



PHYSICAL SCIENCE

0652/12

Paper 1 Multiple Choice (Core)

October/November 2019

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.

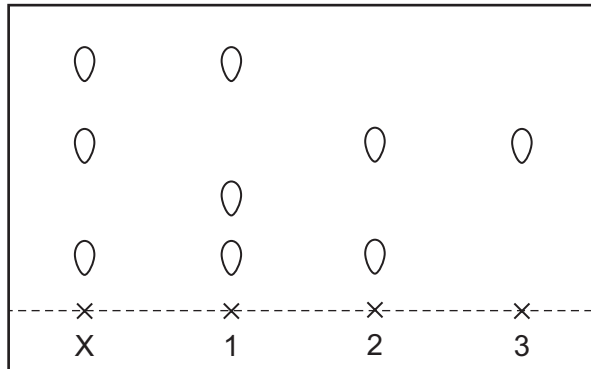
Electronic calculators may be used.

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

1 Which statement about a liquid at 60 °C is **not** correct?

- A It has a fixed volume.
- B It takes the shape of the container.
- C Its particles are far apart.
- D Its particles have enough energy to move around.

2 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.
- 3 When sodium reacts with water, hydrogen gas is released and aqueous sodium hydroxide is formed.

The aqueous sodium hydroxide is a1..... .

The sodium hydroxide is the2..... and water is the3..... .

Which words complete gaps 1, 2 and 3?

	1	2	3
A	solute	solution	solvent
B	solute	solvent	solution
C	solution	solute	solvent
D	solution	solvent	solute

4 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

5 X is a compound that contains the elements potassium, manganese and oxygen.

X has twice as many potassium atoms as manganese atoms, and twice as many oxygen atoms as potassium atoms.

What is the formula of X?

- A** KMnO_2 **B** K_2MnO_2 **C** K_2MnO_4 **D** KMn_2O_4

6 A student dissolves a sample of ammonium nitrate in water.

The student measures the temperature of the mixture before and after the reaction.

The results are shown.

	°C
temperature before	21
temperature after	17

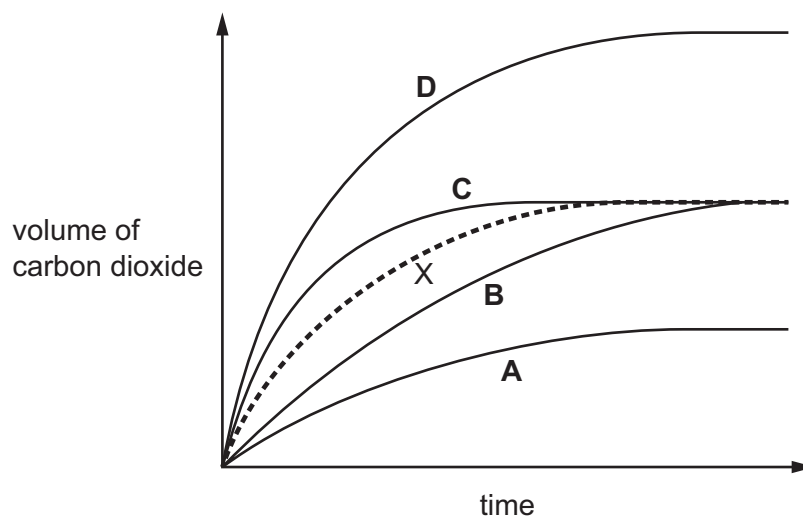
Which process describes the reaction?

- A** combustion
B endothermic
C exothermic
D reduction

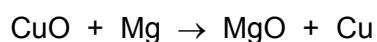
- 7 When hydrochloric acid is added to calcium carbonate, carbon dioxide is given off.

The volume of carbon dioxide given off is plotted against time and is represented by the dashed line X on the graph.

Which solid line on the graph shows the results obtained when the temperature of the mixture is increased and all other factors remain the same?



- 8 The equation for the reaction of magnesium with copper(II) oxide is shown.



Which statement is correct?

- A Copper(II) oxide is oxidised.
 - B Copper(II) oxide is reduced.
 - C Magnesium oxide is oxidised.
 - D Magnesium oxide is reduced.
- 9 Which oxide is acidic?
- A calcium oxide
 - B copper oxide
 - C magnesium oxide
 - D sulfur oxide

10 Which gas turns damp red litmus paper blue?

- A ammonia
- B carbon dioxide
- C chlorine
- D hydrogen

11 Part of the Periodic Table is shown. The letters are not the usual chemical symbols of the elements.

		X															Y		
W																			Z

Which pair of elements are metals?

- A W and X
- B W and Z
- C X and Y
- D Y and Z

12 A soft solid element fizzes gently when placed in water.

The gas given off is tested with a lighted splint and a pop sound is heard.

The element has the highest melting point in its group.

Where is the element found in the Periodic Table?

- A bottom of Group 1
- B bottom of Group 7
- C in the transition elements
- D top of Group 1

13 Some properties of elements are listed.

- 1 poor conductors of heat
- 2 form acidic oxides
- 3 good conductors of electricity
- 4 high melting points

Which properties are shown by a typical metal?

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

14 Some reactions of four metals W, X, Y and Z and their oxides are shown.

The letters are not the chemical symbols of the metals.

metal	reaction of metal with dilute hydrochloric acid	reaction of metal oxide with carbon
W	reacts	not readily reduced
X	no reaction	readily reduced
Y	reacts	reduced
Z	fast reaction	not reduced

What is the order of reactivity of these metals?

	most reactive	—————→		least reactive
A	Z	W	Y	X
B	Z	Y	W	X
C	X	W	Y	Z
D	X	Y	W	Z

15 Which substance is used as a chemical test for water?

- A** anhydrous copper(II) sulfate
- B** hydrated cobalt(II) chloride
- C** hydrated copper(II) sulfate
- D** pink cobalt(II) chloride

16 Which two gases are the main components of clean air?

- A** carbon dioxide and oxygen
- B** carbon dioxide and nitrogen
- C** nitrogen and oxygen
- D** oxygen and argon

17 Limestone is heated to make 'lime' (calcium oxide). The equation is shown.



Which type of reaction takes place?

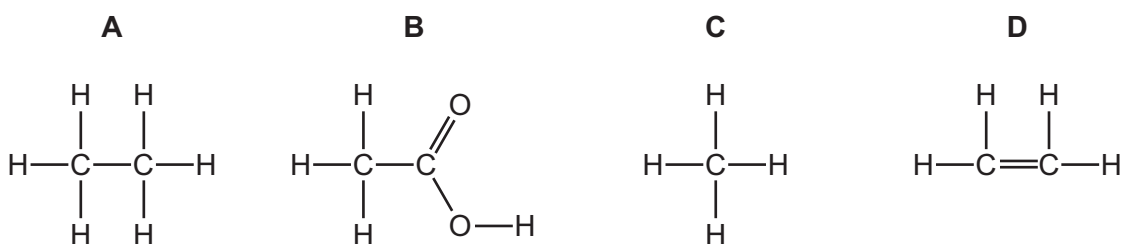
- A combustion
- B fractional distillation
- C reduction
- D thermal decomposition

18 Which statements about the alkanes are correct?

- 1 They are generally unreactive except in terms of burning.
- 2 They burn in air to produce carbon dioxide and water.
- 3 They contain carbon to carbon double bonds.
- 4 They decolourise bromine water.

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

19 Which structure represents an unsaturated hydrocarbon?



20 Ethanol is an alcohol with the formula $\text{C}_2\text{H}_5\text{OH}$.

It is used as a solvent in the manufacture of varnishes and perfumes.

What is another use of ethanol?

- A as a fuel
- B as the monomer unit in the formation of poly(ethene)
- C manufacture of natural gas
- D neutralising acidic soil

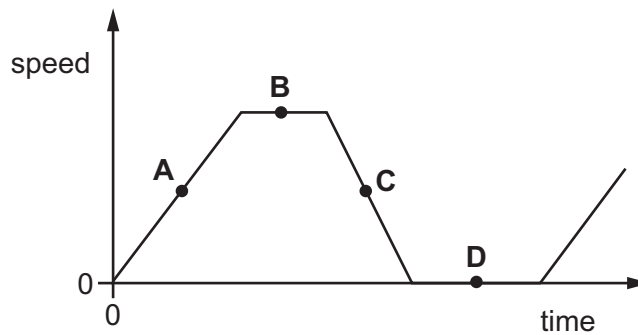
- 21 The diagram shows a stopwatch after it has been used to time 20 swings of a pendulum.



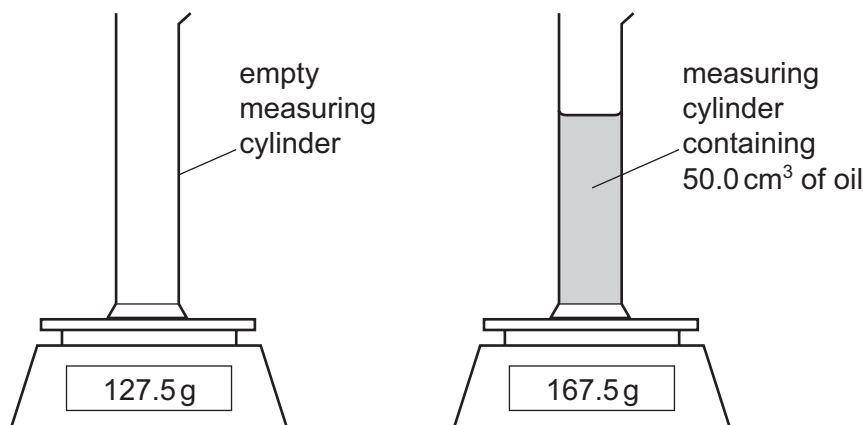
What is the period of the pendulum?

- A 0.82 s B 16.40 s C 82 s D 1640 s
- 22 The diagram shows a speed-time graph for a bus.

At which labelled point is the bus moving with constant speed?



- 23 The diagram shows an experiment to determine the density of oil. The readings on the balance and the volume of the oil are shown.



What is the density of the oil?

- A 0.30 g/cm^3 B 0.80 g/cm^3 C 1.25 g/cm^3 D 3.35 g/cm^3

24 Three properties of a body are its mass, its shape and its size.

Which row correctly shows whether these properties can be changed by a force?

	mass	shape	size
A	✓	✓	✓
B	✓	✓	x
C	✓	x	✓
D	x	✓	✓

key

✓ = can be changed

x = cannot be changed

25 The table gives the weights of four students and the time each student takes to run up the same hill.

Which student produces the least power by running up the hill?

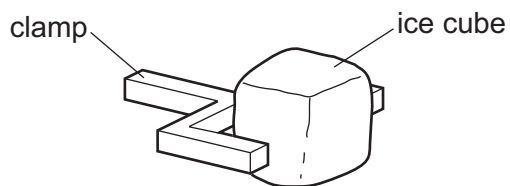
	weight of student / N	time taken to run up hill / s
A	440	11
B	500	10
C	550	11
D	600	10

26 A fixed mass of gas is cooled at constant pressure.

How do the speed of the particles and the volume of the gas change?

	speed of particles	volume of gas
A	decreases	decreases
B	decreases	increases
C	increases	decreases
D	increases	increases

- 27 An ice cube is held in a clamp. The air next to the ice cube becomes very cold.



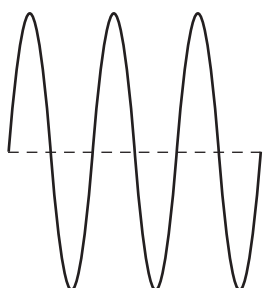
What happens to the density of the air as the air becomes colder and in which direction does the cold air move?

	density change of the air	direction the air moves
A	decreases	downwards
B	decreases	upwards
C	increases	downwards
D	increases	upwards

- 28 The diagrams represent water waves in a deep pond. The diagrams are all drawn to the same scale and the waves are all moving with the same speed.

Which diagram shows the wave with the highest frequency?

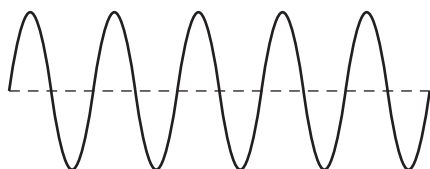
A



B



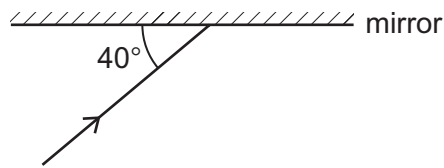
C



D

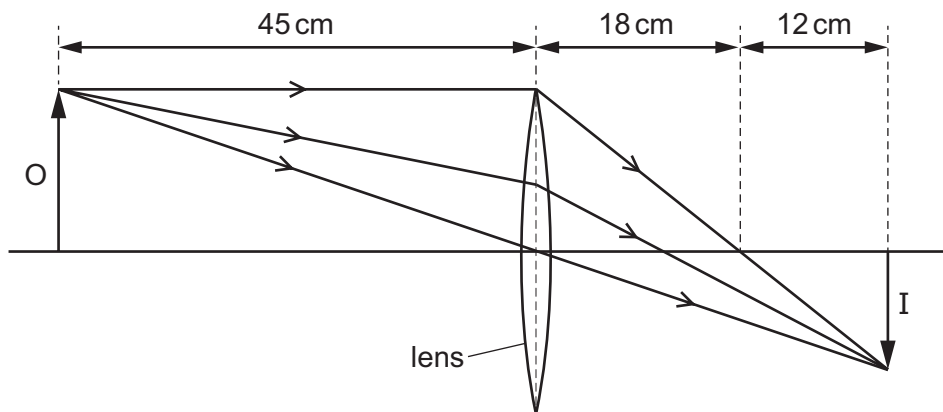


- 29 The diagram shows a ray of light incident on a plane mirror.



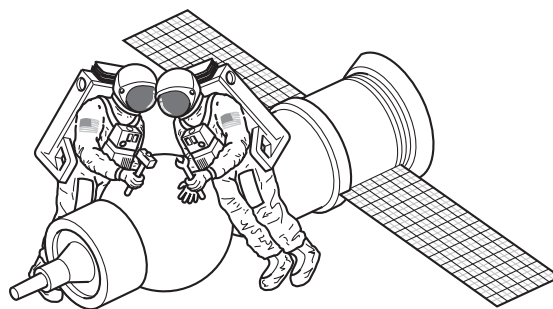
What is the angle of reflection?

- A 40° B 50° C 80° D 100°
- 30 The diagram shows light from an object O passing through a converging lens to form an image I.



What is the focal length of the lens?

- A 18 cm B 30 cm C 45 cm D 75 cm
- 31 Two astronauts without radios can only communicate in space if their helmets are touching. There is no air in space.



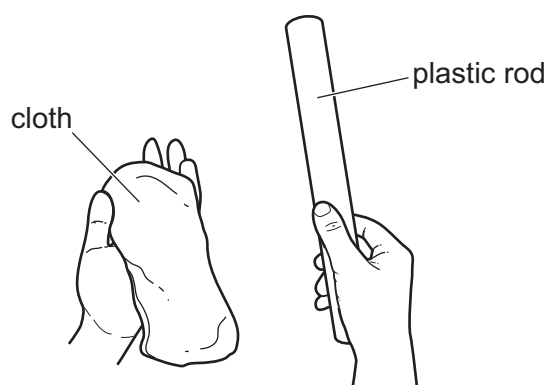
What does this show about sound?

- A It can travel through a solid and a vacuum.
 B It can travel through a solid but cannot travel through a vacuum.
 C It cannot travel through a solid but can travel through a vacuum.
 D It cannot travel through either a solid or a vacuum.

32 Which type of electromagnetic radiation is used for satellite television and which type is used by television remote controllers?

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

33 A student holds a plastic rod and a cloth.



The student rubs the rod with the cloth. The rod and the cloth both become charged as particles are transferred from one to the other.

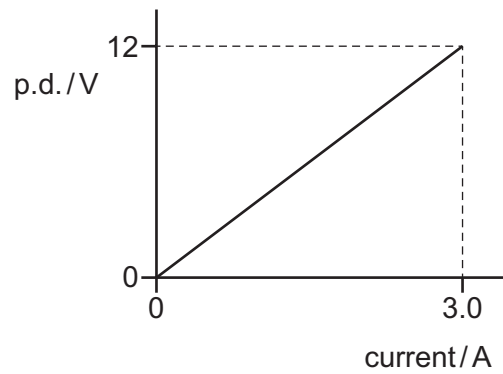
Which row compares the type of charge on the cloth with the type of charge on the rod and gives the name of the particles transferred?

	type of charge on cloth compared to charge on rod	particles that have been transferred
A	opposite	electrons
B	opposite	protons
C	the same	electrons
D	the same	protons

34 What is the unit of electromotive force?

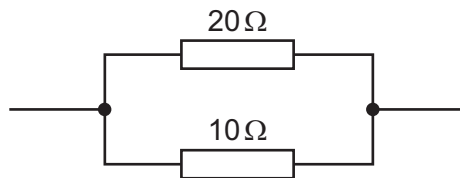
- A** ampere
- B** newton
- C** volt
- D** watt

- 35 The graph shows how the current in a resistor varies with different values of potential difference (p.d.) across it.



What is the resistance of the resistor?

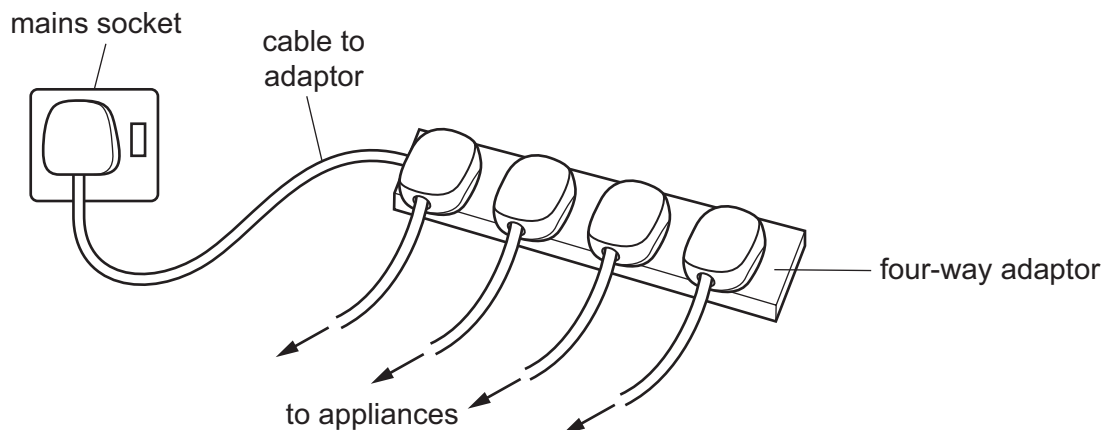
- A** $0.25\ \Omega$ **B** $4.0\ \Omega$ **C** $9.0\ \Omega$ **D** $36\ \Omega$
- 36 A $20\ \Omega$ resistor and a $10\ \Omega$ resistor are connected in parallel.



What is their combined resistance?

- A** less than $10\ \Omega$
B $10\ \Omega$
C $20\ \Omega$
D more than $20\ \Omega$

- 37 Four electrical appliances are connected to a single mains socket using a four-way adaptor.



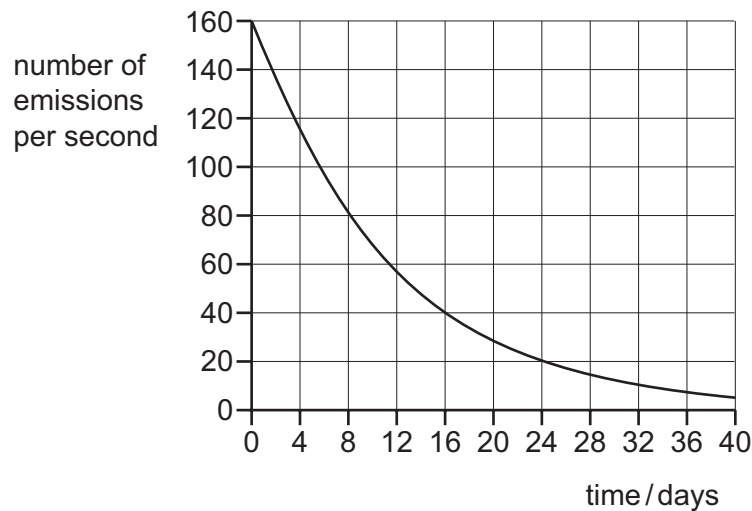
What is a possible danger caused by this arrangement?

- A** a fuse in an appliance overheats
B an appliance overheats
C the cable to an appliance overheats
D the cable to the adaptor overheats
- 38 A current-carrying conductor experiences a force when placed in a magnetic field. Two changes are made to the coil but the direction of the force does **not** change. Which two changes are made?
- A** The current is increased and the direction of the magnetic field is reversed.
B The current is reversed and the strength of the magnetic field is decreased.
C The current is reversed and the strength of the magnetic field is increased.
D The current is reversed and the direction of the magnetic field is reversed.
- 39 A nuclide of oxygen is represented by the symbol $^{17}_8\text{O}$.

In a neutral atom of $^{17}_8\text{O}$, how many electrons, neutrons and protons are there?

	electrons	neutrons	protons
A	8	9	8
B	8	17	8
C	8	17	9
D	9	8	9

- 40 The graph shows how the number of emissions per second from a radioactive source changes with time.



What is the number of emissions per second of the source four half-lives after the starting time of the graph?

- A 0 emissions per second
- B 10 emissions per second
- C 20 emissions per second
- D 40 emissions per second

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The Periodic Table of Elements

		Group															
I	II	III	IV	V	VI	VII	VIII										
3 Li lithium 7	4 Be beryllium 9	<div style="border: 1px solid black; padding: 5px; width: fit-content; margin: auto;"> Key atomic number atomic symbol name relative atomic mass </div>										2 He helium 4					
11 Na sodium 23	12 Mg magnesium 24											5 B boron 11	6 C carbon 12	7 N nitrogen 14	8 O oxygen 16	9 F fluorine 19	10 Ne neon 20
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	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 dm³ at room temperature and pressure (r.t.p.).