

**COMBINED SCIENCE**

**5129/12**

Paper 1 Multiple Choice

**October/November 2015**

**1 hour**

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 20.

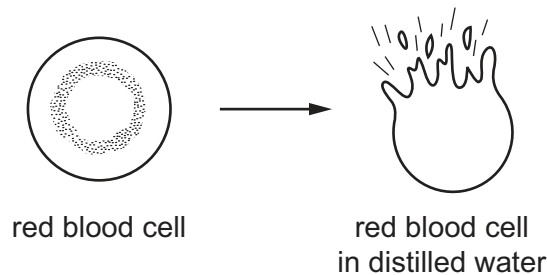
Electronic calculators may be used.

This document consists of **15** printed pages and **1** blank page.

- 1 Which pair of statements best explains why plant cells are more angular in shape than animal cells?

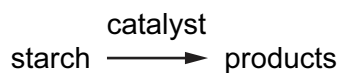
	plant cells	animal cells
<b>A</b>	cell wall present	cell wall absent
<b>B</b>	chloroplast present	chloroplast absent
<b>C</b>	one or more large vacuoles	small or no vacuoles
<b>D</b>	thin layer of cytoplasm	dense cytoplasm throughout cell

- 2 The diagram shows a red blood cell and the same cell after it has been placed in distilled water.



The change in appearance of the cell is because in distilled water

- A** the cytoplasm shrinks.  
**B** water enters the cell by ingestion.  
**C** water enters the cell by osmosis.  
**D** water leaves the cell by diffusion.
- 3 The following reaction occurs in the human alimentary canal.



What is the catalyst and what is one of the products?

	catalyst	product
<b>A</b>	acid	glucose
<b>B</b>	acid	maltose
<b>C</b>	amylase	glucose
<b>D</b>	amylase	maltose

4 Which row describes the process of photosynthesis?

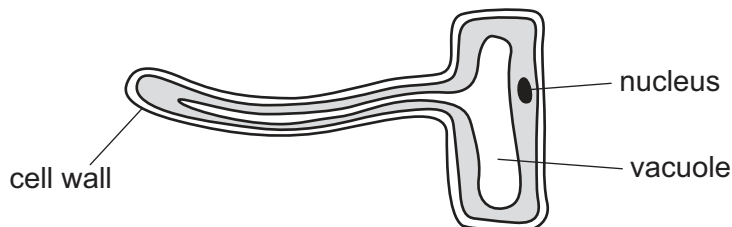
	raw materials	form of energy trapped by chlorophyll	products
<b>A</b>	carbon dioxide and water	nuclear	glucose and oxygen
<b>B</b>	carbon dioxide and water	light	glucose and oxygen
<b>C</b>	oxygen and water	nuclear	glucose and carbon dioxide
<b>D</b>	oxygen and water	light	glucose and carbon dioxide

5 A student changes his diet to one that combines very high fibre with very low fat.

Which row shows the likely outcome of his new diet?

	weight	constipation
<b>A</b>	decreases	decreases
<b>B</b>	decreases	increases
<b>C</b>	increases	decreases
<b>D</b>	increases	increases

6 The diagram shows a root hair cell.

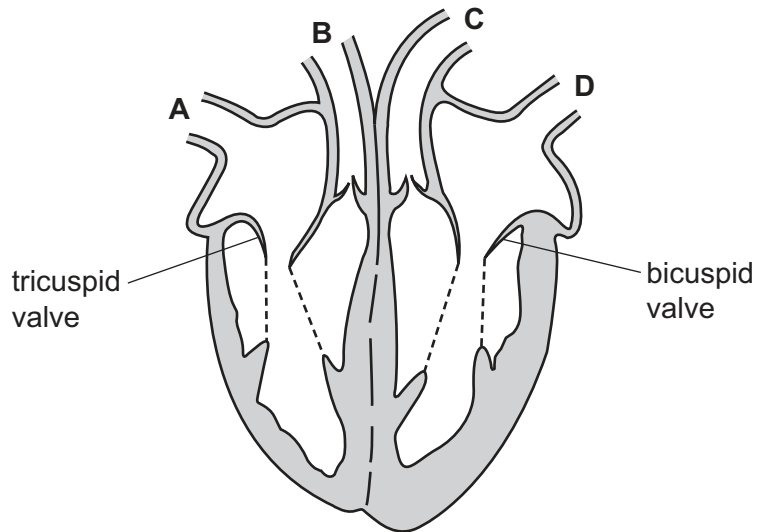


Which feature of a root hair cell does **not** affect the absorption of water?

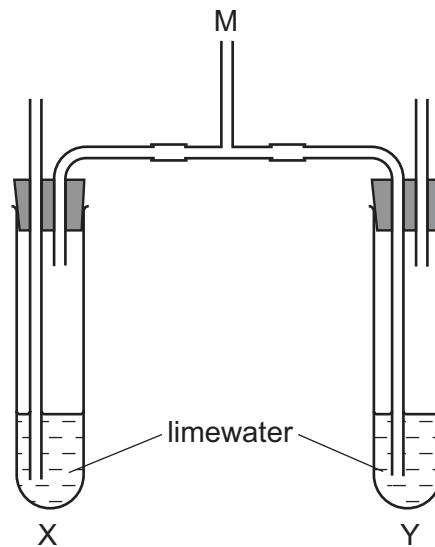
- A** The root hair cell has a cell wall.
- B** The root hair cell has a large surface area.
- C** The root hair cell has a nucleus.
- D** The root hair cell has a vacuole.

7 The diagram shows the heart.

Which vessel is an artery carrying deoxygenated blood?



8 The apparatus shown is used to investigate gas exchange during breathing.



Which describes the appearance of solutions X and Y after a person has exhaled several times through tube M?

	solution X	solution Y
<b>A</b>	clear	clear
<b>B</b>	clear	cloudy
<b>C</b>	cloudy	clear
<b>D</b>	cloudy	cloudy

- 9 Excretion is the removal of waste products of metabolism.

Which row matches the waste products water, urea and carbon dioxide to the organ that removes them from the body?

	water	urea	carbon dioxide
<b>A</b>	kidney	kidney	lungs
<b>B</b>	kidney	liver	lungs
<b>C</b>	lungs	kidney	liver
<b>D</b>	lungs	liver	liver

- 10 What is the target organ of a hormone?

- A** the gland that destroys the hormone
- B** the gland that secretes the hormone
- C** the organ that destroys the hormone
- D** the organ where the hormone acts

- 11 It is estimated that 13.5 million people use opium-like substances such as heroin. Of these, 9.2 million people use heroin.

What is the percentage of users of opium-like substances who use heroin?

- A** 33%                      **B** 50%                      **C** 68%                      **D** 75%

- 12 Which natural process **removes** carbon dioxide from the air?

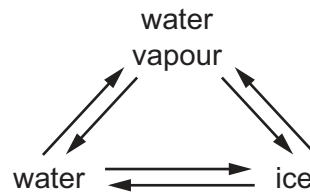
- A** decay
- B** digestion
- C** photosynthesis
- D** respiration

- 13 A young man has gone to the doctor with pain in passing urine and an unpleasant discharge from his penis. The doctor suspects he has contracted an infectious disease.

Which further information might the doctor seek to confirm the diagnosis?

- A** factual details of his recent sexual activity
- B** his blood sugar levels
- C** major recent changes to his diet or anything unusual he has recently eaten
- D** the young man's blood pressure

14 In which conversion do water molecules lose speed?



- A ice  $\rightarrow$  water
- B ice  $\rightarrow$  water vapour
- C water vapour  $\rightarrow$  ice
- D water  $\rightarrow$  water vapour

15 Which row shows an atom containing 24 neutrons?

	proton number	nucleon number
<b>A</b>	8	16
<b>B</b>	12	24
<b>C</b>	21	45
<b>D</b>	24	52

16 The table shows the electronic structure of four elements.

element	electronic structure
1	2,1
2	2,7
3	2,8,2
4	2,8,6

Which two elements form an ionic compound with the formula  $XY_2$ ?

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

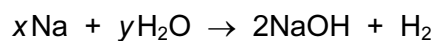
17 The table shows some properties of two solid compounds, X and Y.

property	X	Y
low melting point	yes	no
soluble in water	no	yes
conducts electricity when molten	no	yes

Which row describes the bonding in X and Y?

	X	Y
<b>A</b>	covalent	covalent
<b>B</b>	covalent	ionic
<b>C</b>	ionic	covalent
<b>D</b>	ionic	ionic

18 The equation shows the reaction between sodium and water.



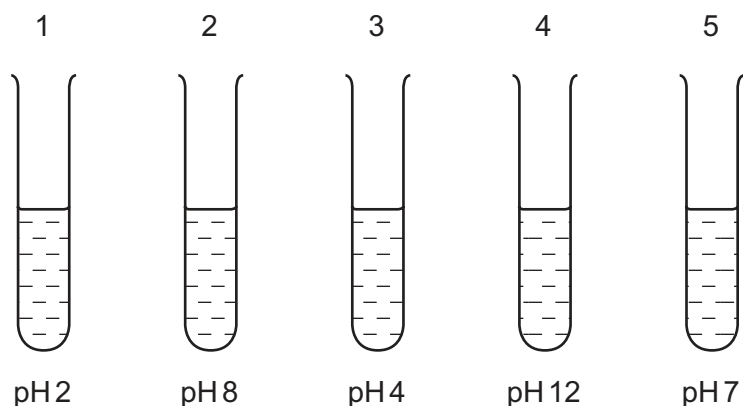
What are the values of  $x$  and  $y$  for the equation to be balanced?

	$x$	$y$
<b>A</b>	1	1
<b>B</b>	1	2
<b>C</b>	2	1
<b>D</b>	2	2

19 A student tests five solutions to discover which solutions were acidic, alkaline or neutral.

The student tests each solution using Universal Indicator paper to determine their pH.

The results are shown below.



Which solutions are acidic?

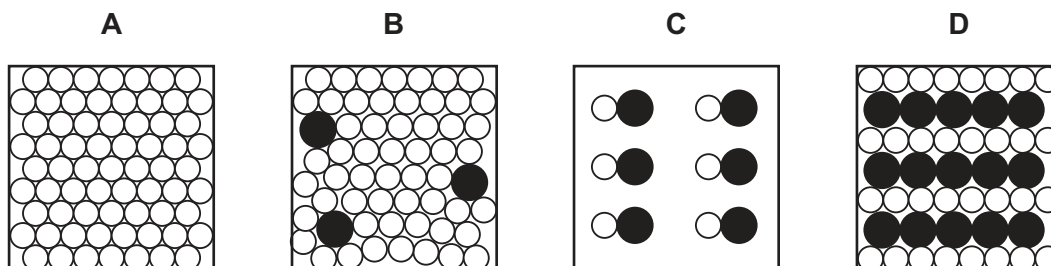
- A** 1 and 3      **B** 1 and 5      **C** 2 and 3      **D** 2 and 4

20 Which statement about elements in a period of the Periodic Table is correct?

- A** Atoms of elements in the same period have the same number of electron shells.  
**B** Atoms of elements in the same period have the same number of protons.  
**C** Elements in the same period have similar chemical properties.  
**D** Elements on the right of a period are more metallic than elements on the left of a period.

21 Brass is an alloy. Brass contains copper and zinc.

Which structure represents the arrangement of atoms in brass?





22 Q, R, S and T are four metals.

T reacts slowly with hydrochloric acid.

Q does not react with acid.

R reacts with steam but not with cold water.

S reacts violently with cold water.

What is the order of reactivity of the four metals, most reactive first?

A Q → T → R → S

B Q → R → T → S

C S → Q → R → T

D S → R → T → Q

23 Which of the three pollutants in air make rain water acidic?

1 carbon monoxide

2 nitrogen oxide

3 sulfur dioxide

A 1 and 3

B 2 and 3

C 2 only

D 3 only

24 Which pair of substances does **not** produce hydrogen gas?

A calcium and sulfuric acid

B copper and water

C sodium and water

D zinc and hydrochloric acid

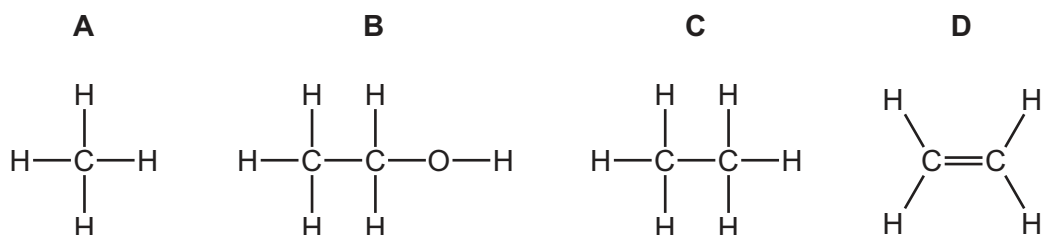
25 Some properties of an organic compound, X, are listed.

X is a saturated hydrocarbon.

X is a gas at room temperature.

X can be cracked to produce ethene and hydrogen.

Which structure is X?



26 Bitumen is obtained from petroleum by fractional distillation.

What is a use of bitumen?

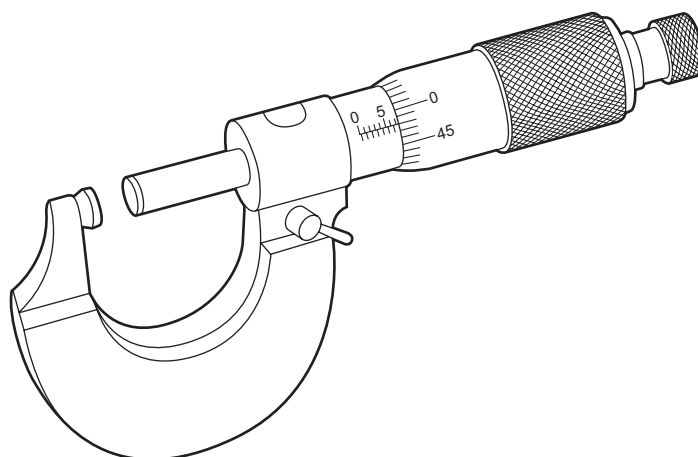
- A fuel for aircraft
- B fuel for cars
- C lubricants
- D making roads

27 Ethene is a member of the alkene homologous series.

Which statement about alkene molecules is correct?

- A They are able to add to each other to produce polymers.
- B They are saturated.
- C They contain carbon, hydrogen and oxygen atoms.
- D They only have single bonds between the atoms.

28 The diagram shows an instrument used in Physics.



What is the name of this instrument and what is it used to measure?

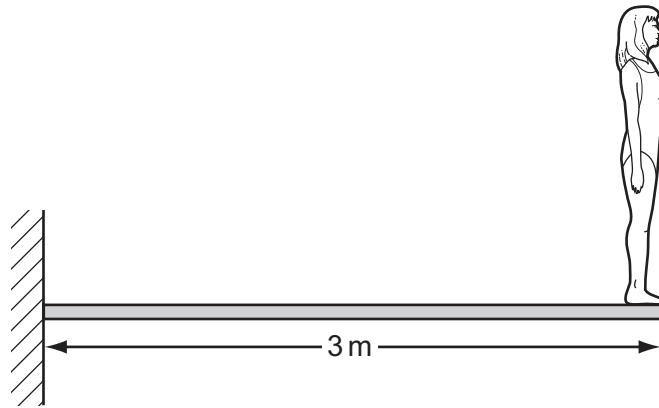
	name	used to measure
A	calipers	length
B	calipers	pressure
C	micrometer	length
D	micrometer	pressure

29 A force is applied to a moving object.

Which effect **cannot** occur?

- A Its direction changes.
- B Its velocity remains constant.
- C The object slows down.
- D The object speeds up.

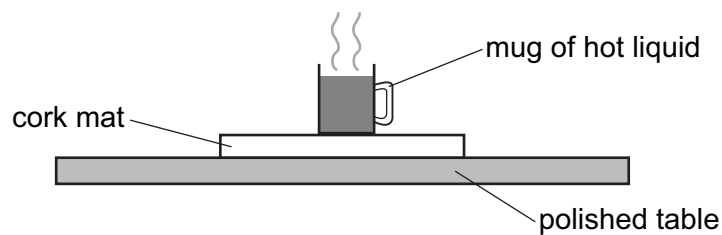
30 A diver, weighing 720 N, stands at the end of a springboard measuring 3 m long.



What is the moment about the support due to the weight of the diver?

- A 720 Nm
- B  $720 \times 3$  Nm
- C  $\frac{3}{720}$  Nm
- D  $\frac{720}{3}$  Nm

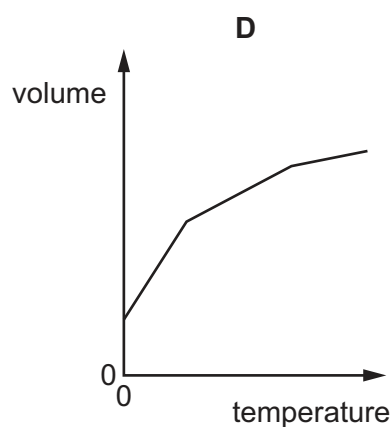
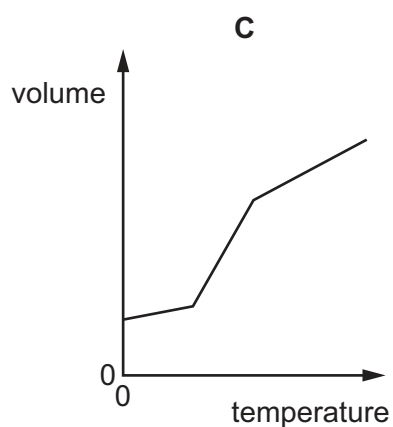
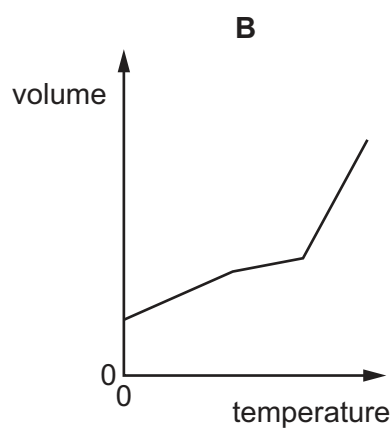
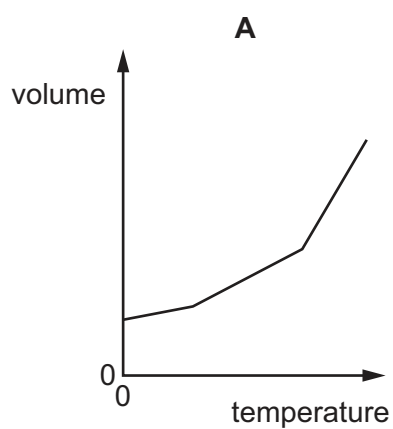
31 To protect a polished table, a cork mat may be put on the table underneath a mug containing hot liquid.



Why is this effective?

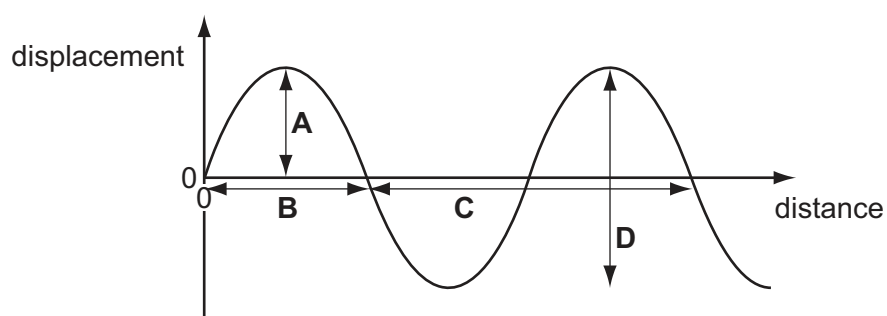
- A Cork is a good conductor.
- B Cork is a good radiator.
- C Cork is a poor conductor.
- D Cork is a poor radiator.

- 32 A piece of solid material is heated continually so that it melts and then boils. During the solid, liquid and gaseous states thermal expansion of the material occurs. Which graph best shows the thermal expansion during each state?

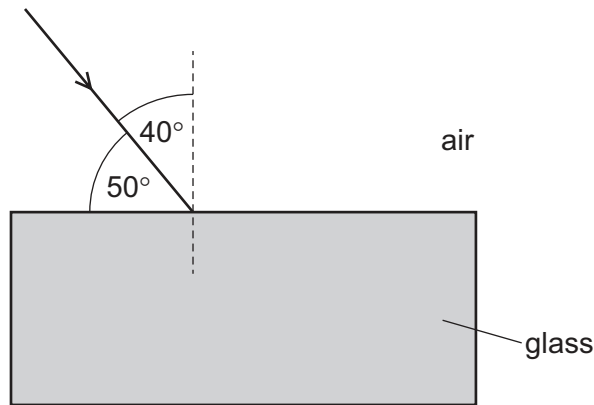


- 33 The diagram shows the displacement across a wave.

Which value is multiplied by the frequency to give the speed of the wave?



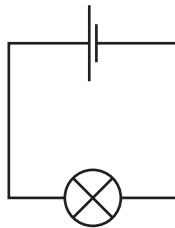
34 A ray of light is incident on the surface of a block of glass.



The refractive index of the glass is 1.5.

What is the angle of refraction of the ray in the glass?

- A**  $25^\circ$                       **B**  $27^\circ$                       **C**  $31^\circ$                       **D**  $33^\circ$
- 35 Which type of electromagnetic radiation travels at the highest speed through a vacuum?
- A** gamma-rays  
**B** light waves  
**C** radio waves  
**D** none – all have the same speed
- 36 In the circuit shown, 20 J of energy is dissipated by the cell in driving 8.0 C of charge round the circuit.



What is the value of the e.m.f. of the cell?

- A** 0.4 V                      **B** 2.5 V                      **C** 28 V                      **D** 160 V

37 An electric kettle has a metal case.

An earth wire is connected to the metal case.

A fuse in the plug has a 13A fuse rating.

A fault occurs and the live wire touches the metal case.

Which statement is **not** correct?

- A The current in the earth wire is greater than 13A.
- B The current in the live wire is greater than 13A.
- C The fuse keeps the current at 13A.
- D The fuse begins to melt.

38 Which statement about the action of a transformer is correct?

- A An e.m.f. is induced in the secondary coil when an alternating voltage is applied to the primary coil.
- B An e.m.f. is induced in the secondary coil when there is a steady direct current in the primary coil.
- C The current in the secondary coil is always larger than the current in the primary coil.
- D The voltage output of the secondary coil is always larger than the voltage input of the primary coil.

39 Which particle is positively-charged?

- A electron
- B neutral atom
- C neutron
- D proton

40 Which row is correct for a beta-particle?

	the nature of a beta-particle	a beta-particle is stopped by
A	electromagnetic wave	a piece of paper
B	electromagnetic wave	twenty centimetres of aluminium
C	electron	a piece of paper
D	electron	twenty centimetres of aluminium



**DATA SHEET**  
**The Periodic Table of the Elements**

		Group												
I	II	III	IV	V	VI	VII	0					0		
		1 <b>H</b> Hydrogen 1											4 <b>He</b> Helium 2	
7 <b>Li</b> Lithium 3	9 <b>Be</b> Beryllium 4											20 <b>Ne</b> Neon 10		
23 <b>Na</b> Sodium 11	24 <b>Mg</b> Magnesium 12	27 <b>Al</b> Aluminium 13	28 <b>Si</b> Silicon 14	31 <b>P</b> Phosphorus 15	32 <b>S</b> Sulfur 16	35.5 <b>Cl</b> Chlorine 17	40 <b>Ar</b> Argon 18					84 <b>Kr</b> Krypton 36		
39 <b>K</b> Potassium 19	40 <b>Ca</b> Calcium 20	70 <b>Ga</b> Gallium 31	73 <b>Ge</b> Germanium 32	75 <b>As</b> Arsenic 33	79 <b>Se</b> Selenium 34	80 <b>Br</b> Bromine 35	84 <b>Kr</b> Krypton 36					131 <b>Xe</b> Xenon 54		
85 <b>Rb</b> Rubidium 37	88 <b>Sr</b> Strontium 38	101 <b>Ru</b> Ruthenium 44	106 <b>Pd</b> Palladium 46	103 <b>Rh</b> Rhodium 45	112 <b>Cd</b> Cadmium 48	122 <b>Sb</b> Antimony 51	127 <b>I</b> Iodine 53					209 <b>Po</b> Polonium 84		
133 <b>Cs</b> Caesium 55	137 <b>Ba</b> Barium 56	190 <b>Os</b> Osmium 76	195 <b>Pt</b> Platinum 78	192 <b>Ir</b> Iridium 77	201 <b>Hg</b> Mercury 80	204 <b>Tl</b> Thallium 81	207 <b>Pb</b> Lead 82					86 <b>Rn</b> Radon 86		
226 <b>Ra</b> Radium 88	227 <b>Ac</b> Actinium 89											169 <b>Tm</b> Thulium 69		
		140 <b>Ce</b> Cerium 58	141 <b>Pr</b> Praseodymium 59	144 <b>Nd</b> Neodymium 60	145 <b>Pm</b> Promethium 61	150 <b>Sm</b> Samarium 62	152 <b>Eu</b> Europium 63	157 <b>Gd</b> Gadolinium 64	159 <b>Tb</b> Terbium 65	162 <b>Dy</b> Dysprosium 66	165 <b>Ho</b> Holmium 67	167 <b>Er</b> Erbium 68	173 <b>Yb</b> Ytterbium 70	175 <b>Lu</b> Lutetium 71
		232 <b>Th</b> Thorium 90	238 <b>U</b> Uranium 92	238 <b>U</b> Uranium 92	238 <b>U</b> Uranium 92	238 <b>U</b> Uranium 92	238 <b>U</b> Uranium 92	238 <b>U</b> Uranium 92	238 <b>U</b> Uranium 92	238 <b>U</b> Uranium 92	238 <b>U</b> Uranium 92	238 <b>U</b> Uranium 92	238 <b>U</b> Uranium 92	238 <b>U</b> Uranium 92
		91 <b>Pa</b> Protactinium 91	91 <b>Pa</b> Protactinium 91	91 <b>Pa</b> Protactinium 91	91 <b>Pa</b> Protactinium 91	91 <b>Pa</b> Protactinium 91	91 <b>Pa</b> Protactinium 91	91 <b>Pa</b> Protactinium 91	91 <b>Pa</b> Protactinium 91	91 <b>Pa</b> Protactinium 91	91 <b>Pa</b> Protactinium 91	91 <b>Pa</b> Protactinium 91	91 <b>Pa</b> Protactinium 91	91 <b>Pa</b> Protactinium 91
		94 <b>Pu</b> Plutonium 94	94 <b>Pu</b> Plutonium 94	94 <b>Pu</b> Plutonium 94	94 <b>Pu</b> Plutonium 94	94 <b>Pu</b> Plutonium 94	94 <b>Pu</b> Plutonium 94	94 <b>Pu</b> Plutonium 94	94 <b>Pu</b> Plutonium 94	94 <b>Pu</b> Plutonium 94	94 <b>Pu</b> Plutonium 94	94 <b>Pu</b> Plutonium 94	94 <b>Pu</b> Plutonium 94	94 <b>Pu</b> Plutonium 94
		96 <b>Cm</b> Curium 96	96 <b>Cm</b> Curium 96	96 <b>Cm</b> Curium 96	96 <b>Cm</b> Curium 96	96 <b>Cm</b> Curium 96	96 <b>Cm</b> Curium 96	96 <b>Cm</b> Curium 96	96 <b>Cm</b> Curium 96	96 <b>Cm</b> Curium 96	96 <b>Cm</b> Curium 96	96 <b>Cm</b> Curium 96	96 <b>Cm</b> Curium 96	96 <b>Cm</b> Curium 96
		97 <b>Bk</b> Berkelium 97	97 <b>Bk</b> Berkelium 97	97 <b>Bk</b> Berkelium 97	97 <b>Bk</b> Berkelium 97	97 <b>Bk</b> Berkelium 97	97 <b>Bk</b> Berkelium 97	97 <b>Bk</b> Berkelium 97	97 <b>Bk</b> Berkelium 97	97 <b>Bk</b> Berkelium 97	97 <b>Bk</b> Berkelium 97	97 <b>Bk</b> Berkelium 97	97 <b>Bk</b> Berkelium 97	97 <b>Bk</b> Berkelium 97
		98 <b>Cf</b> Californium 98	98 <b>Cf</b> Californium 98	98 <b>Cf</b> Californium 98	98 <b>Cf</b> Californium 98	98 <b>Cf</b> Californium 98	98 <b>Cf</b> Californium 98	98 <b>Cf</b> Californium 98	98 <b>Cf</b> Californium 98	98 <b>Cf</b> Californium 98	98 <b>Cf</b> Californium 98	98 <b>Cf</b> Californium 98	98 <b>Cf</b> Californium 98	98 <b>Cf</b> Californium 98
		99 <b>Es</b> Einsteinium 99	99 <b>Es</b> Einsteinium 99	99 <b>Es</b> Einsteinium 99	99 <b>Es</b> Einsteinium 99	99 <b>Es</b> Einsteinium 99	99 <b>Es</b> Einsteinium 99	99 <b>Es</b> Einsteinium 99	99 <b>Es</b> Einsteinium 99	99 <b>Es</b> Einsteinium 99	99 <b>Es</b> Einsteinium 99	99 <b>Es</b> Einsteinium 99	99 <b>Es</b> Einsteinium 99	99 <b>Es</b> Einsteinium 99
		100 <b>Fm</b> Fermium 100	100 <b>Fm</b> Fermium 100	100 <b>Fm</b> Fermium 100	100 <b>Fm</b> Fermium 100	100 <b>Fm</b> Fermium 100	100 <b>Fm</b> Fermium 100	100 <b>Fm</b> Fermium 100	100 <b>Fm</b> Fermium 100	100 <b>Fm</b> Fermium 100	100 <b>Fm</b> Fermium 100	100 <b>Fm</b> Fermium 100	100 <b>Fm</b> Fermium 100	100 <b>Fm</b> Fermium 100
		101 <b>Md</b> Mendelevium 101	101 <b>Md</b> Mendelevium 101	101 <b>Md</b> Mendelevium 101	101 <b>Md</b> Mendelevium 101	101 <b>Md</b> Mendelevium 101	101 <b>Md</b> Mendelevium 101	101 <b>Md</b> Mendelevium 101	101 <b>Md</b> Mendelevium 101	101 <b>Md</b> Mendelevium 101	101 <b>Md</b> Mendelevium 101	101 <b>Md</b> Mendelevium 101	101 <b>Md</b> Mendelevium 101	101 <b>Md</b> Mendelevium 101
		102 <b>No</b> Nobelium 102	102 <b>No</b> Nobelium 102	102 <b>No</b> Nobelium 102	102 <b>No</b> Nobelium 102	102 <b>No</b> Nobelium 102	102 <b>No</b> Nobelium 102	102 <b>No</b> Nobelium 102	102 <b>No</b> Nobelium 102	102 <b>No</b> Nobelium 102	102 <b>No</b> Nobelium 102	102 <b>No</b> Nobelium 102	102 <b>No</b> Nobelium 102	102 <b>No</b> Nobelium 102
		103 <b>Lr</b> Lawrencium 103	103 <b>Lr</b> Lawrencium 103	103 <b>Lr</b> Lawrencium 103	103 <b>Lr</b> Lawrencium 103	103 <b>Lr</b> Lawrencium 103	103 <b>Lr</b> Lawrencium 103	103 <b>Lr</b> Lawrencium 103	103 <b>Lr</b> Lawrencium 103	103 <b>Lr</b> Lawrencium 103	103 <b>Lr</b> Lawrencium 103	103 <b>Lr</b> Lawrencium 103	103 <b>Lr</b> Lawrencium 103	103 <b>Lr</b> 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<sup>3</sup> at room temperature and pressure (r.t.p.).