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**COMBINED SCIENCE**

**0653/11**

Paper 1 Multiple Choice (Core)

**May/June 2019**

**45 minutes**

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

\* 5 1 1 3 4 2 6 9 2 0 \*

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**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.

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

1 Which characteristics are found in all living organisms?

	excretion	growth	photosynthesis	respiration
<b>A</b>	yes	yes	no	yes
<b>B</b>	yes	yes	yes	no
<b>C</b>	yes	no	yes	yes
<b>D</b>	no	yes	yes	yes

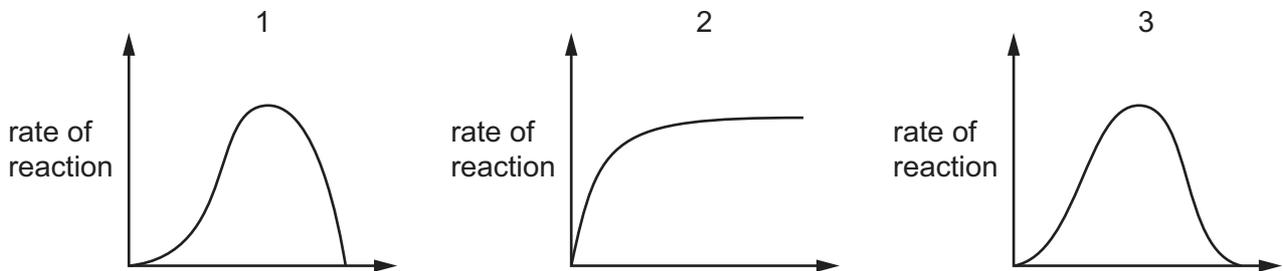
2 Uncooked pieces of potato of identical size were placed in different liquids for one hour.

- 1 pure water
- 2 sugar solution less concentrated than the cell contents
- 3 sugar solution more concentrated than the cell contents
- 4 sugar solution of the same concentration as the cell contents

After this time, which liquids will cause an increase in the size of the pieces of potato?

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

3 Which row identifies the graphs that show the effect of temperature and the effect of pH on an enzyme-controlled reaction?



	temperature	pH
<b>A</b>	graph 1	graph 2
<b>B</b>	graph 2	graph 3
<b>C</b>	graph 1	graph 3
<b>D</b>	graph 3	graph 2

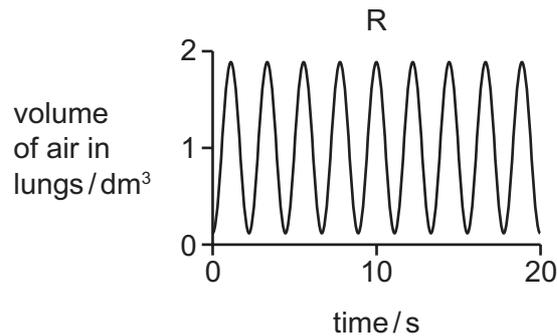
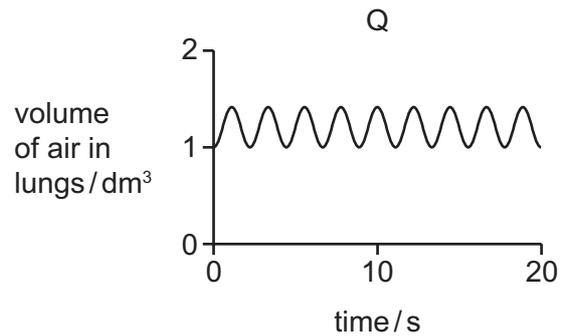
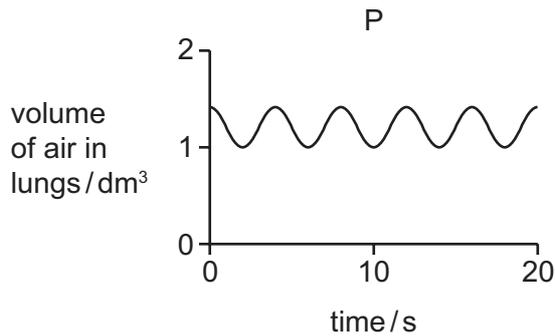
4 What helps maintain healthy gums?

- A** calcium
- B** iron
- C** vitamin C
- D** vitamin D

5 What is a function of the small intestine?

- A It cuts food into small pieces.
- B It provides a large surface area for absorption.
- C It provides space for the storage of faeces.
- D It stores food.

6 The graphs P, Q and R show the changes in the volume of air in the lungs of the same person, measured after different levels of activities.



Which row shows the correct graph for each level of activity?

	at rest	immediately after 10 minutes of running	immediately after 10 minutes of walking
<b>A</b>	P	Q	R
<b>B</b>	P	R	Q
<b>C</b>	R	Q	P
<b>D</b>	R	P	Q

7 Which word equation represents aerobic respiration?

A carbon dioxide + glucose  $\rightarrow$  oxygen + water

B glucose + oxygen  $\rightarrow$  carbon dioxide + water

C oxygen + water  $\rightarrow$  carbon dioxide + glucose

D water + carbon dioxide  $\rightarrow$  glucose + oxygen

8 How does adrenaline affect blood glucose concentration and pulse rate?

	blood glucose concentration	pulse rate
<b>A</b>	decreases	decreases
<b>B</b>	decreases	increases
<b>C</b>	increases	decreases
<b>D</b>	increases	increases

9 Diagram 1 shows a growing seedling after the first few days' growth.

The seedling was then rotated, held in the position shown in diagram 2 and placed in the dark for three days.

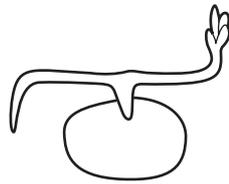


diagram 1

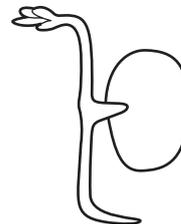


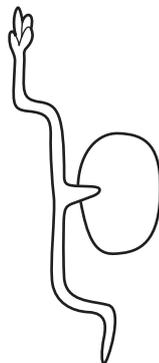
diagram 2

What is the shape of the seedling three days later?

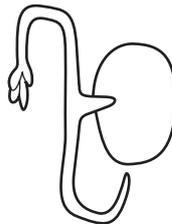
**A**



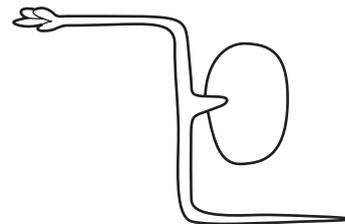
**B**



**C**



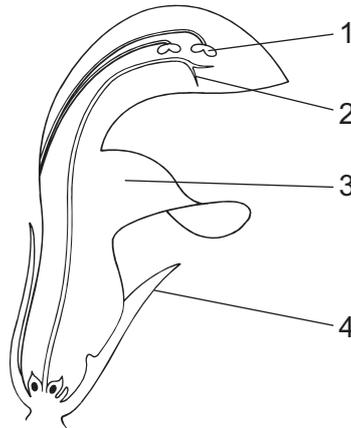
**D**



10 What are the features of sexual reproduction?

	fusion of nuclei	nature of offspring
<b>A</b>	no	genetically dissimilar
<b>B</b>	yes	genetically identical
<b>C</b>	no	genetically identical
<b>D</b>	yes	genetically dissimilar

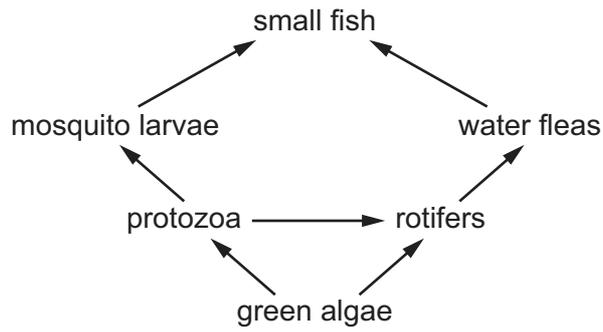
11 The diagram shows a section through an insect-pollinated flower.



Which labels are correct?

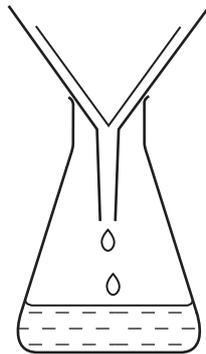
	anther	petal	sepal	stigma
<b>A</b>	1	3	4	2
<b>B</b>	1	4	3	2
<b>C</b>	2	3	4	1
<b>D</b>	2	4	3	1

12 The diagram shows a food web.



Which organisms are both primary and secondary consumers?

- A small fish only
  - B protozoa and rotifers
  - C protozoa only
  - D rotifers only
- 13 Which gas builds up in the atmosphere as a result of deforestation?
- A carbon dioxide
  - B methane
  - C nitrogen
  - D oxygen
- 14 The diagram shows apparatus used for filtration.



Why can sugar and salt **not** be separated by using this apparatus?

- A They are both compounds.
- B They are both white.
- C They both dissolve in water.
- D They both have the same size particles.

15 Copper sulfate crystals dissolve in water.

Which word describes the role of the water?

- A filtrate
- B solute
- C solution
- D solvent

16 Which row describes an ionic compound?

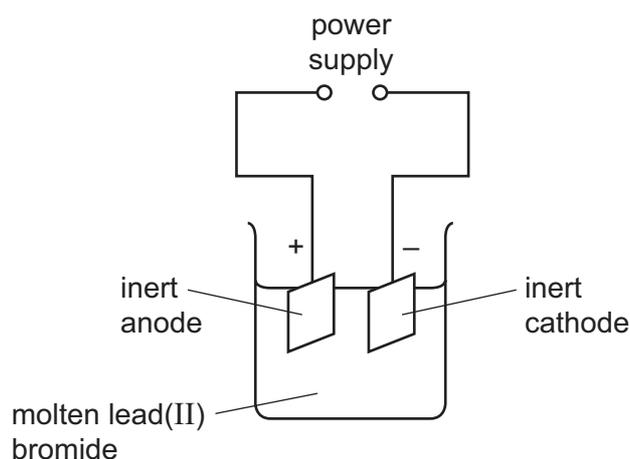
	melting point / °C	electrical conductivity when solid	electrical conductivity when dissolved in water
<b>A</b>	-7	poor	good
<b>B</b>	119	poor	insoluble
<b>C</b>	801	poor	good
<b>D</b>	3652	good	insoluble

17 Aluminium sulfate contains two aluminium atoms, three sulfur atoms and twelve oxygen atoms.

What is the formula of aluminium sulfate?

- A**  $2Al_3S_6O$       **B**  $2AlS_3O_{12}$       **C**  $Al_2(SO_4)_3$       **D**  $Al_23(SO_4)$

18 Molten lead(II) bromide is electrolysed using inert electrodes.



What is formed at each electrode?

	anode	cathode
<b>A</b>	grey solid	orange-brown gas
<b>B</b>	grey solid	grey solid
<b>C</b>	orange-brown gas	orange-brown gas
<b>D</b>	orange-brown gas	grey solid

19 When an excess of zinc is added to dilute hydrochloric acid, a gas is released.

Which pieces of apparatus are needed to investigate the rate of this reaction?

- 1 balance
- 2 gas syringe
- 3 stop watch
- 4 thermometer

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

20 Methane reacts with copper oxide.

The equation for the reaction is shown.



Which statement about this reaction is correct?

- A** Carbon is reduced.  
**B** Copper oxide is oxidised.  
**C** It is a redox reaction.  
**D** Methane is reduced.
- 21 Which aqueous ion gives a white precipitate with aqueous sodium hydroxide and with aqueous ammonia?  
**A**  $\text{Cu}^{2+}$       **B**  $\text{Fe}^{2+}$       **C**  $\text{Fe}^{3+}$       **D**  $\text{Zn}^{2+}$
- 22 Which row describes the physical state of the Group VII elements at room temperature?

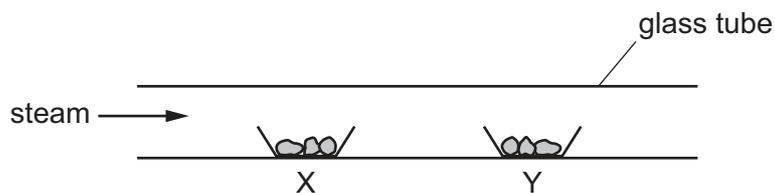
	chlorine	bromine	iodine
<b>A</b>	gas	gas	liquid
<b>B</b>	gas	liquid	solid
<b>C</b>	liquid	liquid	gas
<b>D</b>	liquid	solid	solid

23 Which gas is used to fill lamps?

- A** argon  
**B** carbon dioxide  
**C** hydrogen  
**D** oxygen
- 24 Which two elements do **not** form an alloy?
- A** carbon and sulfur  
**B** carbon and iron  
**C** copper and zinc  
**D** silver and gold

25 Two open containers, X and Y, are inside a glass tube.

Steam passes over solids in X and Y, as shown.



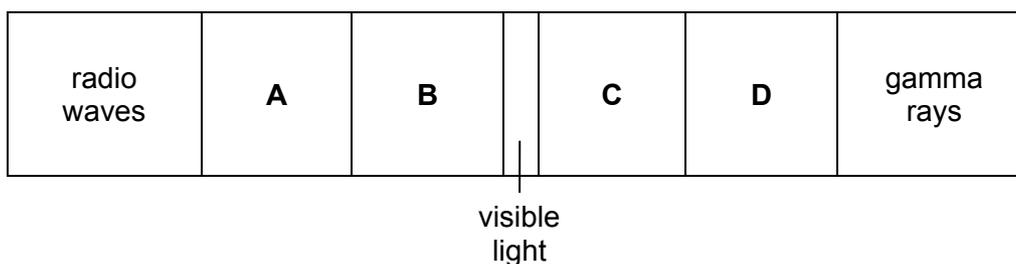
X contains anhydrous copper(II) sulfate.

Y contains hydrated cobalt(II) chloride.

What is observed?

- A The solid in X remains blue.
  - B The solid in X turns from white to blue.
  - C The solid in Y turns from blue to pink.
  - D The solid in Y turns from pink to white.
- 26 Which statement shows that petroleum is a mixture?
- A Petroleum can be burned as a fuel.
  - B Petroleum can be separated into fractions by distillation.
  - C Petroleum is a fossil fuel formed over millions of years.
  - D Petroleum is a thick, black liquid.
- 27 Which statement about alkanes is **not** correct?
- A Alkanes are unsaturated hydrocarbons.
  - B Alkanes burn to release heat energy.
  - C Alkanes form carbon dioxide and water when they burn.
  - D Alkane molecules contain only single bonds.

- 28 Which labelled part of the electromagnetic spectrum is often involved in thermal energy transfer by radiation?

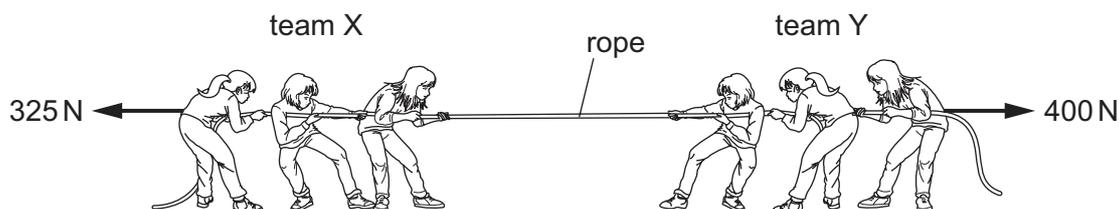


- 29 What does the gradient of a speed–time graph represent?

- A** acceleration
- B** average speed
- C** distance travelled
- D** time taken

- 30 The diagram shows a tug-of-war between team X and team Y.

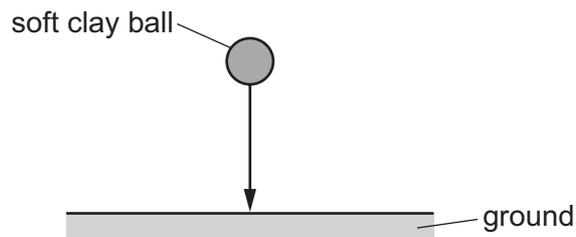
The arrows show the forces exerted by the teams on the rope.



What is the size of the resultant force on the rope and in which direction does the resultant force act?

	size of resultant force / N	direction of resultant force
<b>A</b>	75	to the left
<b>B</b>	75	to the right
<b>C</b>	725	to the left
<b>D</b>	725	to the right

- 31 A ball made of soft clay is dropped and hits the ground. It does not bounce.



What energy changes take place as the ball drops and hits the ground?

- A** gravitational potential  $\rightarrow$  kinetic  $\rightarrow$  thermal  
**B** gravitational potential  $\rightarrow$  thermal  $\rightarrow$  kinetic  
**C** kinetic  $\rightarrow$  gravitational potential  $\rightarrow$  thermal  
**D** kinetic  $\rightarrow$  thermal  $\rightarrow$  gravitational potential
- 32 Which two quantities are used to calculate the power produced by a car engine?
- A** the speed of the car and the distance the car has travelled  
**B** the speed of the car and the time for the journey  
**C** the work done by the engine and the distance the car has travelled  
**D** the work done by the engine and the time taken to do the work
- 33 Benzene and glycerine are two substances.

The table gives the melting point and the boiling point of benzene and of glycerine.

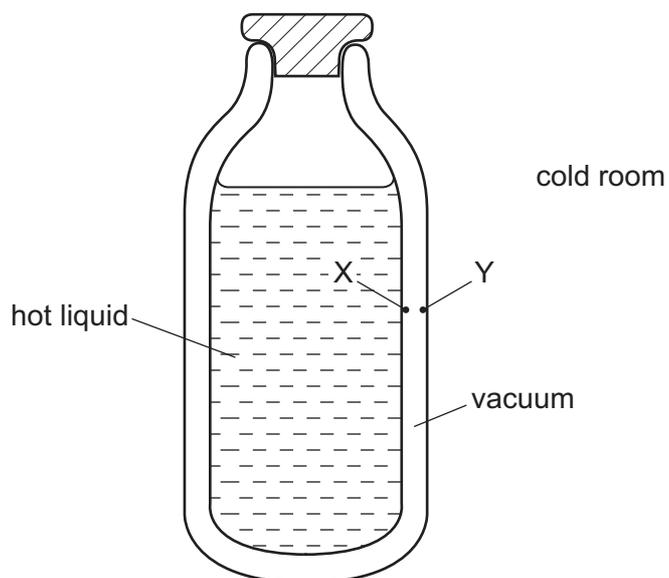
	melting point/ $^{\circ}\text{C}$	boiling point/ $^{\circ}\text{C}$
benzene	5.4	80
glycerine	18	290

At which temperature are both benzene and glycerine liquid?

- A**  $0^{\circ}\text{C}$       **B**  $50^{\circ}\text{C}$       **C**  $90^{\circ}\text{C}$       **D**  $300^{\circ}\text{C}$

34 The diagram shows a vacuum flask containing a hot liquid in a cold room.

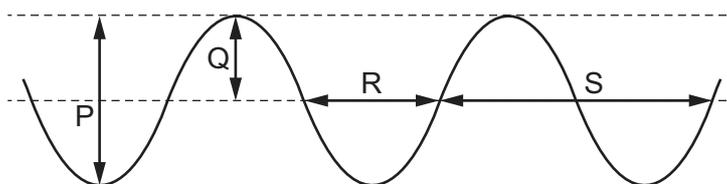
X and Y are points on the inside surfaces of the walls of the flask.



How is thermal energy transferred through the vacuum between X and Y?

- A by conduction and convection
- B by conduction only
- C by radiation and convection
- D by radiation only

35 The diagram represents a wave at one moment.



Which labelled arrows represent the amplitude and the wavelength of the wave?

	amplitude	wavelength
<b>A</b>	P	R
<b>B</b>	P	S
<b>C</b>	Q	R
<b>D</b>	Q	S

36 Which row describes the characteristics of the image of an object formed by a plane mirror?

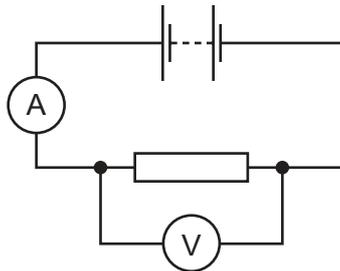
	type of image	size of image
<b>A</b>	real	same as object
<b>B</b>	real	smaller than object
<b>C</b>	virtual	same as object
<b>D</b>	virtual	smaller than object

37 The amplitude of a sound wave decreases and its frequency increases.

What happens to the sound heard?

- A** It becomes louder and its pitch becomes higher.
- B** It becomes louder and its pitch becomes lower.
- C** It becomes quieter and its pitch becomes higher.
- D** It becomes quieter and its pitch becomes lower.

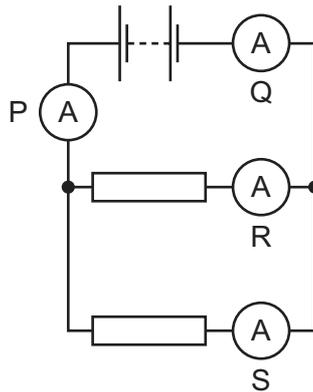
38 The diagram shows a circuit set up by a student.



How is the resistance of the resistor calculated?

- A**  $\frac{\text{ammeter reading}}{\text{voltmeter reading}}$
- B** ammeter reading  $\times$  voltmeter reading
- C**  $\frac{\text{voltmeter reading}}{\text{ammeter reading}}$
- D** voltmeter reading + ammeter reading

39 A circuit contains four ammeters P, Q, R and S.



Which of these ammeters show the greatest reading?

- A** P only      **B** P and Q      **C** R only      **D** R and S

40 A mains circuit can safely supply a current of up to 40 A.

The current in a hairdryer is 2 A when it is operating normally. The hairdryer is connected to the mains by a lead which can safely carry up to 5 A.

What is the correct fuse to protect the hairdryer?

- A** 1 A fuse  
**B** 3 A fuse  
**C** 10 A fuse  
**D** 50 A fuse

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The Periodic Table of Elements

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

1 <b>H</b> hydrogen 1
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atomic number atomic symbol name relative atomic mass
----------------------------------------------------------------

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

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