Cambridge Assessment International Education

Cambridge IGCSE™

PHYSICAL SCIENCE **0652/11**

Paper 1 Multiple Choice (Core) **October/November 2024**

45 minutes

You must answer on the multiple choice answer sheet.

You will need: Multiple choice answer sheet
Soft clean eraser
Soft pencil (type B or HB is recommended)

INSTRUCTIONS

- 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 multiple choice answer sheet.
- Follow the instructions on the multiple choice answer sheet.
- Write in soft pencil.
- Write your name, centre number and candidate number on the multiple choice answer sheet in the spaces provided unless this has been done for you.
- Do **not** use correction fluid.
- Do **not** write on any bar codes.
- You may use a calculator.

INFORMATION

- The total mark for this paper is 40.
- Each correct answer will score one mark.
- Any rough working should be done on this question paper.
- The Periodic Table is printed in the question paper.

This document has **16** pages.

1 Ammonia gas has a strong smell.

A gas jar of ammonia with its lid on is placed in the corner of a room.

The lid is removed and after 30 minutes the smell of ammonia is detected all around the room.

Which statements about this process are correct?

1 The particles of ammonia are breaking away from their fixed positions in the gas jar.

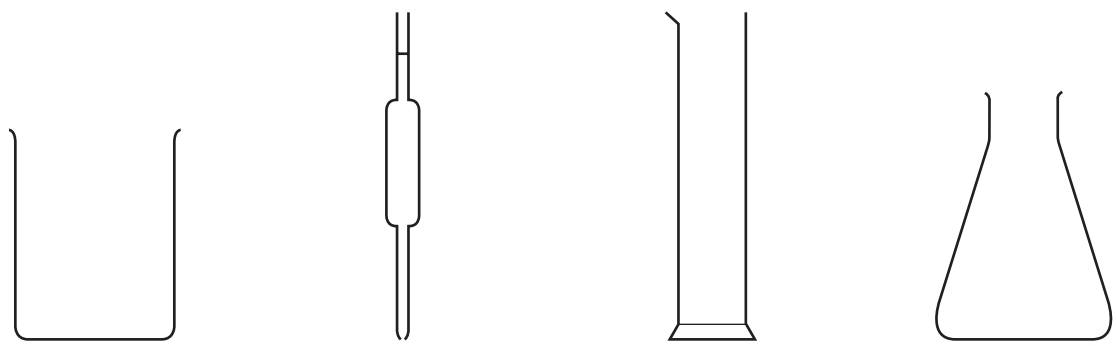
2 The particles of ammonia are diffusing through the air.

3 The particles of ammonia are moving randomly.

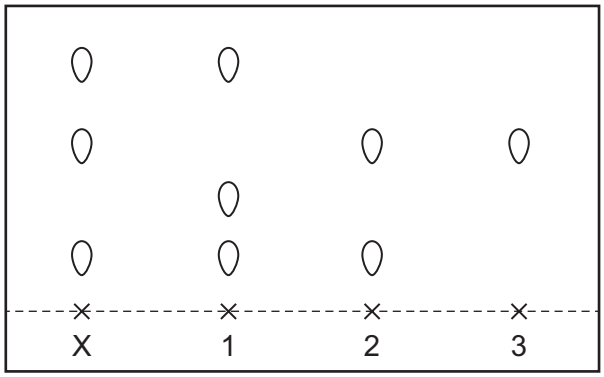
A 1, 2 and 3 **B** 1 and 2 only **C** 1 and 3 only **D** 2 and 3 only

2 Which piece of apparatus is used to measure exactly 25.00 cm^3 of solution?

A **B** **C** **D**



3 The diagram shows a chromatogram of several different inks.



Which statement is correct?

A 2 is a pure substance.

B 3 is a pure substance.

C X is a mixture of 1 and 2.

D X is a mixture of 2 and 3.

4 A new element was officially named as flerovium at the end of May 2012.

An atom of flerovium is represented by the symbol $^{289}_{114}Fl$.

Which statement about the atom of flerovium is correct?

A It contains 114 electrons and 175 nucleons.

B It contains 114 electrons and 289 protons.

C It contains 114 neutrons and 175 protons.

D It contains 114 protons and 289 nucleons.

5 Some properties of X and Y are shown.

property	X	Y
volatility	non-volatile	highly volatile
solubility in water	soluble	insoluble
electrical conductivity when molten	good	poor

Which row describes the bonding in X and Y?

	X	Y
A	covalent	covalent
B	covalent	ionic
C	ionic	covalent
D	ionic	ionic

6 Which row shows the formulae of carbon dioxide and chlorine?

	carbon dioxide	chlorine
A	CO	Cl_2
B	CO	Cl
C	CO_2	Cl_2
D	CO_2	Cl

7 A hydrocarbon burns in excess oxygen.

Part of the equation for the reaction is shown.

$$\text{.....} + 5O_2 \rightarrow 3CO_2 + 4H_2O$$

What needs to be added to the equation in order to balance it?

A C_3H_8 **B** C_3H_4 **C** $3CH_4$ **D** C_3H_7OH

8 Concentrated aqueous sodium chloride is electrolysed using inert electrodes.

Which row shows the name of the negative electrode and identifies the gas that forms at the negative electrode?

	name	gas
A	anode	chlorine
B	anode	hydrogen
C	cathode	chlorine
D	cathode	hydrogen

9 Magnesium carbonate reacts with dilute hydrochloric acid.

Which statement explains why the rate of reaction decreases as time increases?

A The concentration of the dilute hydrochloric acid decreases.

B The particle size of the magnesium carbonate decreases.

C The surface area of the magnesium carbonate increases.

D The temperature of the reaction mixture increases.

10 The word equation for the reaction between aluminium and iron(III) oxide is shown.

$$\text{aluminium} + \text{iron(III) oxide} \rightarrow \text{iron} + \text{aluminium oxide}$$

Which statement about this reaction is correct?

A Aluminium is oxidised as it gains oxygen.

B Aluminium is reduced as it loses oxygen.

C Iron is reduced as it gains oxygen.

D Iron is oxidised as it loses oxygen.

11 Which row about the named oxides is correct?

	name of oxide	metallic or non-metallic oxide	acidic or basic oxide
A	calcium oxide	metallic	acidic
B	sulfur dioxide	metallic	basic
C	calcium oxide	non-metallic	basic
D	sulfur dioxide	non-metallic	acidic

12 What is used to show the presence of chlorine?

A a lighted splint

B bromine water

C damp litmus paper

D limewater

13 Which row describes the trend in properties of the Group I elements down the group?

	melting point	density
A	decreases	decreases
B	decreases	increases
C	increases	decreases
D	increases	increases

14 Which statement describes the properties of transition elements?

A They have high densities and high melting points.

B They have high densities and low melting points.

C They have low densities and high melting points.

D They have low densities and low melting points.

[Turn over

15 The reactivity series for five metals, P, Q, R, S and T, and hydrogen is shown.

most reactive →					least reactive
P	Q	H	R	S	T

Which statement about these metals is correct?

A Q oxide will be reduced to Q by heating with hydrogen.

B Q will reduce P oxide to P on heating.

C R will react with dilute acids to give hydrogen.

D S will displace T from aqueous T sulfate.

16 How does the colour of anhydrous copper(II) sulfate change when water is added?

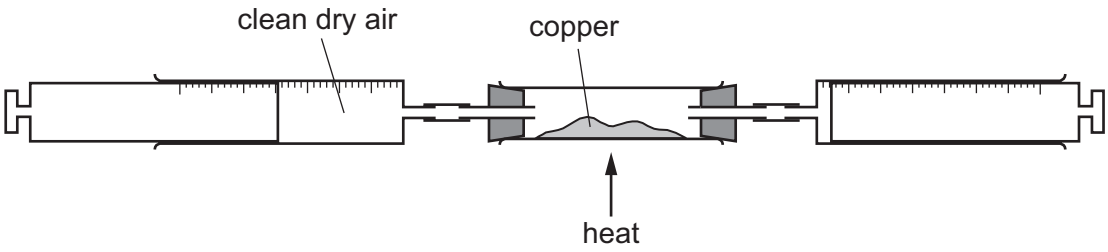
A blue to pink

B blue to white

C pink to blue

D white to blue

17 A sample of clean dry air contains 20% oxygen. It is passed repeatedly over hot copper, as shown.



The volume of air decreases by 15 cm^3.

What is the starting volume of the sample of air?

A 30 cm^3 **B** 50 cm^3 **C** 75 cm^3 **D** 100 cm^3

18 Ethane, ethanol, ethene and methane are all organic compounds.

Which compounds contain six hydrogen atoms in one molecule?

A ethane and ethanol

B ethane only

C methane and ethene

D ethene only

19 Hydrocarbon X decolourises aqueous bromine.

Which statement about X is correct?

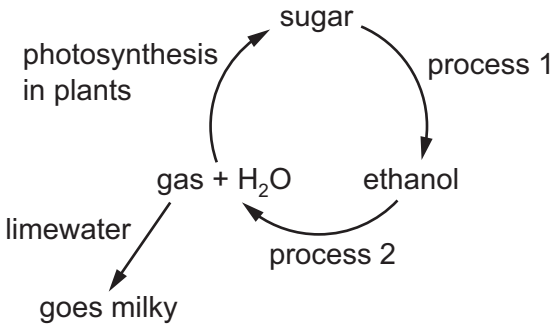
A Complete combustion of X gives carbon monoxide and water.

B It can form an addition polymer.

C It contains only C–C single bonds.

D It contains three different elements.

20 A cycle of reactions involving carbon compounds is shown.



What are processes 1 and 2?

	process 1	process 2
A	addition	complete combustion
B	addition	incomplete combustion
C	fermentation	complete combustion
D	fermentation	incomplete combustion

21 A ball falls through the air.

The air resistance acting on the ball increases.

What happens when the air resistance becomes equal to the weight of the ball?

A The ball accelerates downwards.

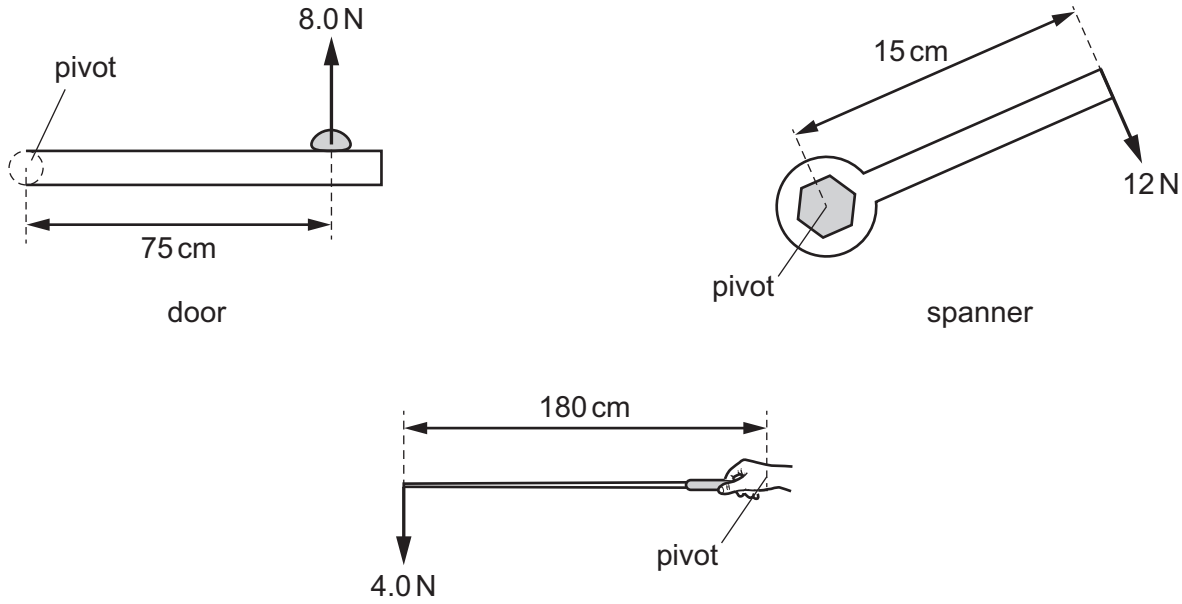
B The ball accelerates upwards.

C The ball moves at constant speed.

D The ball stops moving.

[Turn over

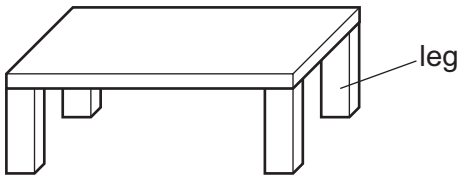
22 Each diagram shows an example of a force causing a moment about a pivot. The diagrams are **not** drawn to the same scale.



Which row gives the moments produced by the forces, in order, from smallest moment to largest moment?

	smallest moment	→	largest moment
A	door	fishing rod	spanner
B	fishing rod	door	spanner
C	spanner	door	fishing rod
D	spanner	fishing rod	door

23 A heavy table with four legs is placed on soft ground.



Different sets of legs can be used for the table, without changing the total mass.

Which set of legs increases the pressure on the ground?

A longer legs

B shorter legs

C thicker legs

D thinner legs

24 In which situation is a 200 N force doing work?

A a constant force of 200 N pushing a bicycle along a rough surface

B a rope holding a box of weight 200 N at a constant height above the ground

C a constant force of 200 N keeping a spring stretched at a constant length

D two children, each of weight 200 N, balancing on either end of a stationary see-saw (teeter-totter)

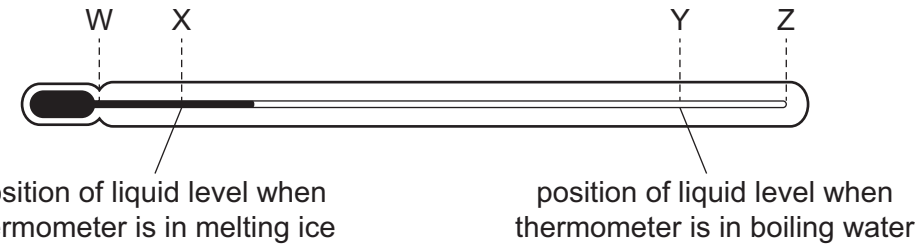
25 Four students take different times to do work.

Which student produces the **smallest** power?

	work done / J	time taken / s
A	5 000	20
B	5 000	40
C	10 000	20
D	10 000	40

26 A thermometer has no scale markings. W and Z are the two ends of the tube.

A scientist places the thermometer in melting ice and then in boiling water and marks the two corresponding positions of the liquid level in the tube X and Y, as shown.



The scientist marks a scale on the thermometer that gives the temperature in degrees Celsius (°C).

Which distance does the scientist divide into 100 equal parts to make the scale?

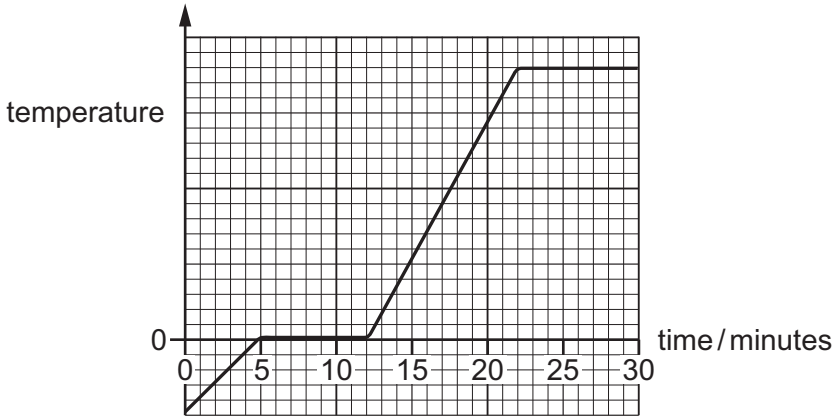
A the distance between W and Y

B the distance between W and Z

C the distance between X and Y

D the distance between X and Z

27 A substance that is initially solid is supplied with thermal energy at a constant rate for 30 minutes. The graph shows how the temperature of the substance varies with time.



For which period of time is the substance all liquid?

A 5 minutes **B** 7 minutes **C** 10 minutes **D** 17 minutes

28 How does energy from the Sun reach the Earth through the vacuum of space?

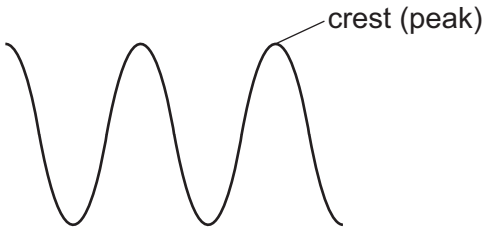
A by both conduction and convection

B by conduction only

C by convection only

D by radiation only

29 A wave travels across the surface of water.



Which name is given to the number of wave crests passing a fixed point every second?

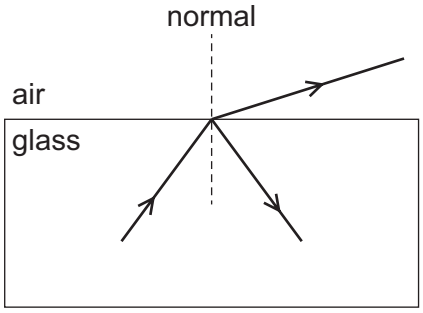
A amplitude

B frequency

C wavelength

D wave speed

30 The diagram shows what happens when light travelling in a glass block is incident on a glass–air surface.



Which statement is correct?

A The angle of incidence is greater than the critical angle and total internal reflection occurs.

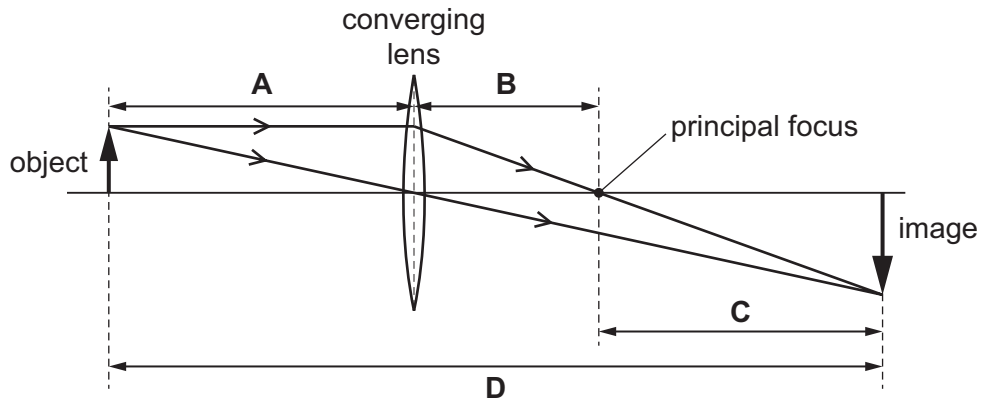
B The angle of incidence is greater than the critical angle and total internal reflection does **not** occur.

C The angle of incidence is less than the critical angle and total internal reflection occurs.

D The angle of incidence is less than the critical angle and total internal reflection does **not** occur.

31 The diagram shows how a converging lens produces a real image of an object. A principal focus of the lens is marked.

Which labelled distance is the focal length of the lens?



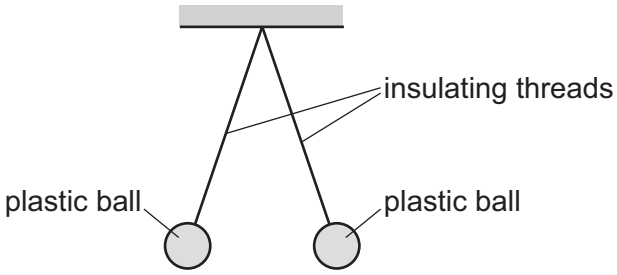
32 Which row compares the frequency of X-rays with the frequency of visible light and states a use of X-rays?

	frequency of X-rays	use
A	greater than visible light	satellite television
B	greater than visible light	security scanner
C	smaller than visible light	satellite television
D	smaller than visible light	security scanner

33 Which metal is used to make a permanent magnet and which metal is used to make the core of an electromagnet?

	permanent magnet	core of electromagnet
A	iron	iron
B	iron	steel
C	steel	iron
D	steel	steel

34 The diagram shows two light plastic balls suspended by insulating threads from a support.



Which statement explains why the plastic balls hang apart from each other?

A The balls have like charges.

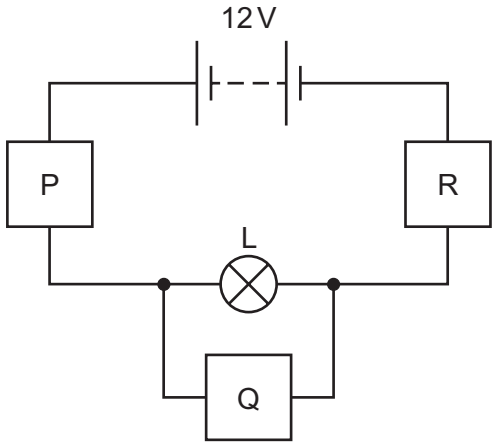
B One ball is charged and the other ball is uncharged.

C The balls have unlike charges.

D Both balls are uncharged.

35 The diagram shows a circuit used to find how the resistance of lamp L varies with current.

Blocks P, Q and R represent the different components used.

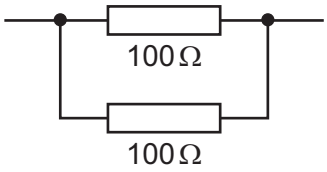


Which row shows a possible choice of components to use for P, Q and R?

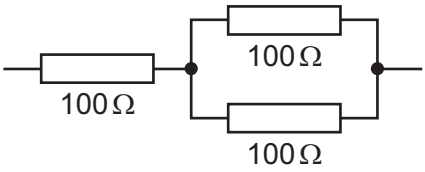
	P	Q	R
A	ammeter	variable resistor	voltmeter
B	variable resistor	voltmeter	ammeter
C	voltmeter	ammeter	variable resistor
D	voltmeter	variable resistor	ammeter

36 Which combination of resistors has a total resistance of less than 100 Ω?

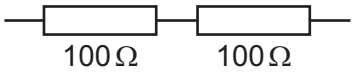
A



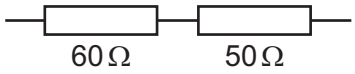
B



C



D



37 An electrical appliance has a metal case.

Why is the metal case earthed?

A to complete the circuit so that the appliance works

B to make sure the case is connected to the live supply

C to protect the user from electric shock

D to reduce electrical power loss

38 Two atoms are atoms of different isotopes of the same element.

Which statement is correct?

A The atoms contain the same number of neutrons and the same number of protons.

B The atoms contain the same number of neutrons but a different number of protons.

C The atoms contain the same number of nucleons but a different number of protons.

D The atoms contain the same number of protons but a different number of neutrons.

39 A beta (β)-particle is one type of emission from a radioactive substance.

What is the nature of a beta-particle and from which part of the atom is it emitted?

	nature of beta-particle	where it is emitted from
A	fast-moving electron	nucleus of atom
B	fast-moving electron	outer shell of atom
C	helium nucleus	nucleus of atom
D	helium nucleus	outer shell of atom

40 A scientist measures the radiation emitted from a radioactive material at the same time every day for 4 days.

The results are shown but the reading for day 2 is missing.

day	number of emissions per minute
1	2000
2	missing reading
3	500
4	250

What is the most likely reading for day 2?

A 750 emissions per minute

B 1000 emissions per minute

C 1500 emissions per minute

D 1750 emissions per minute

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 –	113 Nh nihonium –	114 Fl flerovium –	115 Mc moscovium –	116 Lv livermorium –	117 Ts tennessine –	118 Og oganesson –

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.).