



Cambridge International Examinations
Cambridge International General Certificate of Secondary Education

COMBINED SCIENCE

0653/22

Paper 2 Multiple Choice (Extended)

October/November 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.

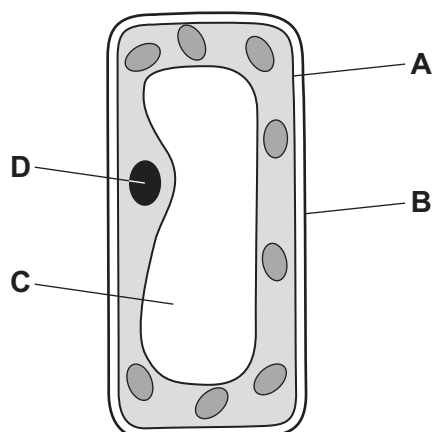
Electronic calculators may be used.

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



- 1 The diagram shows a typical plant cell.

Which part of the cell controls the movement of materials into and out of the cell?



- 2 Which process depends on diffusion?

- A circulation
- B digestion
- C gaseous exchange
- D phagocytosis

- 3 Enzymes are used in digestion to break down larger molecules into smaller molecules.

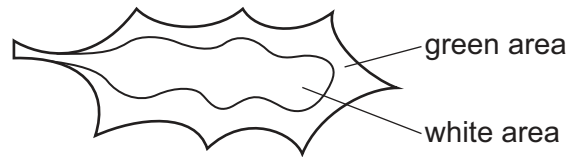
Which row matches the large molecules with the small molecules they are broken down into?

	large molecules	small molecules
A	fat	glycerol and fatty acids
B	glycogen	glycerol and amino acids
C	protein	simple sugars
D	starch	amino acids

- 4 Which two nutrients are needed for healthy bone and tooth development?

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

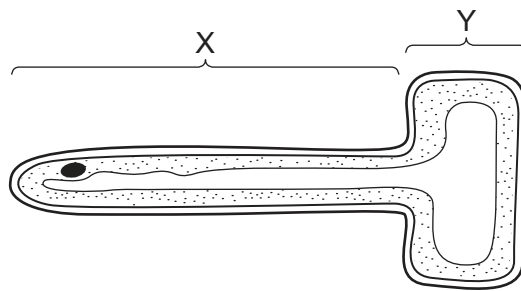
- 5 The diagram shows a leaf that was tested for starch using iodine solution.



Which row shows the results for this leaf and explains the results?

	green area of leaf after test	white area of leaf after test	explanation
A	blue-black	blue-black	chlorophyll is found in all parts of the leaf
B	blue-black	brown	chlorophyll is found in only part of the leaf
C	brown	brown	chlorophyll is found in all parts of the leaf
D	brown	blue-black	chlorophyll is found in only part of the leaf

- 6 The diagram shows a cross-section of a root hair cell.

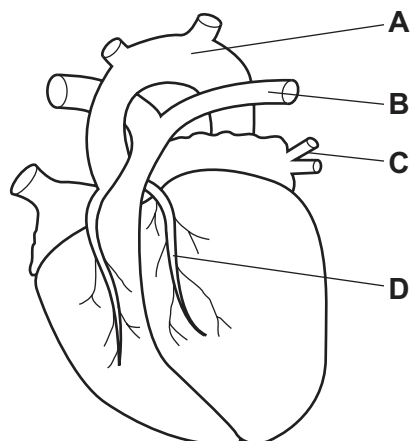


Which row identifies the part of the cell with the larger surface area and its function?

	part of cell	function
A	X	water and glucose uptake
B	X	water and ion uptake
C	Y	water and glucose uptake
D	Y	water and ion uptake

- 7 The diagram shows the external surface of the heart.

Which letter identifies a coronary artery?



- 8 Six molecules of glucose are aerobically respired in an animal cell.

How many molecules of carbon dioxide are released in this process?

- A 1 B 6 C 12 D 36

- 9 Which features will maximise the rate of gas exchange across the alveoli?

	large surface area	small blood supply	thin membrane
A	✓	✓	x
B	✓	✓	✓
C	✓	x	✓
D	x	✓	✓

- 10 What happens to the blood glucose concentration and pulse rate when adrenaline is released into a person's bloodstream?

	blood glucose concentration	pulse rate
A	decreases	increases
B	decreases	decreases
C	increases	increases
D	increases	decreases

- 11 Which row describes the net diffusion of substances between the fetus and the mother across the placenta?

	from fetus to mother	from mother to fetus
A	carbon dioxide and glucose	oxygen and amino acids
B	carbon dioxide and waste products	oxygen and glucose
C	oxygen and glucose	carbon dioxide and amino acid
D	oxygen and waste products	carbon dioxide and glucose

- 12 What is the definition of a trophic level?

- A** It shows how an organism loses energy.
- B** It shows the position of an organism in a food chain.
- C** It shows the consumers of an organism.
- D** It shows the food eaten by an organism.

- 13 Which are possible harmful effects of deforestation?

	global warming	species extinction
A	✓	✓
B	✓	✗
C	✗	✓
D	✗	✗

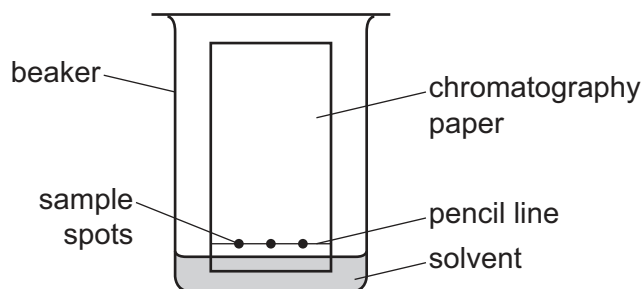
- 14 Sucrose is a covalent compound.

It is a solid at room temperature.

Which statement about sucrose is correct?

- A** It is made of atoms that are close together and in continuous random motion.
- B** It is made of atoms that are far apart and vibrating about a fixed point.
- C** It is made of molecules that are close together and vibrating about a fixed point.
- D** It is made of molecules that are far apart and in continuous random motion.

15 The apparatus used for chromatography is shown.



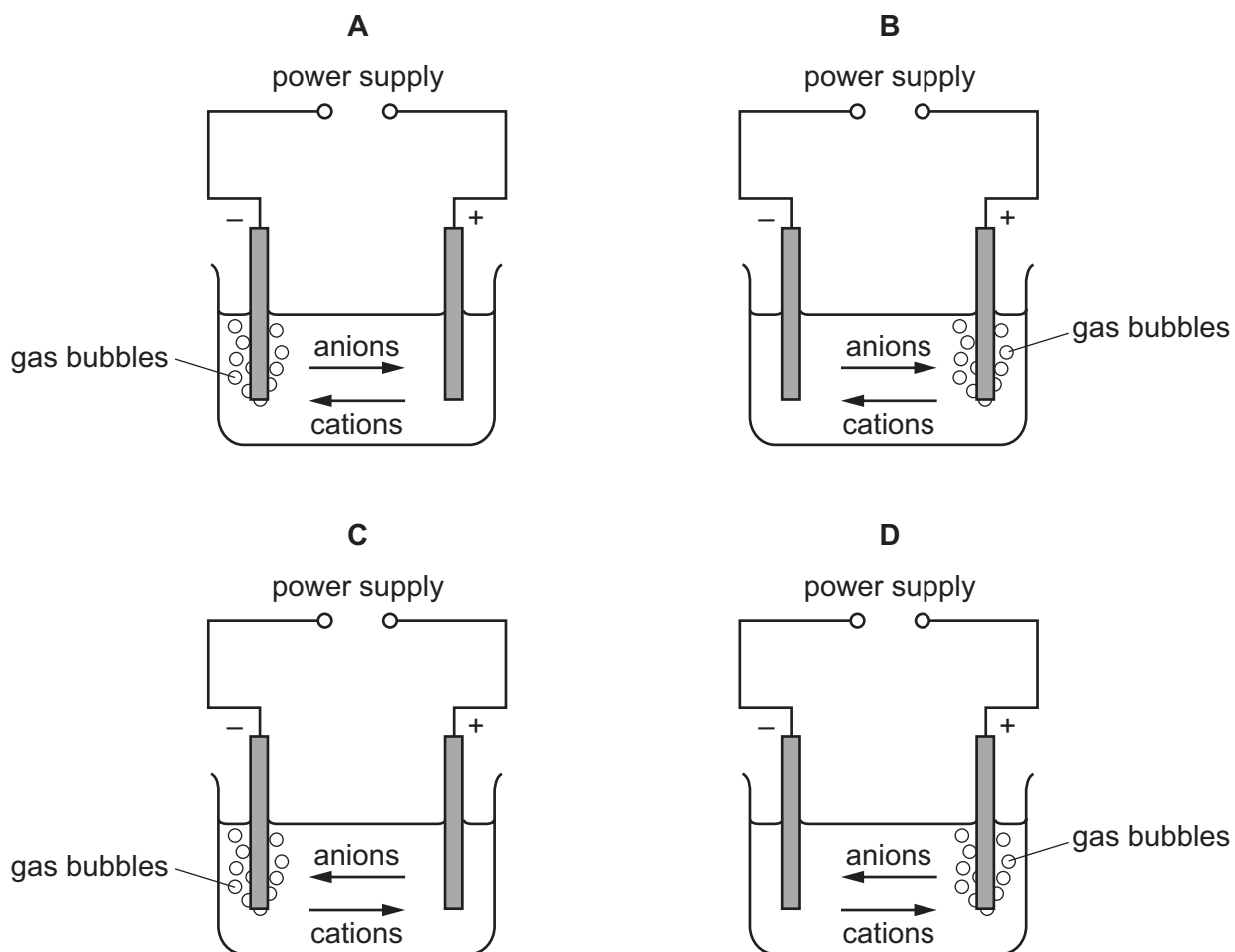
Which statement about the method used for chromatography is **not** correct?

- A The beaker is swirled to help the solvent to rise.
 - B The chromatography paper is placed in the beaker after the solvent has been added.
 - C The chromatography paper is removed before the solvent reaches the top of the paper.
 - D The sample spots are placed on the pencil line above the level of the solvent.
- 16 Which molecule contains a double covalent bond?
- A ethene
 - B methane
 - C nitrogen
 - D water
- 17 Which formula does **not** represent an acid?
- A H_2SO_4
 - B HCl
 - C HNO_3
 - D NH_3

18 During the electrolysis of aqueous copper chloride, ions move.

A gas is produced at one of the electrodes.

Which diagram shows the movement of ions and the electrode at which the gas is produced?



19 Which statement describes an endothermic reaction?

- A** Chemical energy is transformed into thermal energy and the temperature falls.
- B** Chemical energy is transformed into thermal energy and the temperature rises.
- C** Thermal energy is transformed into chemical energy and the temperature falls.
- D** Thermal energy is transformed into chemical energy and the temperature rises.

- 20 Hydrogen peroxide decomposes to form oxygen and water.

A catalyst is added to the hydrogen peroxide.

Which row describes the change in the rate of reaction and the mass of catalyst left at the end of the reaction?

	rate of reaction	mass of catalyst left at end of reaction
A	decrease	less
B	decrease	no change
C	increase	less
D	increase	no change

- 21 Iron oxide reacts with carbon monoxide.

The word equation for the reaction is:



Which statement is **not** correct?

- A** Carbon is neither oxidised nor reduced.
 - B** Carbon is oxidised.
 - C** Iron is reduced.
 - D** This is a redox reaction.
- 22 Francium is the element at the bottom of Group I.
- What would happen if a sample of francium is added to water?
- A** Francium reacts rapidly to produce bubbles of carbon dioxide.
 - B** Francium reacts to form a precipitate of francium oxide.
 - C** Francium reacts violently and produces a flammable gas.
 - D** Francium sinks and no reaction occurs.

Which element has a high melting point and forms coloured compounds?

A blank periodic table grid is shown. The grid is composed of squares representing elements. The layout is as follows:

- Period 1: 2 squares.
- Period 2: 8 squares.
- Period 3: 8 squares.
- Period 4: 18 squares, with a 10-column gap between the 4th and 13th columns.
- Period 5: 18 squares, with a 10-column gap between the 4th and 13th columns.
- Period 6: 32 squares, with a 10-column gap between the 4th and 13th columns.
- Period 7: 24 squares, with a 10-column gap between the 4th and 13th columns.

Labels are placed in the following positions:

- A**: In the 10th column of Period 4.
- B**: In the 18th column of Period 4.
- C**: In the 1st column of Period 6.
- D**: In the 2nd column of Period 6.

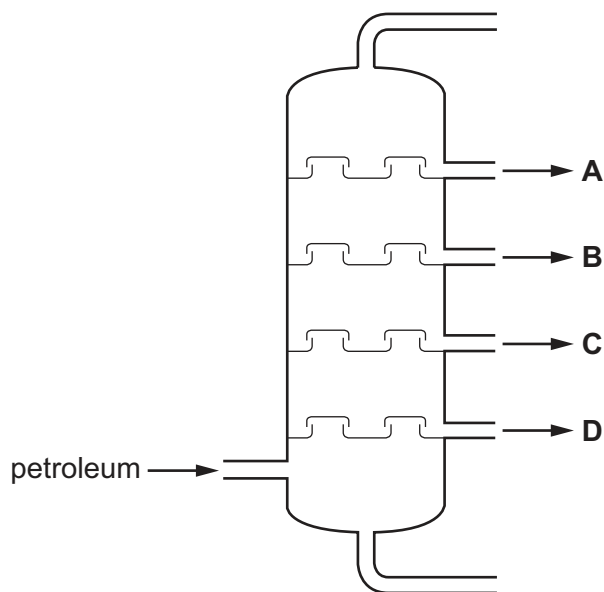
D Noble gases exist as molecules containing two atoms.

D zinc

D The combustion of gasoline is an endothermic reaction.

27 Petroleum is separated into fractions by fractional distillation.

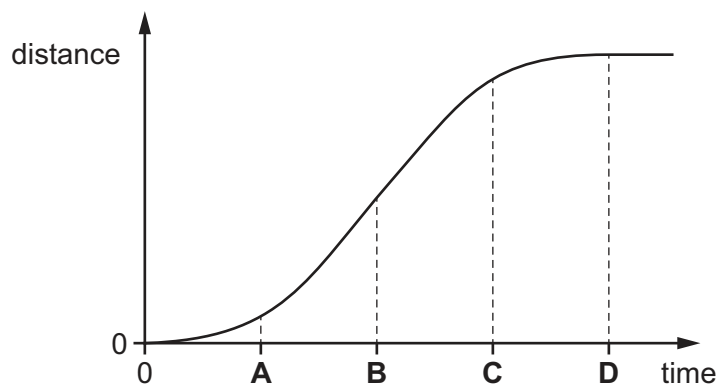
Which labelled fraction contains molecules with the largest intermolecular attractive forces?



28 A train travels between two stations.

The distance-time graph for the train is shown.

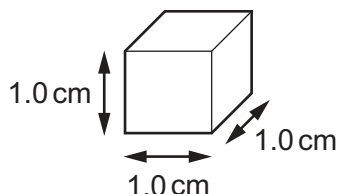
At which time is the train travelling the fastest?



29 What name is given to the gravitational force acting on a mass?

- A** density
- B** power
- C** weight
- D** work

- 30 A cube of aluminium has sides of length 1.0 cm.



Compared with this cube, which statement about a cube of aluminium with sides of 2.0 cm is correct?

- A It has the same density.
 - B It has the same mass.
 - C It has twice the density.
 - D It has twice the mass.
- 31 A brick of mass 4.0 kg rests on a window ledge. It falls off the window ledge and drops through a height of 5.0 m to the ground. The acceleration of free fall g is 10 m/s^2 .

Air resistance can be ignored.

Which row states the kinetic energy and the speed of the brick just before it hits the ground?

	kinetic energy of brick / J	<u>speed of brick</u> m/s
A	20	2.2
B	20	3.2
C	200	7.1
D	200	10

- 32 Gases are easier to compress than either solids or liquids.

Which statement about gas molecules is correct?

- A They are closer together and the forces between them are stronger.
- B They are closer together and the forces between them are weaker.
- C They are further apart and the forces between them are stronger.
- D They are further apart and the forces between them are weaker.

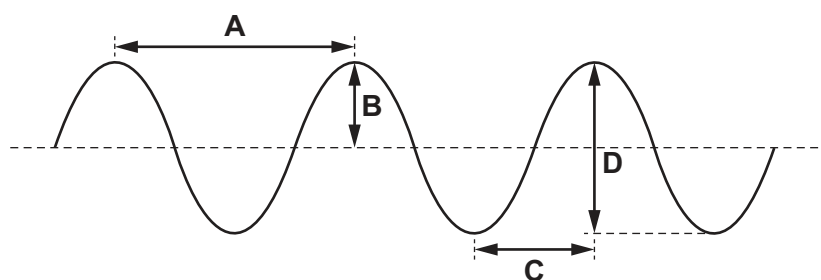
- 33** A liquid evaporates when molecules leave its surface.

Which molecules leave the surface, and what happens to the temperature of the remaining liquid?

- A** The more energetic molecules leave and the temperature falls.
- B** The more energetic molecules leave and the temperature rises.
- C** The less energetic molecules leave and the temperature falls.
- D** The less energetic molecules leave and the temperature rises.

- 34** The diagram represents a wave.

Which labelled distance gives the amplitude of the wave?



- 35** A student is watching television. He uses a remote controller to change the programme.

The remote controller uses electromagnetic waves. Electromagnetic waves are also used to transmit the television signals from a satellite.

Which row shows the type of wave used for each purpose?

	remote controller	satellite
A	infra-red	microwaves
B	infra-red	radio waves
C	ultraviolet	microwaves
D	ultraviolet	radio waves

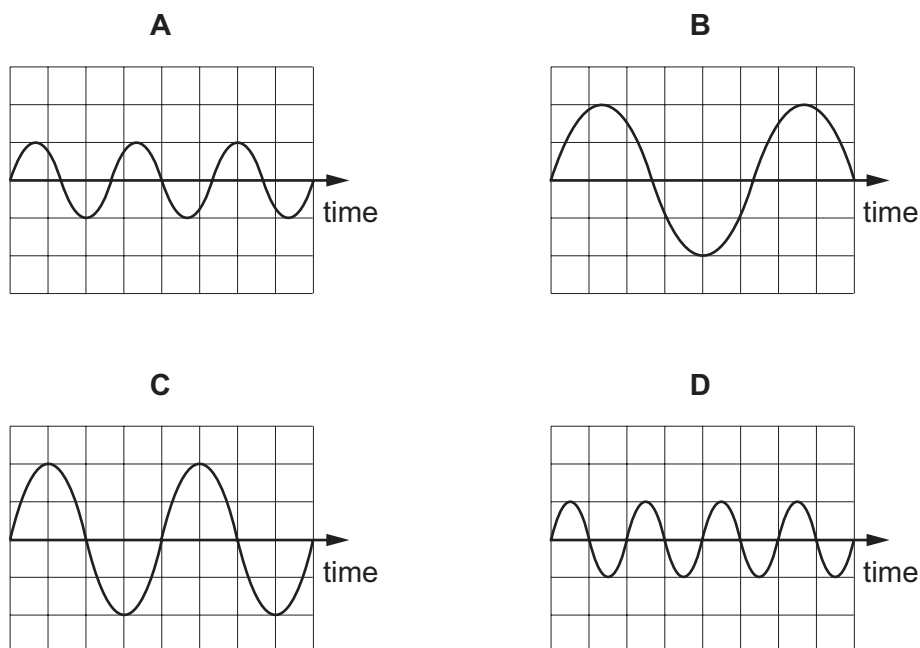
- 36** A girl stands in front of a plane mirror. She then walks towards the mirror at a speed of 1.0 m/s.

At what combined speed do the girl and her image appear to approach each other?

- A** 0 m/s
- B** 0.50 m/s
- C** 1.0 m/s
- D** 2.0 m/s

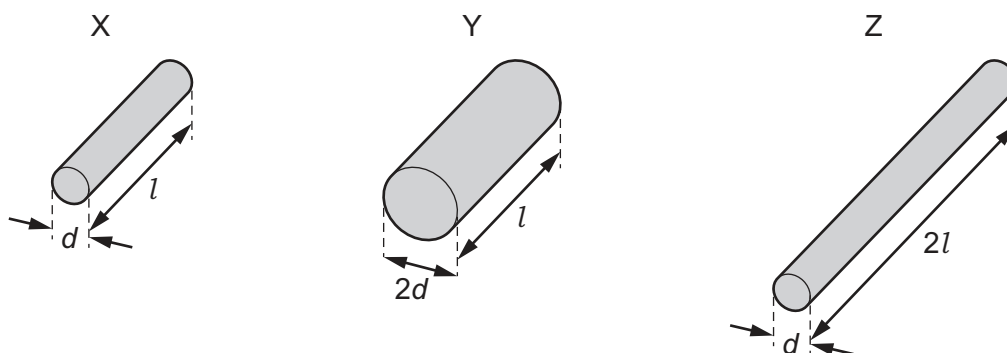
37 The diagrams represent four different sound waves. The scales are the same in all the diagrams.

Which sound has the lowest pitch?



38 Three pieces of resistance wire X, Y and Z are made of the same metal.

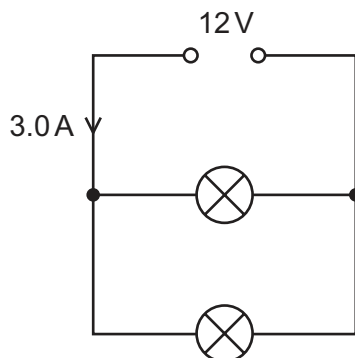
The diagram shows the lengths and the diameters of the wires.



What is the order of the wires when they are placed in order of increasing resistance, least resistance first?

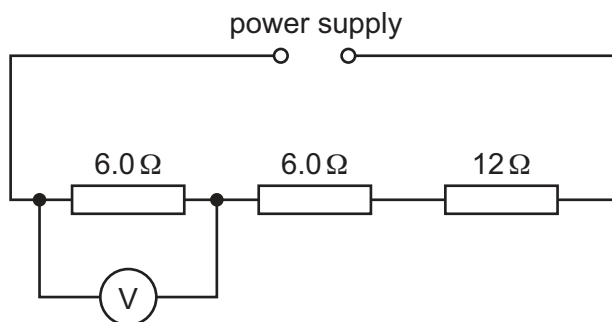
- A** $Y \rightarrow X \rightarrow Z$ **B** $Y \rightarrow Z \rightarrow X$ **C** $Z \rightarrow X \rightarrow Y$ **D** $Z \rightarrow Y \rightarrow X$

- 39 The diagram shows two identical lamps connected in parallel to a 12 V power supply. A current of 3.0 A is delivered by the power supply.



What is the power produced by **each** lamp?

- A** 4.0 W **B** 8.0 W **C** 18 W **D** 36 W
- 40 The diagram shows two $6.0\ \Omega$ resistors and one $12\ \Omega$ resistor connected in series to a power supply. The voltmeter connected across one $6.0\ \Omega$ resistor reads 2.0 V.



What is the potential difference across the power supply?

- A** 6.0 V **B** 8.0 V **C** 12 V **D** 48 V

Answer Sheet_____

	A	B	C	D
1	☐	☐	☐	☐
2	☐	☐	☐	☐
3	☐	☐	☐	☐
4	☐	☐	☐	☐
5	☐	☐	☐	☐
6	☐	☐	☐	☐
7	☐	☐	☐	☐
8	☐	☐	☐	☐
9	☐	☐	☐	☐
10	☐	☐	☐	☐
11	☐	☐	☐	☐
12	☐	☐	☐	☐
13	☐	☐	☐	☐
14	☐	☐	☐	☐
15	☐	☐	☐	☐
16	☐	☐	☐	☐
17	☐	☐	☐	☐
18	☐	☐	☐	☐
19	☐	☐	☐	☐
20	☐	☐	☐	☐

	A	B	C	D
21	☐	☐	☐	☐
22	☐	☐	☐	☐
23	☐	☐	☐	☐
24	☐	☐	☐	☐
25	☐	☐	☐	☐
26	☐	☐	☐	☐
27	☐	☐	☐	☐
28	☐	☐	☐	☐
29	☐	☐	☐	☐
30	☐	☐	☐	☐
31	☐	☐	☐	☐
32	☐	☐	☐	☐
33	☐	☐	☐	☐
34	☐	☐	☐	☐
35	☐	☐	☐	☐
36	☐	☐	☐	☐
37	☐	☐	☐	☐
38	☐	☐	☐	☐
39	☐	☐	☐	☐
40	☐	☐	☐	☐

The Periodic Table of Elements

Group																	
I	II	1 H hydrogen 1										III	IV	V	VI	VII	VIII
3 Li lithium 7	4 Be beryllium 9	Key atomic number atomic symbol name relative atomic mass										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																
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 —	—	—	—	—

lanthanoids

actinoids

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
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 dm³ at room temperature and pressure (r.t.p.).