Cambridge International Examinations
Cambridge International General Certificate of Secondary Education

CO-ORDINATED SCIENCES **0654/12**

Paper 1 Multiple Choice (Core) **May/June 2017**

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.

1 What is **not** produced by artificial selection?

A bacteria with antibiotic resistance

B cows with high milk yield

C sheep with thick wool

D wheat with resistance to disease

2 Which characteristic of living organisms involves chemical reactions that break down nutrient molecules to release energy?

A excretion

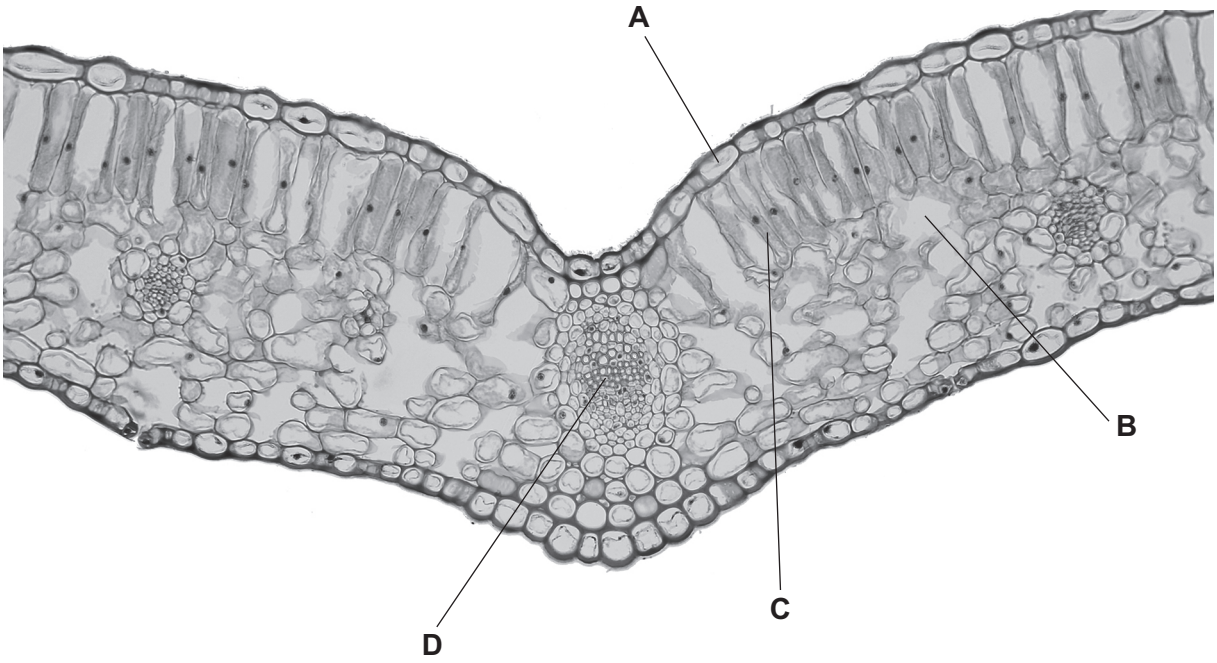
B nutrition

C reproduction

D respiration

3 The photograph shows a leaf as seen under a microscope.

Which part of the leaf produces oxygen in the light?



4 In a plant, what leads to offspring that are identical to the parent?

A asexual reproduction

B insect pollination

C seed germination

D sexual reproduction

5 Enzymes are biological catalysts.

To which group of compounds do enzymes belong?

A carbohydrates

B fats

C hormones

D proteins

6 Which conditions would cause the highest rate of transpiration in a plant?

	temperature	wind speed
A	high	high
B	high	low
C	low	high
D	low	low

7 Which structure carries nerve impulses away from the central nervous system?

A motor neurone

B relay neurone

C sensory neurone

D spinal cord

8 What is the word equation for aerobic respiration?

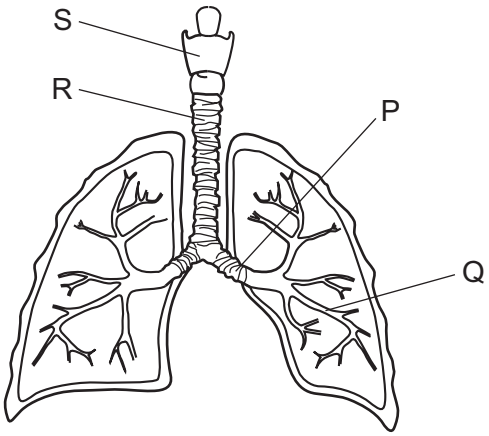
A carbon dioxide + water → glucose + oxygen

B glucose + oxygen → carbon dioxide

C glucose + oxygen → water + carbon dioxide

D glucose + water → carbon dioxide

9 The diagram shows the main structures in the breathing system.



Which row identifies the larynx, bronchus, trachea and bronchioles?

	larynx	bronchus	trachea	bronchioles
A	P	Q	R	S
B	R	P	S	Q
C	S	P	R	Q
D	S	Q	P	R

10 Which statement about all food chains is correct?

A All the carnivores are producers.

B All the consumers are carnivores.

C All the herbivores are consumers.

D All the producers are herbivores.

11 The list shows some effects of human activities.

P global warming

Q loss of fossil fuels

R water pollution

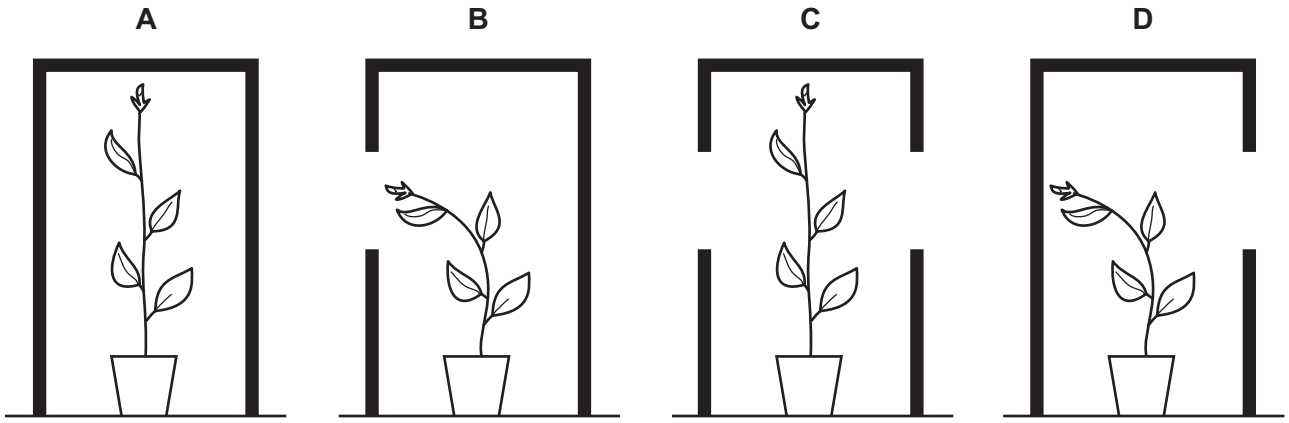
S flooding

Which effects can be the result of deforestation?

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

12 Four plants with straight stems were placed in four black boxes, some with holes cut in the side.

Which diagram shows positive phototropism?



13 Which structural feature is found in a plant cell but **not** in an animal cell?

A cell membrane

B cell wall

C cytoplasm

D nucleus

14 The dyes in a sweet are separated using chromatography.

Which dyes are present in the sweet?

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

15 Which statement about a carbon dioxide molecule is correct?

A It is composed of metallic elements, which are covalently bonded.

B It is composed of metallic elements, which are ionically bonded.

C It is composed of non-metallic elements, which are covalently bonded.

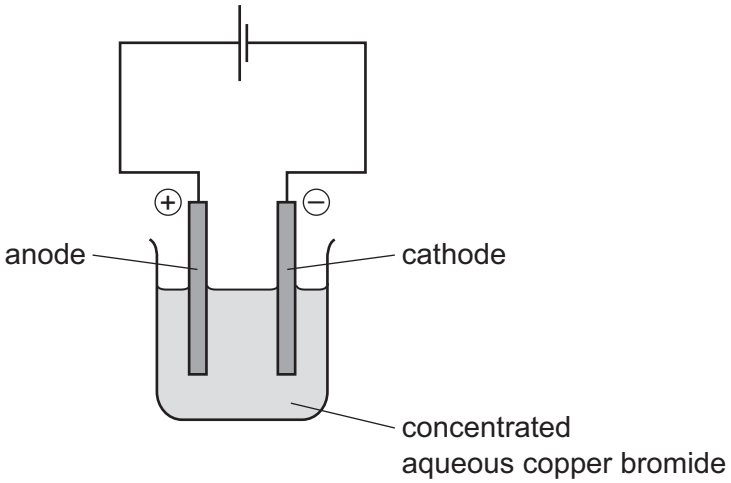
D It is composed of non-metallic elements, which are ionically bonded.

16 How many atoms of metals and of non-metals are shown in the formula Na_2SO_4?

	atoms of metals	atoms of non-metals
A	1	1
B	1	2
C	2	4
D	2	5

17 The electrolysis of concentrated aqueous copper bromide is shown.

Copper bromide is similar to copper chloride.



Which row describes the products at each electrode?

	cathode	anode
A	bromine	copper
B	copper	bromine
C	copper	oxygen
D	hydrogen	bromine

18 When sodium is added to water it reacts violently and melts.

Which row describes the type of reaction and how the temperature of the water changes during the reaction?

	type of reaction	temperature of the water
A	endothermic	decreases
B	endothermic	increases
C	exothermic	decreases
D	exothermic	increases

19 Marble (calcium carbonate) reacts with dilute hydrochloric acid.

1 g of powdered marble reacts faster with the same volume and concentration of acid than a 1 g lump of marble.

What is the reason for this observation?

A The powder has a larger mass.

B The powder has a larger surface area.

C The powder has a smaller mass.

D The powder has a smaller surface area.

20 The pH of water changes when ammonia is bubbled into it.

What happens to the pH and why?

	pH	ammonia is
A	decreases	acidic
B	decreases	alkaline
C	increases	acidic
D	increases	alkaline

21 Two aqueous salt solutions X and Y are tested in three separate tests.

The results are shown.

test	result	
	X	Y
add aqueous sodium hydroxide	light blue precipitate	green precipitate
add dilute nitric acid and aqueous silver nitrate	white precipitate	no change
add dilute nitric acid and aqueous barium nitrate	no change	white precipitate

What are X and Y?

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

22 Which row about the melting point and the density of copper is correct?

	melting point	density
A	high	high
B	high	low
C	low	high
D	low	low

23 Why is argon used in lamps?

A It is heavier than air.

B It is lighter than air.

C It is reactive.

D It is unreactive.

24 Which metal is extracted from its ore by heating with carbon?

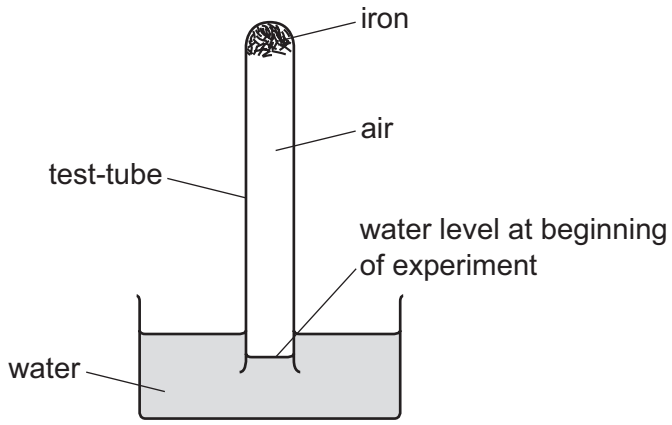
A copper

B magnesium

C potassium

D sodium

25 The diagram shows an experiment about the rusting of iron.



The apparatus is left for one week.

After one week the water level has risen up the test-tube by ……1…… because the ……2…… in the air reacts with the iron.

Which row completes gaps 1 and 2?

	1	2
A	20%	nitrogen
B	20%	oxygen
C	79%	nitrogen
D	79%	oxygen

26 Why do farmers add lime to soil?

A It acts as a fertiliser.

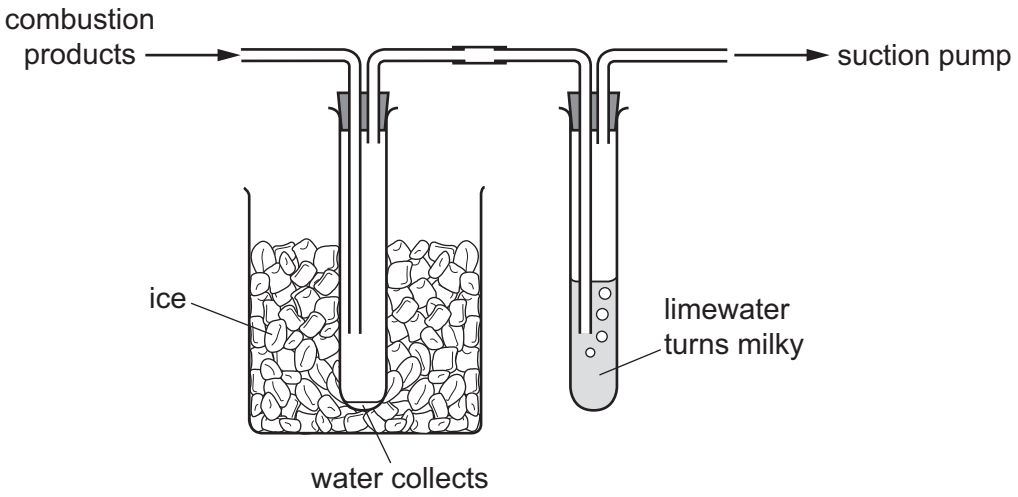
B It adds nitrogen to the soil.

C It decreases the pH of the soil.

D It increases the pH of the soil.

27 Substance X is burned in oxygen.

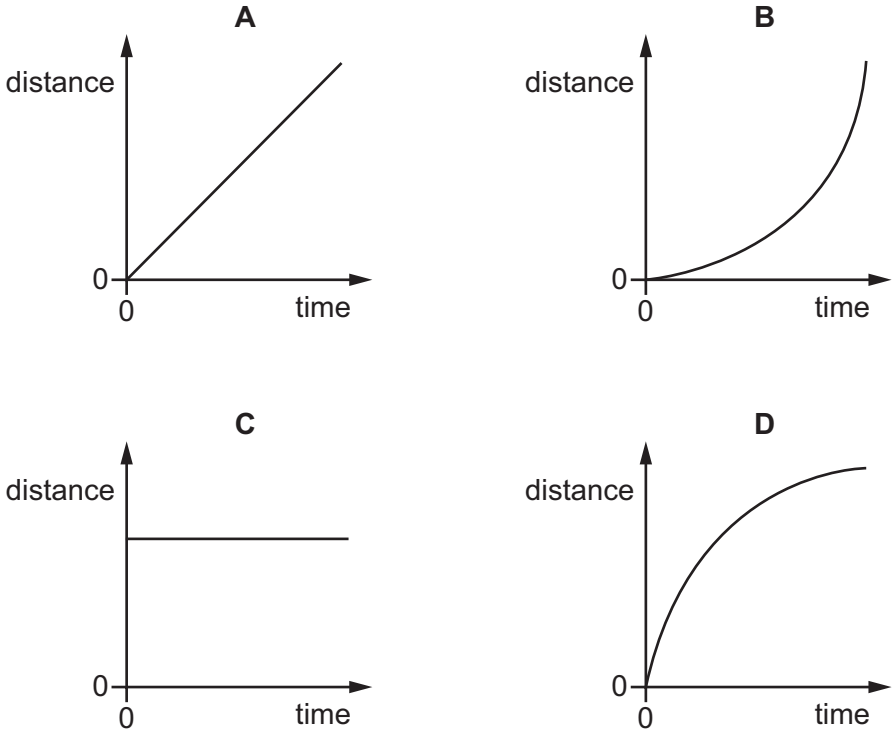
The combustion products pass through the apparatus as shown.



What is X?

A C **B** CO **C** CH_4 **D** H_2

28 Which diagram shows the distance-time graph for an object moving with constant speed?



29 On Earth an astronaut has a mass of 80 kg and weighs 800 N.

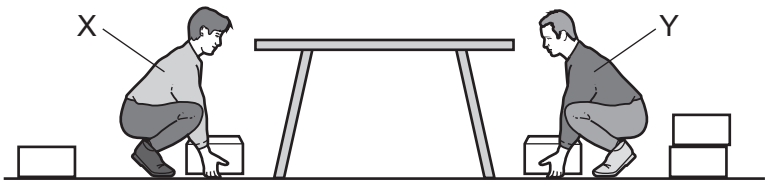
In deep space the gravitational field is very weak.

What is the mass and what is the weight of the astronaut in deep space?

	mass / kg	weight / N
A	less than 80	less than 800
B	less than 80	800
C	80	less than 800
D	80	800

30 Two men lift identical boxes vertically upwards onto the same table.

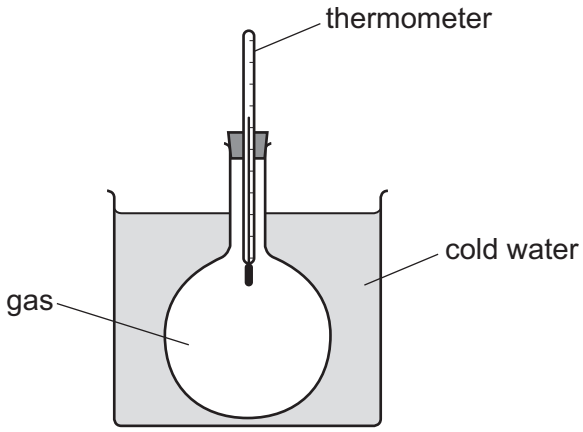
Man X lifts two boxes in a time of 5.0 s and man Y lifts three boxes in a time of 5.0 s.



Which man does the most work in lifting the boxes and which man produces the greatest power?

	man doing most work	man producing greatest power
A	X	X
B	X	Y
C	Y	X
D	Y	Y

31 A closed flask of gas is placed in a bath of cold water.



As the flask cools, the temperature of the gas decreases.

What happens to the molecules of the gas?

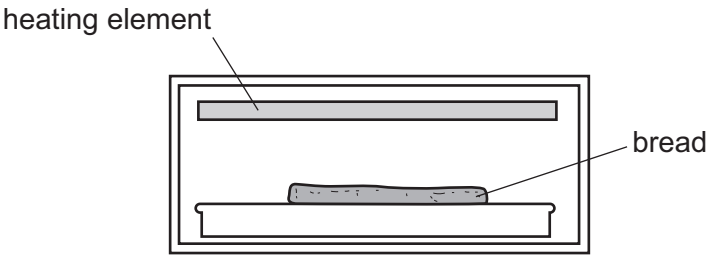
A They contract.

B They expand.

C They move more quickly.

D They move more slowly.

32 Bread can be cooked by placing it below a heating element.



Which process transfers thermal energy from the heating element to the bread?

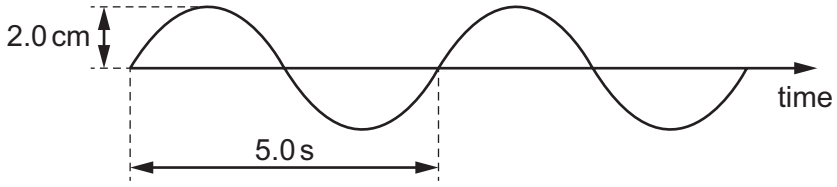
A conduction

B convection

C evaporation

D radiation

33 The diagram represents a wave.

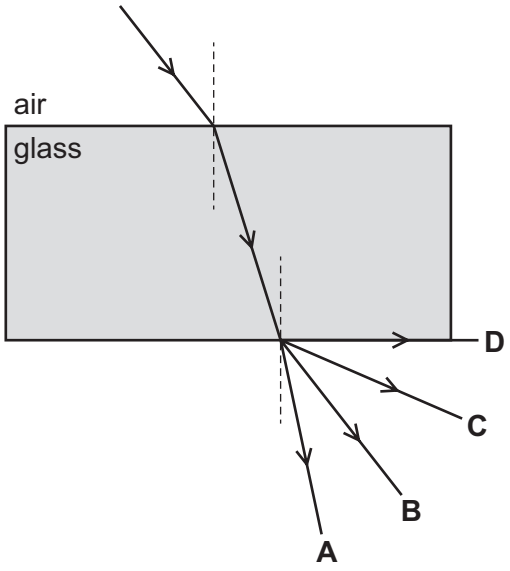


Which row gives the amplitude of the wave and the frequency of the wave?

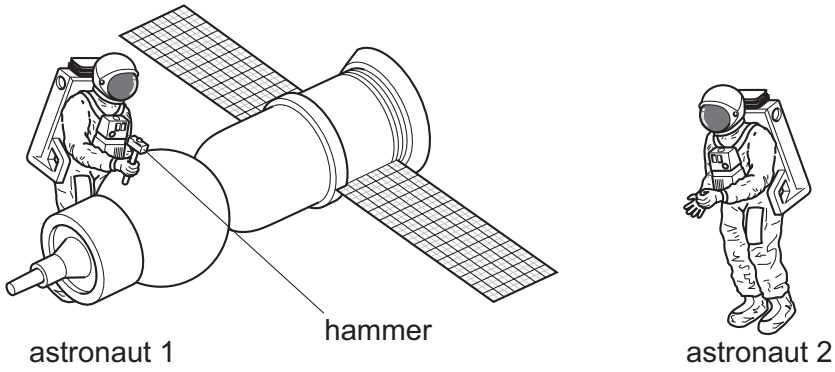
	amplitude / cm	frequency / Hz
A	2.0	0.20
B	2.0	5.0
C	4.0	0.20
D	4.0	5.0

34 The diagram shows a ray of light in air entering and passing through a glass block.

Which labelled arrow shows the direction of the ray after it leaves the glass block?



35 Astronaut 1 uses a hammer to mend a satellite in space. Astronaut 2 is nearby. There is no air in space.



What does astronaut 2 hear compared with the sound heard if they were working on Earth?

A a louder sound

B a quieter sound

C a sound of the same loudness

D no sound at all

36 Electromagnetic waves are used for different applications.

Which row gives two waves in order of increasing wavelength, with their applications?

	smaller wavelength	larger wavelength
A	infra-red for satellite television	microwaves for television remote controller
B	infra-red for television remote controller	microwaves for satellite television
C	microwaves for satellite television	infra-red for television remote controller
D	microwaves for television remote controller	infra-red for satellite television

37 Which material is used for the core of an electromagnet?

A aluminium

B copper

C iron

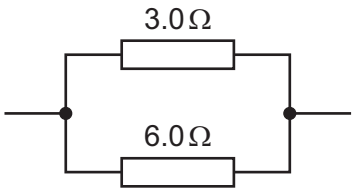
D steel

38 There is a current of 4.0 A in a resistor. The potential difference across the resistor is 8.0 V.

What is the resistance of the resistor?

A 0.50 Ω **B** 2.0 Ω **C** 12 Ω **D** 32 Ω

39 The diagram shows a 3.0 Ω resistor connected to a 6.0 Ω resistor.



What is a possible combined resistance of the two resistors?

A 2.0 Ω **B** 3.0 Ω **C** 4.5 Ω **D** 9.0 Ω

40 Which row compares the number of protons and the number of neutrons in atoms of different isotopes of an element?

	number of protons	number of neutrons
A	different	different
B	different	the same
C	the same	different
D	the same	the same

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.).