Cambridge IGCSE

Cambridge International Examinations
Cambridge International General Certificate of Secondary Education

0123456789

PHYSICAL SCIENCE **0652/02**

Paper 2 Multiple Choice (Extended) **For Examination from 2019**

SPECIMEN PAPER

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.

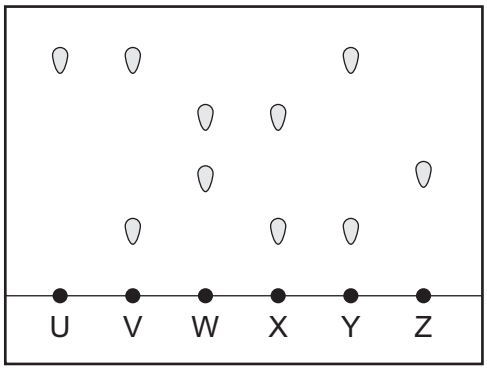
Each correct answer will score one mark. A mark will not be deducted for a wrong answer.
Any rough working should be done in this booklet.
A copy of the Periodic Table is printed on page 18.
Electronic calculators may be used.

This document consists of **17** printed pages and **1** blank page.

CAMBRIDGE International Examinations

[Turn over

1 The diagram shows the results of a chromatography experiment.



Which two substances are pure?

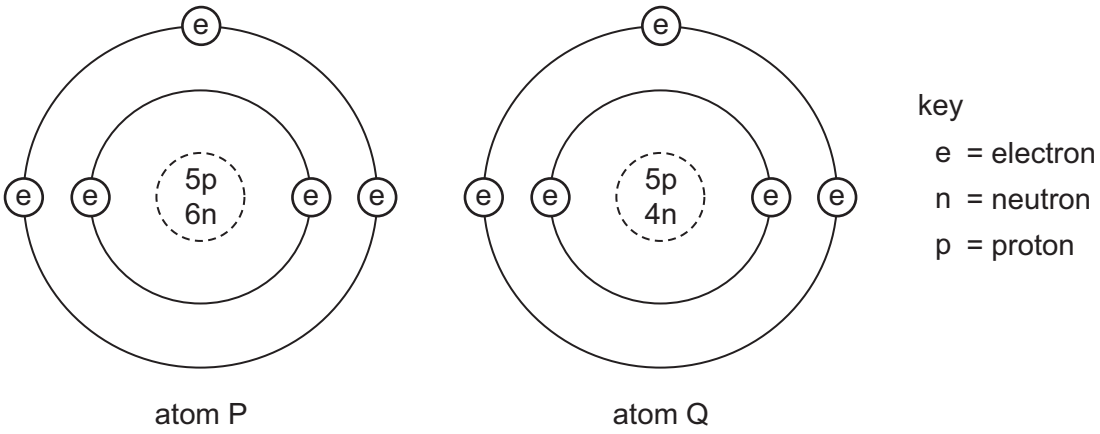
A U and X

B U and Z

C V and Y

D V and W

2 The diagrams show two different atoms.



atom P atom Q

Which statement is **not** correct?

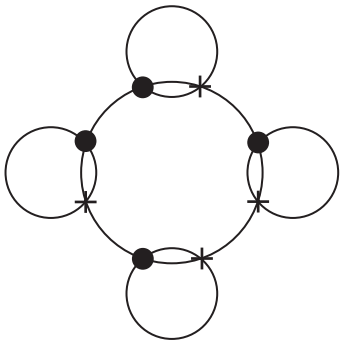
A Atoms P and Q are isotopes of the same element.

B Atom P has the electronic configuration 2,3.

C Atom Q is boron.

D The nucleon number of atom P is 9.

3 The diagram shows the bonding electrons in a covalent molecule.



Which molecule is shown?

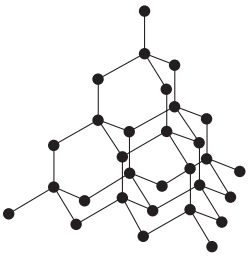
A chlorine

B hydrogen chloride

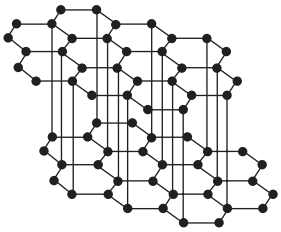
C methane

D water

4 The structures of two different forms of carbon are shown.



diamond



graphite

Which statement is correct?

A Diamond does not conduct electricity because its atoms are unable to move.

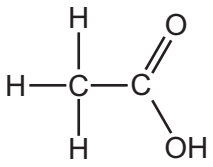
B Diamond has a high melting point because of strong ionic bonds between its atoms.

C Graphite conducts electricity because some electrons are free to move.

D Graphite has a low melting point because of weak bonds between the layers.

[Turn over

5 The diagram shows the structure of ethanoic acid.



What is the formula of ethanoic acid?

A CHO

B $C_2H_4O_2$

C CH_3CO_2

D $C_2H_3O_2$

6 10 cm^3 of propene, C_3H_6, are reacted with 60 cm^3 of oxygen.

The equation for the reaction is

$$2C_3H_6(g) + 9O_2(g) \rightarrow 6CO_2(g) + 6H_2O(l)$$

What is the total volume of gas remaining at the end of the reaction?
All volumes are measured at room temperature and pressure.

A 30 cm^3

B 45 cm^3

C 60 cm^3

D 75 cm^3

7 500 cm^3 of a solution contains 2.8 g of potassium hydroxide, KOH.

What is the concentration of potassium hydroxide in this solution?

A 0.025 mol / dm^3

B 0.05 mol / dm^3

C 0.10 mol / dm^3

D 0.25 mol / dm^3

8 What is the effect of reducing the temperature on the particles in a chemical reaction?

A They collide less frequently and more particles reach the activation energy.

B They collide more frequently and more particles reach the activation energy.

C They collide less frequently and fewer particles reach the activation energy.

D They collide more frequently and fewer particles reach the activation energy.

9 Zinc reacts with steam to form zinc oxide and hydrogen.

$$Zn + H_2O \rightarrow ZnO + H_2$$

During the reaction, which substance is oxidised?

A hydrogen

B water

C zinc

D zinc oxide

10 Ammonia is a base.

What is a base?

A an electron acceptor

B an electron donor

C a proton acceptor

D a proton donor

11 Reactions of three different oxides X, Y and Z are described.

X reacts with both hydrochloric acid and sodium hydroxide.

Y does not react with either hydrochloric acid or sodium hydroxide.

Z does not react with hydrochloric acid but does react with sodium hydroxide.

Which row describes the three oxides?

	acidic	amphoteric	neutral
A	X	Z	Y
B	Y	X	Z
C	Z	X	Y
D	Z	Y	X

12 Which gas turns damp red litmus paper blue?

A ammonia

B chlorine

C hydrogen

D sulfur dioxide

13 An atom of a Group VI element contains 16 electrons.

How many electrons are in the outer shell of this atom?

A 2

B 6

C 8

D 16

14 Element Y is a transition element.

Which row in the table describes element Y?

	forms coloured compounds	high density
A	yes	yes
B	no	no
C	no	yes
D	yes	no

15 The structure of pure iron is described as a lattice of positive ions in a 'sea of electrons'.

Which statements about pure iron are correct?

1 Iron conducts electricity because electrons are free to move.

2 Iron has a high melting point due to strong covalent bonds.

3 Iron is an alloy.

4 Iron is malleable because the layers of atoms can slide over each other.

A 1 only

B 1 and 3

C 1 and 4

D 2, 3 and 4

16 Which of the following reactions occur in the blast furnace?

1 $CaCO_3 + 2HCl \rightarrow CaCl_2 + CO_2 + H_2O$

2 $CaO + SiO_2 \rightarrow CaSiO_3$

3 $CO_2 + C \rightarrow 2CO$

4 $Fe_2O_3 + 3H_2 \rightarrow 2Fe + 3H_2O$

A 1 and 2

B 1 and 3

C 2 and 3

D 2 and 4

17 Nitrogen oxides and carbon monoxide are produced in a car engine when petrol is burned.

The exhaust gases from the engine pass through a catalytic converter. The following reaction takes place.

$$2NO + 2CO \rightarrow N_2 + 2CO_2$$

Which statement is **not** correct?

A Carbon monoxide is oxidised by the nitrogen oxides.

B Carbon monoxide is produced by the complete combustion of petrol.

C Nitrogen oxides are formed when nitrogen burns in oxygen.

D Nitrogen oxides are reduced in the catalytic converter.

18 Which row in the table shows the correct uses of the fractions obtained from petroleum?

	petrol	refinery gases	naphtha
A	fuel for cars	fuel for cooking	making chemicals
B	fuel for cars	fuel for diesel engines	fuel for cooking
C	fuel for diesel engines	fuel for cooking	making chemicals
D	fuel for diesel engines	fuel for cars	fuel for cooking

19 The word equation shows a reaction of ethene.

$$\text{ethene} + \text{substance X} \xrightarrow{\text{catalyst}} \text{ethane}$$

Which type of reaction occurs and what is X?

	type of reaction	X
A	addition	hydrogen
B	addition	steam
C	oxidation	hydrogen
D	oxidation	steam

20 Ethanol is produced by the fermentation of glucose.

Which statement about fermentation is **not** correct?

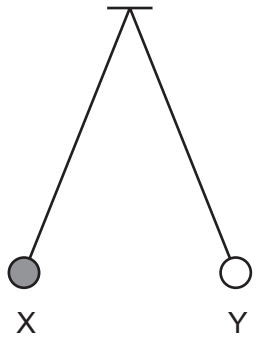
A Carbon dioxide is produced in the reaction.

B Ethanol is produced in the absence of oxygen.

C The reaction only takes place between 50 °C and 60 °C.

D Yeast provides the catalyst for the reaction.

21 A pendulum swings between point X and point Y.



A student wishes to measure the period of the pendulum.

Which method produces the most accurate value for the period?

A measure the time for the pendulum to move from X to Y once

B measure the time for the pendulum to move from X to Y ten times and divide this time by ten

C measure the time for the pendulum to move from X to Y and back to X once

D measure the time for the pendulum to move from X to Y and back to X ten times and divide this time by ten

22 What quantity does the area under a speed-time graph represent?

A acceleration

B average velocity

C distance travelled

D initial velocity

23 An astronaut in an orbiting spacecraft experiences a force due to gravity. This force is less than when she is on the Earth's surface.

Compared with being on the Earth's surface, how do her mass and her weight change, if at all, when she is in orbit?

	mass in orbit	weight in orbit
A	decreased	decreased
B	decreased	unchanged
C	unchanged	decreased
D	unchanged	unchanged

24 An experiment is carried out to measure the extension of a rubber band for different loads.

The results are shown below.

load / N	0	1.0	2.0	3.0
length / cm	15.2	16.2		18.6
extension / cm	0	1.0	2.1	3.4

Which figure is missing from the table?

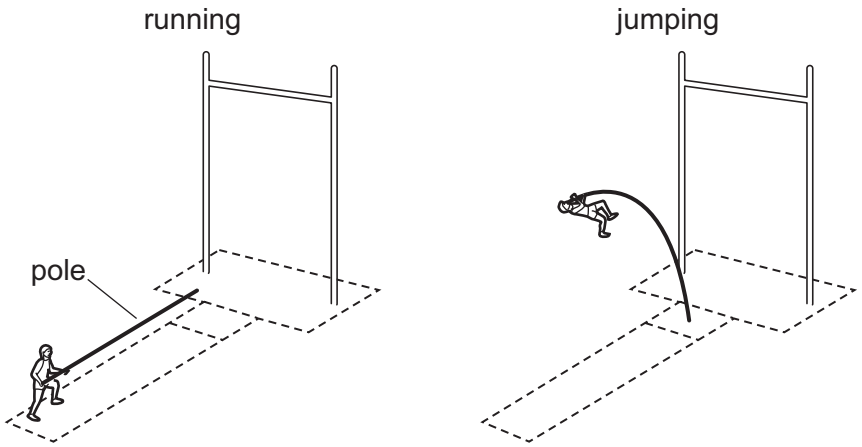
A 17.2

B 17.3

C 17.4

D 18.3

25 A pole-vaulter runs up to a jump with his pole straight. He puts one end of the pole down on the ground and the pole bends as he jumps.



Which form of energy is stored in the pole because it is bent?

A chemical

B elastic (strain)

C gravitational potential

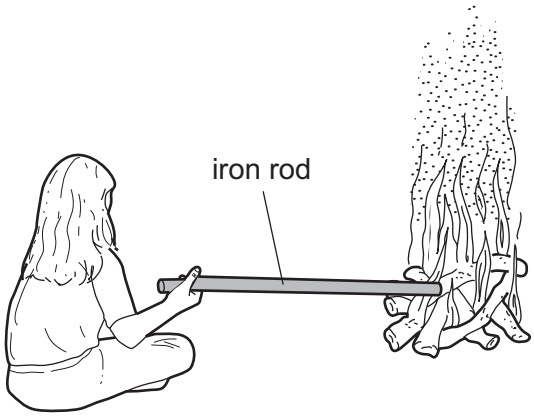
D motion

26 Two different temperatures are measured. One temperature is constant, and very high (approximately 600 °C). The second temperature varies rapidly, and is approximately 60 °C.

Which row in the table shows a thermometer suitable for measuring each temperature?

	constant and very high temperature (approximately 600 °C)	rapidly varying temperature (approximately 60 °C)
A	liquid-in-glass	liquid-in-glass
B	liquid-in-glass	thermocouple
C	thermocouple	liquid-in-glass
D	thermocouple	thermocouple

27 A girl sits by a camp fire. She holds an iron rod with one end in the fire.



Heat from the fire reaches her hand.

How does heat from the fire reach her hand?

A conduction, convection and radiation

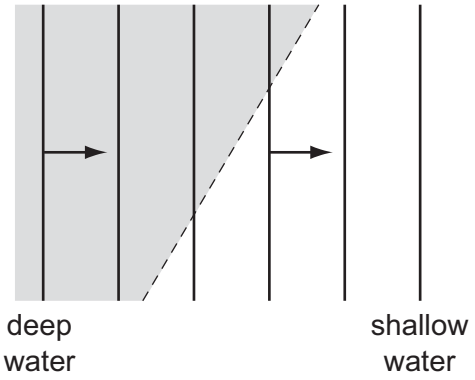
B conduction and convection

C conduction and radiation

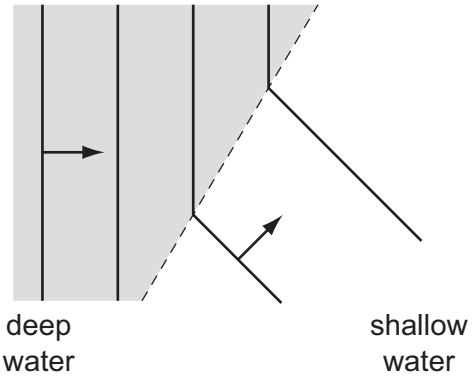
D convection and radiation

28 Which diagram shows what happens to water waves when they pass from deep to shallow water?

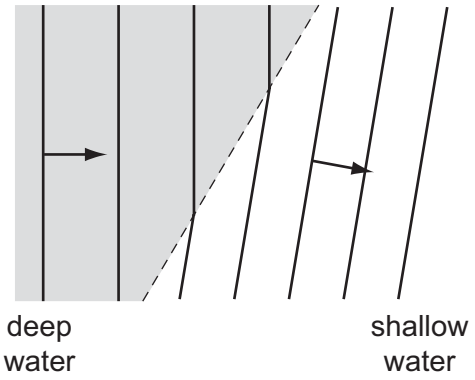
A



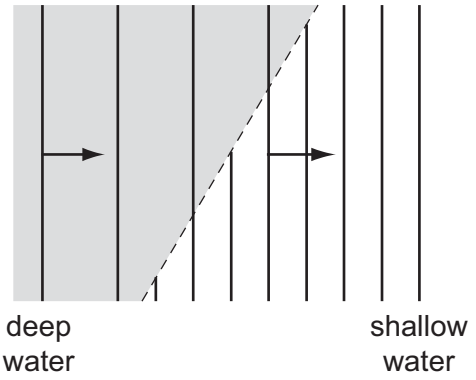
B



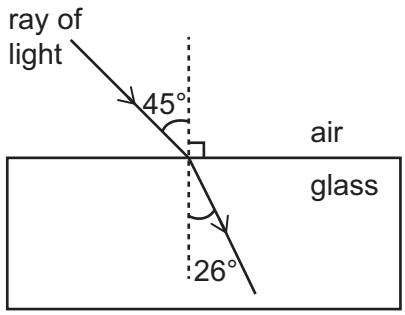
C



D



29 The diagram shows a ray of light passing from air into a glass block. The values of two angles are shown.



What is the refractive index *n* of the glass?

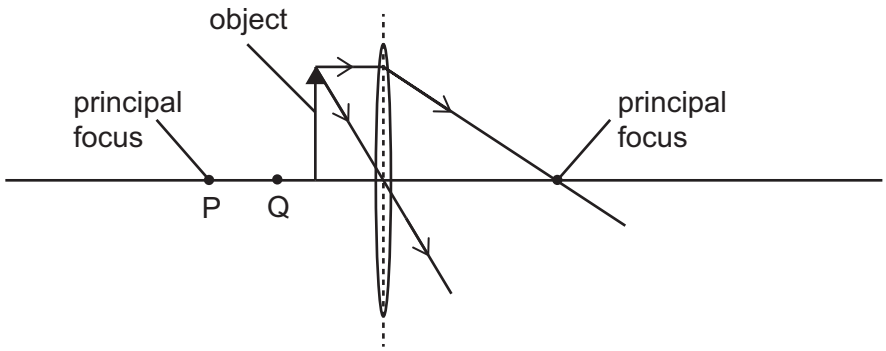
A 0.58

B 0.62

C 1.61

D 1.73

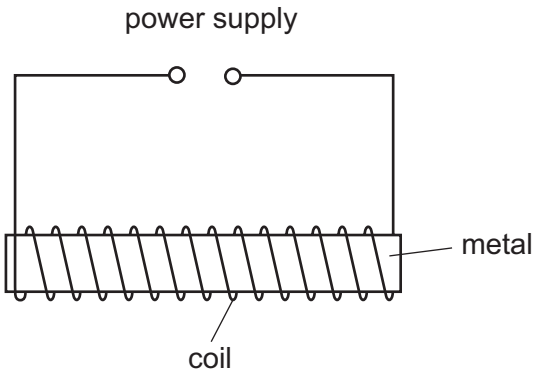
30 The diagram shows the paths of two rays of light from the top of an object. The rays pass through a converging lens. The principal focuses of the lens are labelled.



At which point, P or Q, is an image formed, and is the image real or virtual?

	position of image	real or virtual image?
A	P	real
B	P	virtual
C	Q	real
D	Q	virtual

31 The diagram shows apparatus that is used to make a permanent magnet.



Which metal and which power supply are normally used to make a permanent magnet?

	metal	power supply
A	iron	a.c.
B	iron	d.c.
C	steel	a.c.
D	steel	d.c.

32 An electrical quantity is defined as the energy supplied by a source in driving a unit charge around a complete circuit.

What is this electrical quantity?

A current

B e.m.f.

C p.d.

D power

33 A metal wire of length l and cross-sectional area A has resistance R.

What is the resistance of a wire of the same material, which has length $2l$ and cross-sectional area $2A$?

A $0.5R$

B R

C $2R$

D $4R$

34 Two resistors of $3.0\,\Omega$ and $6.0\,\Omega$ are connected in parallel.

What is their effective resistance?

A $2.0\,\Omega$

B $3.0\,\Omega$

C $6.0\,\Omega$

D $9.0\,\Omega$

35 Domestic appliances use electricity in a variety of ways.

Which electrical appliance includes both an electric motor and a heater?

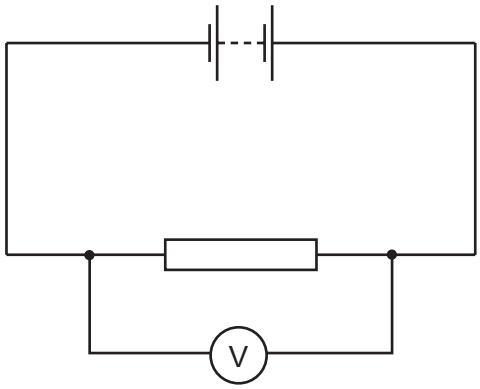
A hairdryer

B iron

C kettle

D vacuum cleaner

36 In the circuit shown, the current in the resistor is 4.0A and the voltmeter reads 6.0V.



How much energy is transferred by the resistor in 2.0 minutes?

A 0.20J

B 12J

C 48J

D 2880J

37 Which device uses slip rings?

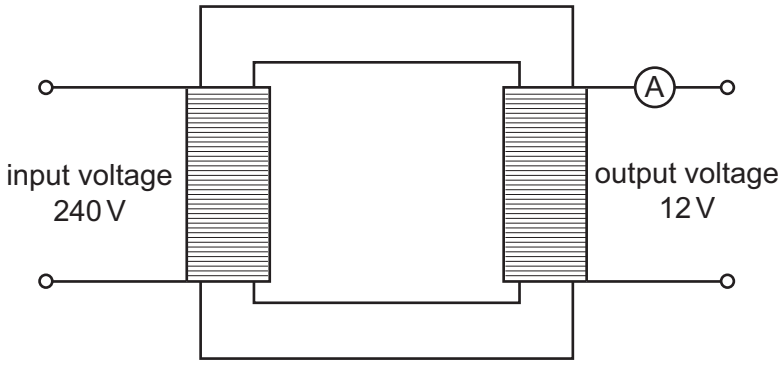
A a d.c. motor

B a thermacouple

C a transformer

D an a.c. generator

38 A transformer has an input voltage of 240V and an output voltage of 12V. The transformer is 100% efficient. An ammeter connected to the secondary coil shows a reading of 5.0A.



What is the current in the primary coil?

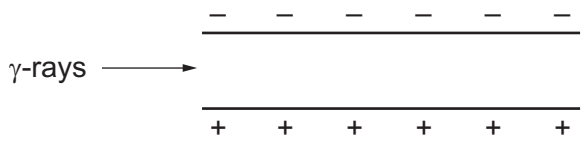
A 0.25A

B 5.0A

C 60A

D 100A

39 A beam of γ-rays passes between two charged metal plates as shown in the diagram.



How do the γ-rays pass between the two charged plates?

A The rays are deflected in a direction perpendicular to the page.

B The rays are deflected towards the negative plate.

C The rays are deflected towards the positive plate.

D The rays continue in the same direction.

40 A powder contains 400 mg of a radioactive isotope.

The half-life of the isotope is 5 days.

What mass of this isotope remains after 10 days?

A 0 mg

B 40 mg

C 100 mg

D 200 mg

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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.).