.0 W

40 A circuit consists of two identical resistors, R_1 and R_2, and a battery.



The current in the battery is I_B. The current in R_1 is I_1 and the current in R_2 is I_2.

How are I_B, I_1 and I_2 related?

A $I_B = I_1 = I_2$

B $I_B > I_1$ and $I_1 = I_2$

C $I_B < I_2$ and $I_1 = I_2$

D $I_B > I_1 > I_2$

The Periodic Table of Elements

Group																	
I	II											III	IV	V	VI	VII	VIII
							1 H hydrogen 1										2 He helium 4
3 Li lithium 7	4 Be beryllium 9											5 B boron 11	6 C carbon 12	7 N nitrogen 14	8 O oxygen 16	9 F fluorine 19	10 Ne neon 20
11 Na sodium 23	12 Mg magnesium 24											13 Al aluminium 27	14 Si silicon 28	15 P phosphorus 31	16 S sulfur 32	17 Cl chlorine 35.5	18 Ar argon 40
19 K potassium 39	20 Ca calcium 40	21 Sc scandium 45	22 Ti titanium 48	23 V vanadium 51	24 Cr chromium 52	25 Mn manganese 55	26 Fe iron 56	27 Co cobalt 59	28 Ni nickel 59	29 Cu copper 64	30 Zn zinc 65	31 Ga gallium 70	32 Ge germanium 73	33 As arsenic 75	34 Se selenium 79	35 Br bromine 80	36 Kr krypton 84
37 Rb rubidium 85	38 Sr strontium 88	39 Y yttrium 89	40 Zr zirconium 91	41 Nb niobium 93	42 Mo molybdenum 96	43 Tc technetium –	44 Ru ruthenium 101	45 Rh rhodium 103	46 Pd palladium 106	47 Ag silver 108	48 Cd cadmium 112	49 In indium 115	50 Sn tin 119	51 Sb antimony 122	52 Te tellurium 128	53 I iodine 127	54 Xe xenon 131
55 Cs caesium 133	56 Ba barium 137	57–71 lanthanoids	72 Hf hafnium 178	73 Ta tantalum 181	74 W tungsten 184	75 Re rhenium 186	76 Os osmium 190	77 Ir iridium 192	78 Pt platinum 195	79 Au gold 197	80 Hg mercury 201	81 Tl thallium 204	82 Pb lead 207	83 Bi bismuth 209	84 Po polonium –	85 At astatine –	86 Rn radon –
87 Fr francium –	88 Ra radium –	89–103 actinoids	104 Rf rutherfordium –	105 Db dubnium –	106 Sg seaborgium –	107 Bh bohrium –	108 Hs hassium –	109 Mt meitnerium –	110 Ds darmstadtium –	111 Rg roentgenium –	112 Cn copernicium –		114 Fl flerovium –		116 Lv livermorium –		

Key

atomic number
atomic symbol
name
relative atomic mass

lanthanoids	57 La lanthanum 139	58 Ce cerium 140	59 Pr praseodymium 141	60 Nd neodymium 144	61 Pm promethium –	62 Sm samarium 150	63 Eu europium 152	64 Gd gadolinium 157	65 Tb terbium 159	66 Dy dysprosium 163	67 Ho holmium 165	68 Er erbium 167	69 Tm thulium 169	70 Yb ytterbium 173	71 Lu lutetium 175
actinoids	89 Ac actinium –	90 Th thorium 232	91 Pa protactinium 231	92 U uranium 238	93 Np neptunium –	94 Pu plutonium –	95 Am americium –	96 Cm curium –	97 Bk berkelium –	98 Cf californium –	99 Es einsteinium –	100 Fm fermium –	101 Md mendelevium –	102 No nobelium –	103 Lr lawrencium –

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