



PHYSICAL SCIENCE

0652/11

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 Carbon dioxide is a solid at temperatures below $-78\text{ }^{\circ}\text{C}$.

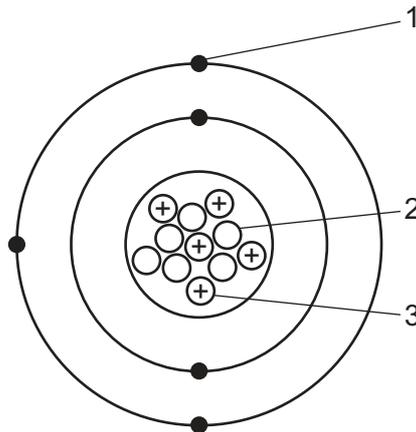
What is **not** a property of solid carbon dioxide?

- A It has a fixed shape.
- B It is incompressible.
- C Its particles are very close together.
- D Its particles slide past each other.

2 Which process is used to separate the components of petroleum?

- A chromatography
- B crystallisation
- C filtration
- D fractional distillation

3 The atomic structure of an atom of boron is shown.



What do the labels on the diagram represent?

	1	2	3
A	electron	proton	neutron
B	electron	neutron	proton
C	proton	neutron	electron
D	proton	nucleus	electron

4 Which row describes properties of a simple covalent compound?

	electrical conductivity	volatility
A	good	high
B	good	low
C	poor	high
D	poor	low

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 Hydrochloric acid is added to aqueous sodium hydroxide.

The temperature change of the sodium hydroxide solution before and after mixing is measured and shows that thermal energy is given out.

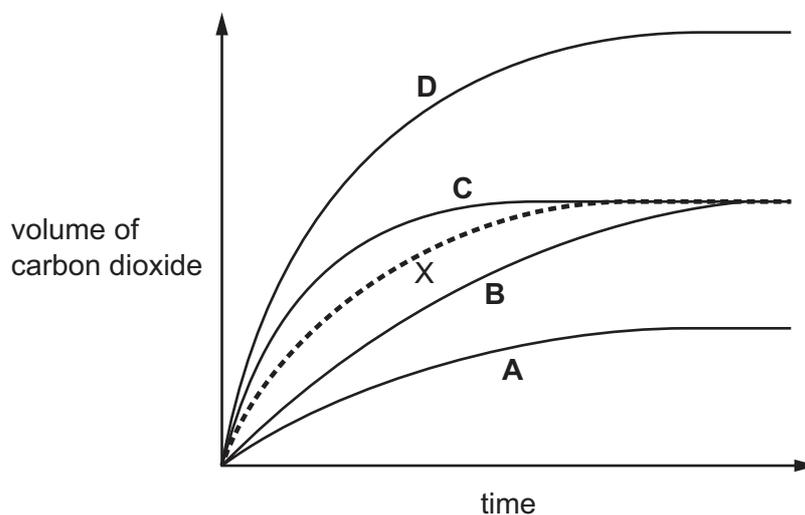
Which row describes the type of reaction and the temperature change of the solution for this reaction?

	type of reaction	temperature change
A	endothermic	decrease
B	endothermic	increase
C	exothermic	decrease
D	exothermic	increase

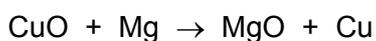
- 7 When hydrochloric acid is added to calcium carbonate, carbon dioxide is given off.

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 statement describes the pH of **all** acids?
- A It is between 1 and 2.
 - B It is between 12 and 13.
 - C It is less than 7.
 - D It is more than 7.

10 Which row describes a test for oxygen and the approximate percentage of oxygen in clean air?

	test for oxygen	approximate percentage of oxygen in clean air
A	glowing splint relights	21
B	glowing splint relights	78
C	lighted splint pops	21
D	lighted splint pops	78

11 The diagram shows the positions of two elements, X and Y, in the Periodic Table.



Which row describes elements X and Y, and their oxides?

	element X	element Y	oxide of X	oxide of Y
A	metal	non-metal	acidic	alkali
B	metal	non-metal	alkali	acidic
C	non-metal	metal	acidic	alkali
D	non-metal	metal	alkali	acidic

12 Why is argon used in lamps?

- A** It conducts electricity better than air.
- B** It forms a chemical compound with the glass.
- C** It is more reactive than air.
- D** It provides an inert atmosphere.

13 Which element is mixed with copper to make brass?

- A** argon
- B** carbon
- C** iodine
- D** zinc

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

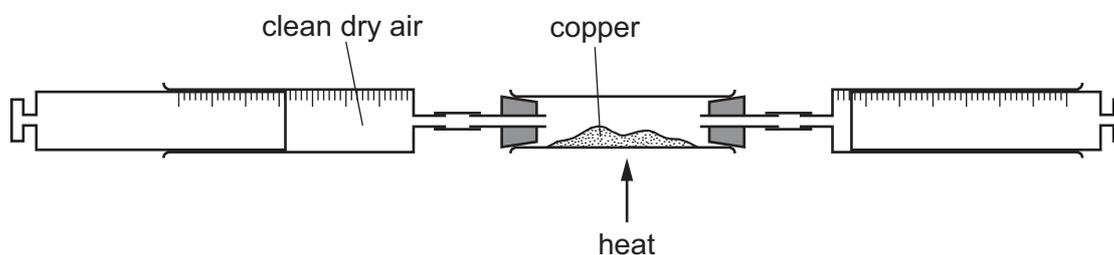
What is the order of reactivity of these metals?

	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 A sample of clean dry air is passed over heated copper until all of the oxygen is removed.



The final volume of the remaining gas is 63 cm^3 .

What is the approximate starting volume of the sample of air?

- A** 50 cm^3
- B** 76 cm^3
- C** 80 cm^3
- D** 286 cm^3

17 Which fuel does **not** produce carbon dioxide during complete combustion?

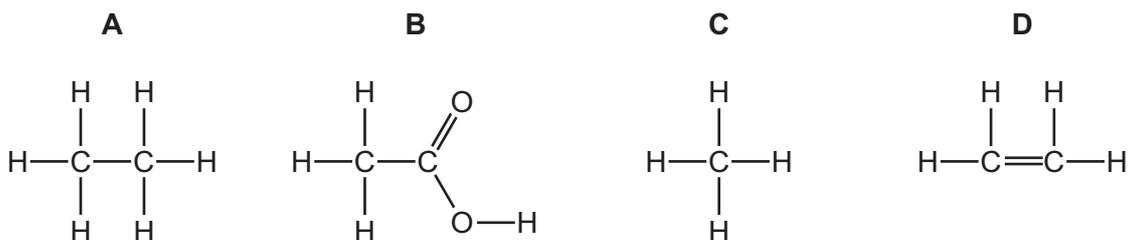
- A coal
- B hydrogen
- C natural gas
- D petroleum

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?



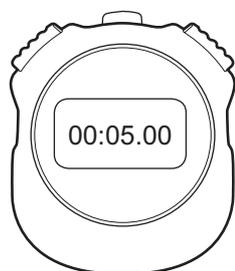
20 Which statement about the uses of ethanol is correct?

- A It is used as a solvent.
- B It is used as a test for unsaturated hydrocarbon.
- C It is used as a monomer in the manufacture of addition polymers.
- D It is used to extinguish fires.

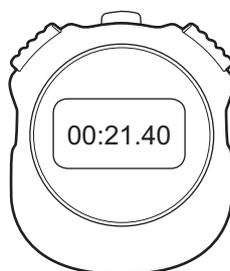
- 21 A student carries out an experiment to determine the period of a simple pendulum.

The student starts counting oscillations when the stopwatch reads 5.00 s and stops the stopwatch at the end of the 20th oscillation.

The diagram shows the stopwatch when the student starts counting oscillations and at the end of 20 oscillations.



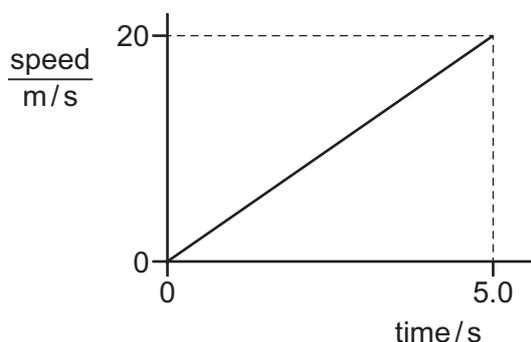
stopwatch when counting starts



stopwatch at the end of 20 oscillations

What is the period of the pendulum?

- A** 0.25 s **B** 0.82 s **C** 1.07 s **D** 1.32 s
- 22 The graph shows how the speed of a car changes with time during the first 5.0 s of a journey.



What is the distance travelled by the car during the 5.0 s?

- A** 0.25 m **B** 4.0 m **C** 50 m **D** 100 m
- 23 The gravitational field strength on the surface of the Earth is 10 N/kg.

A body has a mass of 500 g.

What is the weight of the body on the surface of the Earth?

- A** 0.050 N **B** 5.0 N **C** 50 N **D** 5000 N

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?

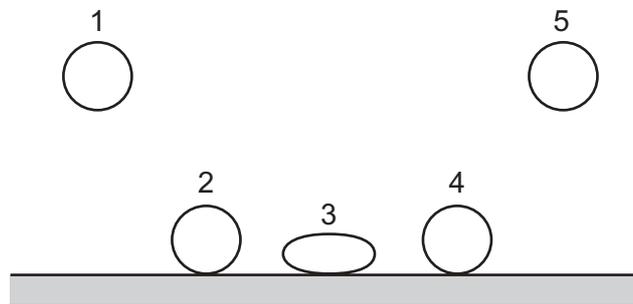
	mass	shape	size
A	✓	✓	✓
B	✓	✓	x
C	✓	x	✓
D	x	✓	✓

key

✓ = can be changed

x = cannot be changed

25 The diagram shows a number of stages of a soft ball bouncing.



Between which two stages does the kinetic energy transfer to elastic (strain) energy?

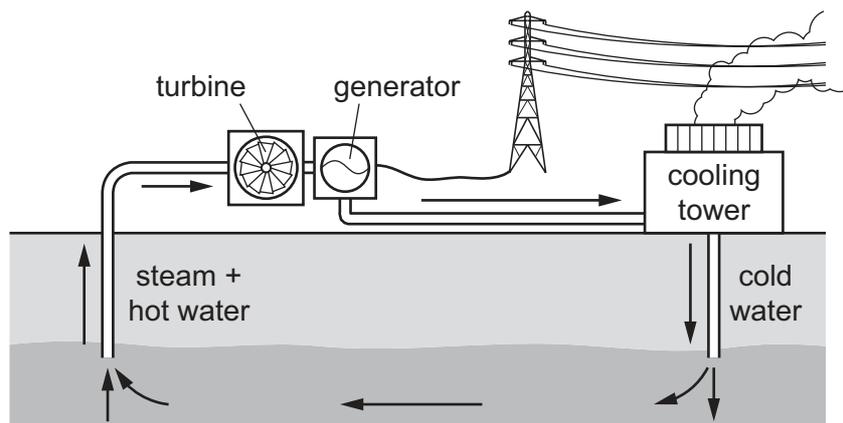
- A** 1 to 2 **B** 2 to 3 **C** 3 to 4 **D** 4 to 5

26 The work done by a force acting on an object depends on the size of the force and...

Which phrase completes the sentence?

- A** the distance moved by the object.
B the mass of the object.
C the shape of the object.
D the time for which the force acts.

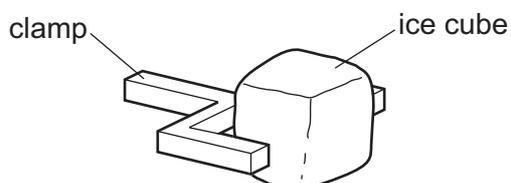
27 The diagram shows a power station used to generate electricity.



What is the source of the energy transferred by the electric current?

- A coal
- B gas
- C hot rocks
- D oil

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



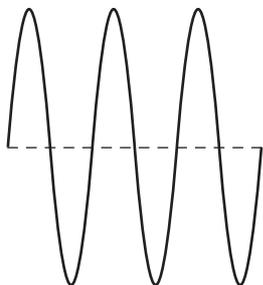
What happens to the density of the air as the air becomes colder and in which direction does the cold air move?

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

- 29 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?

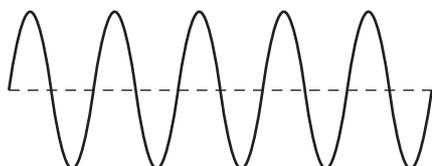
A



B



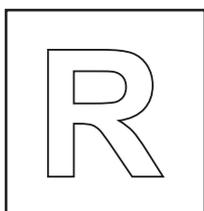
C



D



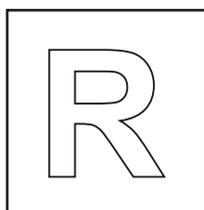
- 30 A large letter R is printed on a sheet of paper, as shown in the diagram.



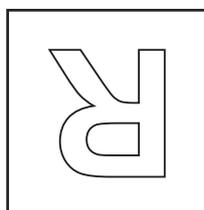
The sheet of paper is held in front of a vertical plane mirror by a student.

How does the image of the sheet of paper appear to the student?

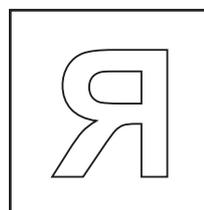
A



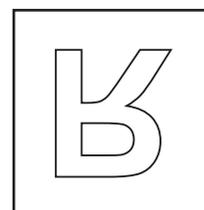
B



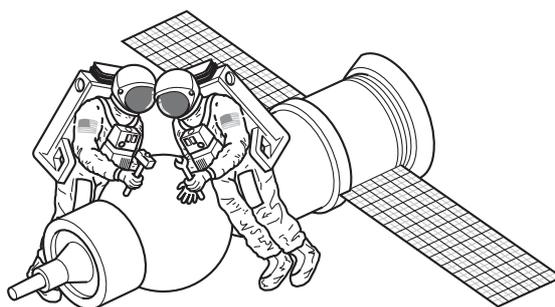
C



D

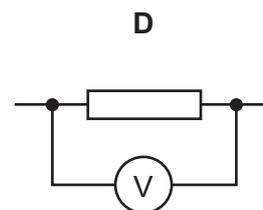
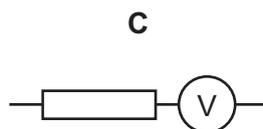
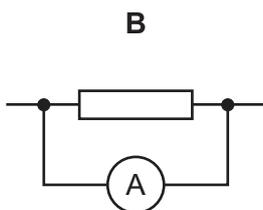
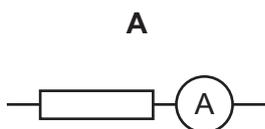


- 31 Two astronauts without radios can only communicate in space if their helmets are touching. There is no air in space.

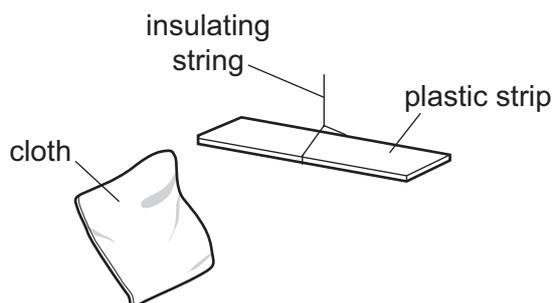


What does this show about sound?

- 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 statement about soft iron is correct?
- A Soft iron is a magnetic material that can be made into a permanent magnet.
 B Soft iron is a magnetic material that is used in the core of an electromagnet.
 C Soft iron is a non-magnetic material that can be made into a permanent magnet.
 D Soft iron is a non-magnetic material that is used in the core of an electromagnet.
- 33 Which diagram shows a meter being used to measure the potential difference across a resistor?



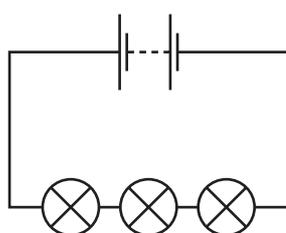
- 34 A plastic strip is suspended by an insulating string and rubbed with a cloth. The same cloth is then brought close to the strip.



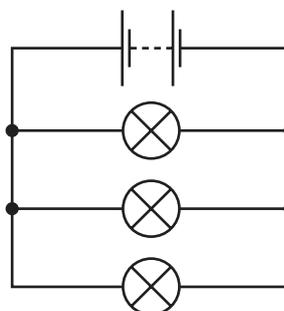
Which row describes and explains what is observed?

	observation	explanation
A	the cloth attracts the plastic strip	the cloth and plastic strip have opposite charges
B	the cloth attracts the plastic strip	the cloth and plastic strip have the same charge
C	the cloth repels the plastic strip	the cloth and plastic strip have opposite charges
D	the cloth repels the plastic strip	the cloth and plastic strip have the same charge

- 35 The diagrams show a series circuit and a parallel circuit. Each battery is identical and all lamps are identical.



series circuit

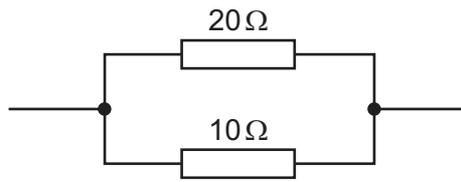


parallel circuit

Which row correctly compares the current in the batteries and the brightness of the lamps in the two circuits?

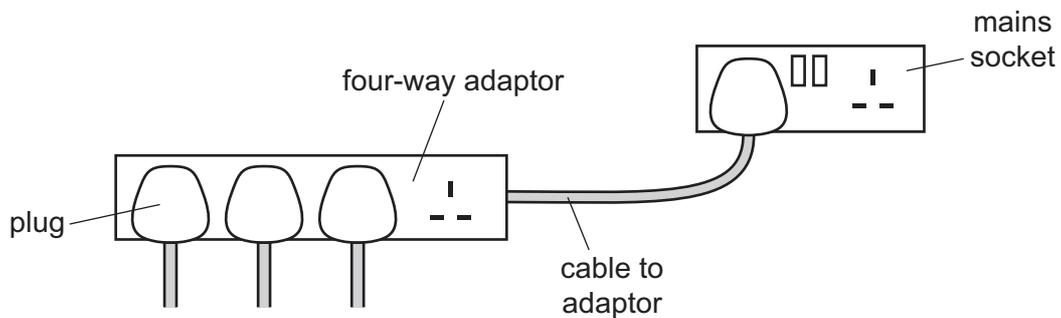
	current in battery	brightness of lamps
A	greater in series circuit	brighter in series circuit
B	greater in series circuit	dimmer in series circuit
C	smaller in series circuit	brighter in series circuit
D	smaller in series circuit	dimmer in series circuit

- 36 A 20Ω resistor and a 10Ω resistor are connected in parallel.



What is their combined resistance?

- A** less than 10Ω
B 10Ω
C 20Ω
D more than 20Ω
- 37 A four-way adaptor is connected by a cable to the mains supply. The cable is protected by a 13A fuse.



Which use of the adaptor causes the fuse protecting the cable to 'blow'?

	number of plugs used	current in plugs
A	1	12 A
B	2	10 A and 10 A
C	3	3 A, 4 A and 5 A
D	4	2 A, 2 A, 3 A and 3 A

38 A current-carrying coil experiences a turning effect when it is placed in a magnetic field.

Which row gives two changes to the coil that each result in a greater turning effect?

	number of turns on the coil	current in the coil
A	decreases	decreases
B	decreases	increases
C	increases	decreases
D	increases	increases

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 A sample initially contains 2400 atoms of a radioactive isotope. After 96 hours, 300 of the radioactive isotope atoms remain.

What is the half-life of the isotope?

- A** 24 hours **B** 32 hours **C** 48 hours **D** 96 hours

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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; text-align: center;"> Key atomic number atomic symbol name relative atomic mass </div>										1 H hydrogen 1					
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.).