

International General Certificate of Secondary Education
CAMBRIDGE INTERNATIONAL EXAMINATIONS

PHYSICAL SCIENCE

PAPER 1 Multiple Choice

0652/1

OCTOBER/NOVEMBER SESSION 2002

45 minutes

Additional materials:

Multiple Choice answer sheet

Soft clean eraser

Soft pencil (type B or HB is recommended)

TIME 45 minutes

INSTRUCTIONS TO CANDIDATES

Do not open this booklet until you are told to do so.

Write your name, Centre number and candidate number on the answer sheet in the spaces provided unless this has already been done for you.

There are **forty** questions in 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 very carefully the instructions on the answer sheet.

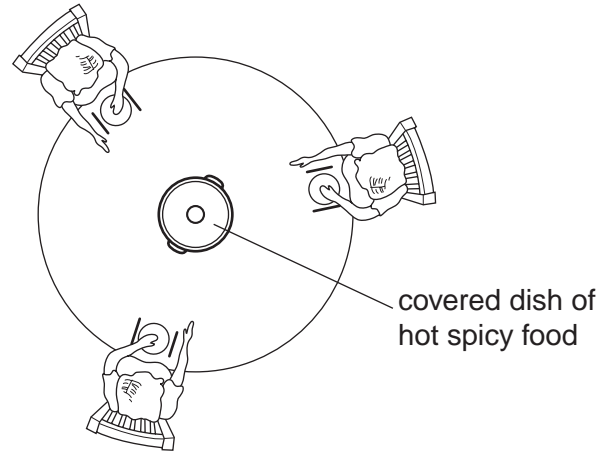
INFORMATION FOR CANDIDATES

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.

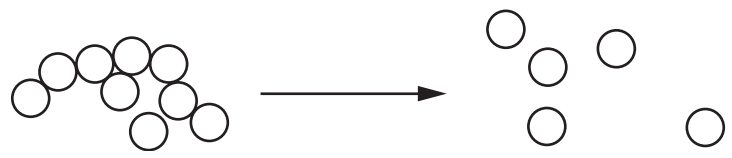
A copy of the Periodic Table is printed on page 20.

- 1 The diagram shows some people sitting round a dinner table.
When the lid of the dish is removed, all the people can smell the food.



How does the smell reach them?

- A by decolourisation
 - B by decomposition
 - C by diffusion
 - D by distillation
- 2 The diagram represents a change of state.



Which change of state is shown?

- A boiling
- B condensation
- C freezing
- D melting

3

- 3 The table shows how soluble two solids, P and Q, are in liquids X and Y.

solid	liquid	
	X	Y
P	insoluble	soluble
Q	soluble	insoluble

To obtain a pure sample of P from a mixture of P and Q:

shake the mixture with¹.....;

filter;

collect the².....;

allow the liquid to evaporate.

How should gaps 1 and 2 be correctly filled?

	gap 1	gap 2
A	X	filtrate
B	X	residue
C	Y	filtrate
D	Y	residue

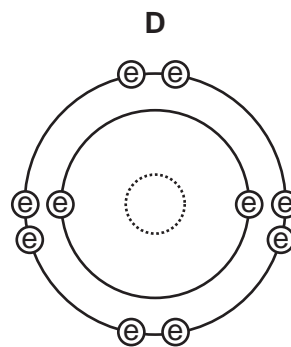
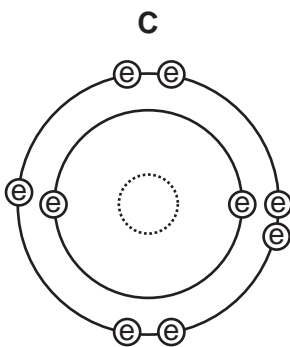
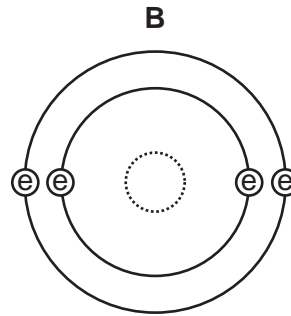
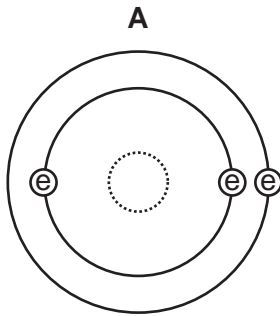
- 4 What does the nucleus of an atom contain?

- A** electrons, neutrons and protons
- B** electrons and neutrons only
- C** neutrons and protons only
- D** protons only


4


5 The electronic structures of four atoms are shown.

Which atom is chemically unreactive?



key

 = nucleus

 = electron

6 What is the formula of a strontium ion?

- A** Sr^{2+} **B** Sr^+ **C** Sr^- **D** Sr^{2-}

7 Which substance is **not** used as a fuel?

- A** hydrogen
B methane
C oxygen
D uranium

5

8 The diagrams show four pieces of laboratory equipment.

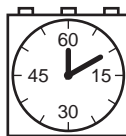
balance



pipette



stop-clock



thermometer



Which of these pieces of equipment are essential to find out if dissolving salt in water is an exothermic process?

	balance	pipette	stop-clock	thermometer
A	x	x	x	✓
B	✓	x	x	✓
C	x	✓	x	✓
D	✓	x	✓	x

9 In which changes has nitrogen monoxide, NO, been oxidised?

	NO → N ₂ O	NO → NO ₂
A	✓	✓
B	✓	x
C	x	✓
D	x	x

10 Which compound is a base?

- A** ammonium nitrate
- B** copper(II) sulphate
- C** hydrogen chloride
- D** iron(III) oxide

11 In the outline of the Periodic Table, some elements are shown as numbers.

Which two of these are metals in the same period?

- A 1 and 7
 - B 2 and 3
 - C 4 and 5
 - D 4 and 6
- 12 Why are some weather balloons filled with helium rather than hydrogen?
- A Helium is found in air.
 - B Helium is less dense than hydrogen.
 - C Helium is more dense than hydrogen.
 - D Helium is unreactive.
- 13 Which property do **all** metals have?
- A They are soluble in water.
 - B They conduct electricity.
 - C They have high melting points.
 - D They react with dilute sulphuric acid.

- 14 The physical states of some elements at room temperature and the types of their oxides are given in the table below.

Which element is a metal?

element	physical state	type of oxide
A	gas	acidic
B	gas	basic
C	solid	acidic
D	solid	basic

- 15 The table shows the results of adding three metals, P, Q and R, to dilute hydrochloric acid and to water.

metal	dilute hydrochloric acid	water
P	hydrogen produced	hydrogen produced
Q	hydrogen produced	no reaction
R	no reaction	no reaction

What is the order of reactivity of the metals?

	most reactive \longrightarrow least reactive		
A	P	Q	R
B	Q	P	R
C	Q	R	P
D	R	Q	P

- 16 An element **X** is extracted by heating its oxide with carbon.

Which properties is **X** likely to have?

	metal	highly reactive
A	✓	✓
B	✓	x
C	x	✓
D	x	x

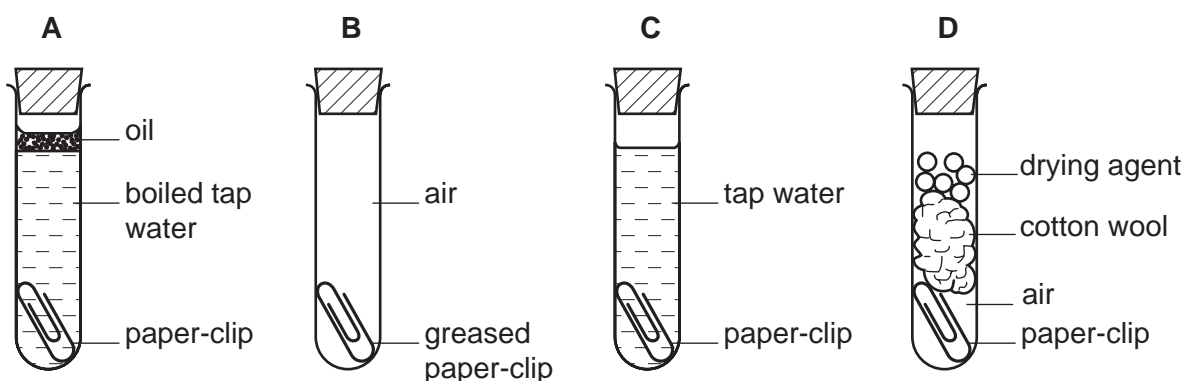
17 Manganese is added to the steel used to make drill bits.

What is the reason for the addition of manganese?

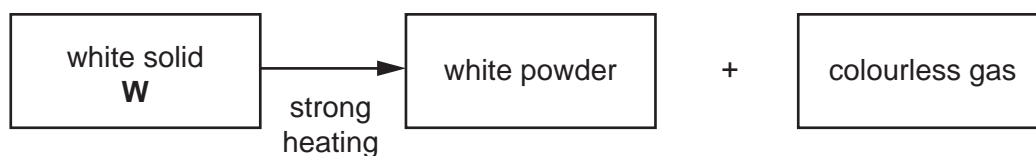
- A It increases the electrical conductivity of the iron.
- B It increases the hardness of the iron.
- C It lowers the density of the iron.
- D It lowers the melting point of the iron.

18 Four shiny steel paper-clips are placed in test-tubes as shown.

In which test-tube does the paper-clip rust?



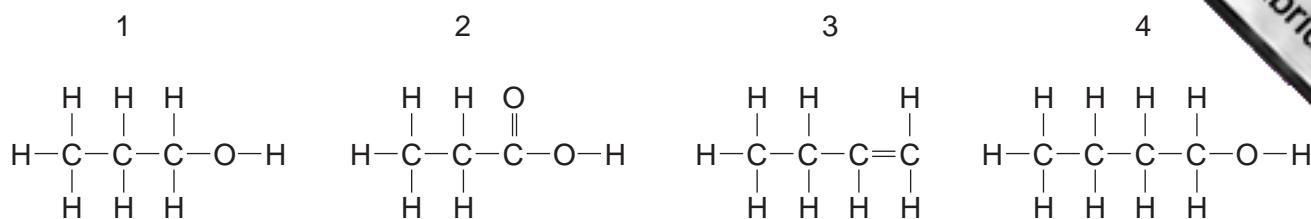
19 The diagram gives information about the effect of heat on a white solid **W**.



What could **W** be?

- A calcium carbonate
- B copper(II) carbonate
- C iron(III) chloride
- D sodium chloride

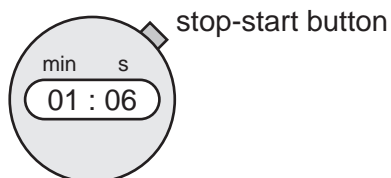
20 Which structures show compounds that are members of the same homologous series?



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

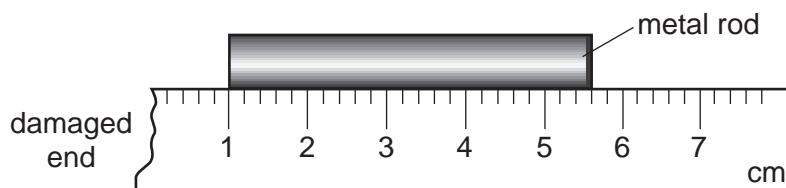
21 The diagram shows a stopwatch, originally set at 00:00.

When a car was first seen, the stop-start button was pressed. When the car passed the observer the stopwatch showed 01:06.



How long did the car take to reach the observer?

- A** 1.06 seconds
B 6 seconds
C 66 seconds
D 106 seconds
- 22 A girl uses a rule to measure the length of a metal rod. Because the end of the rule is damaged, she places one end of the rod at the 1 cm mark as shown.



How long is the metal rod?

- A** 43 mm **B** 46 mm **C** 53 mm **D** 56 mm

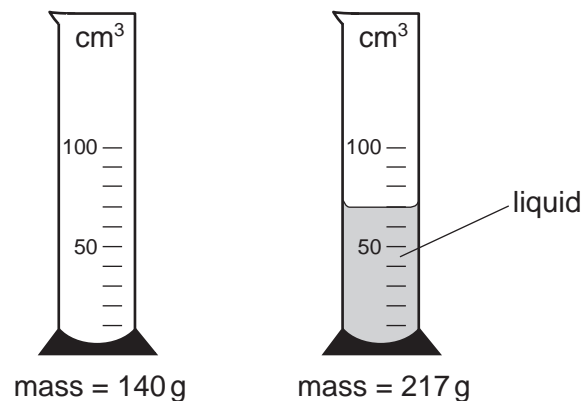
- 23 A child is standing on the platform of a station, watching the trains.



A train travelling at 30 m/s takes 3 s to pass the child.

What is the length of the train?

- A 10 m B 30 m C 90 m D 270 m
- 24 Which of the following statements is correct?
- A Mass and weight are different names for the same thing.
- B The mass of an object is different if the object is taken to the Moon.
- C The weight of a car is one of the forces acting on the car.
- D The weight of a chocolate bar is measured in kilograms.
- 25 The masses of a measuring cylinder before and after pouring some liquid are shown in the diagram.



What is the density of the liquid?

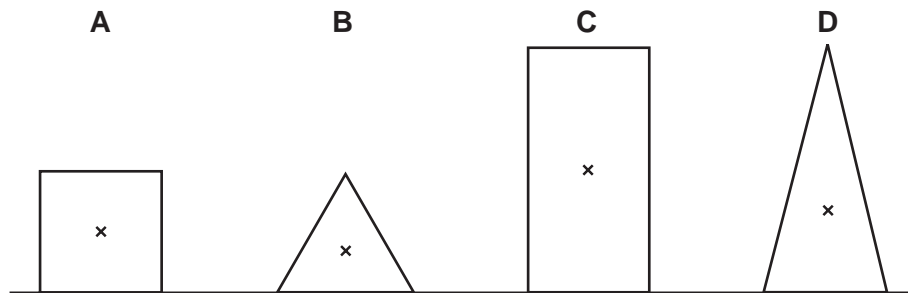
- A $\frac{217}{52}$ g/cm³ B $\frac{217}{70}$ g/cm³ C $\frac{77}{52}$ g/cm³ D $\frac{77}{70}$ g/cm³

26 In which of these situations is no resultant force needed?

- A a car changing direction
- B a car moving in a straight line at a steady speed
- C a car slowing down
- D a car speeding up

27 The diagram shows sections of four objects, all of equal mass. The position of the centre of mass of each object has been marked with a cross.

Which object is the most stable?



28 In a car engine, energy stored in the fuel is converted into thermal energy (heat energy) and energy of motion (kinetic energy).

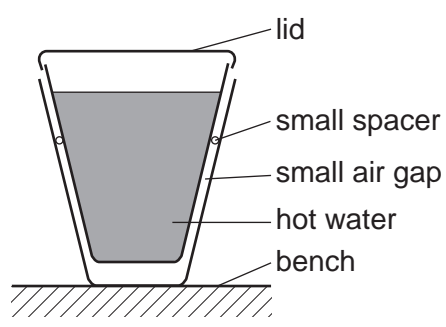
In which form is the energy stored in the fuel?

- A chemical
- B geothermal
- C hydroelectric
- D nuclear

29 How does thermal energy (heat energy) travel through the vacuum between the Earth and the Sun?

- A by conduction
- B by convection
- C by radiation
- D by radioactive decay

30 Two plastic cups are placed one inside the other. Hot water is poured into the inner cup and the lid is put on top as shown.

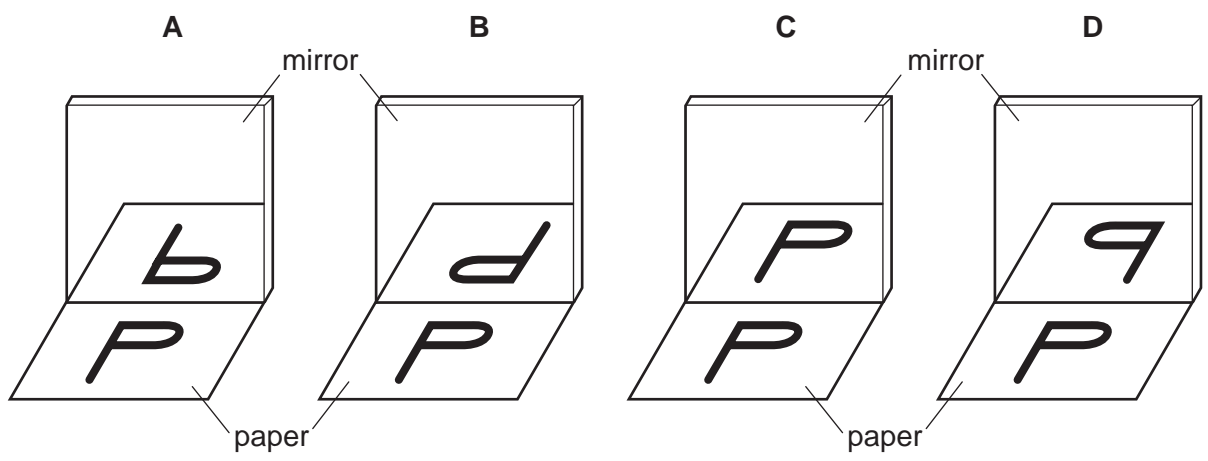


Which statement is correct?

- A Heat loss by radiation is prevented by the small air gap.
- B No heat passes through the sides of either cup.
- C The bench is heated by convection from the bottom of the outer cup.
- D The lid is used to reduce heat loss by convection.

31 A student looks at the letter P on a piece of paper, and at its reflection in a mirror.

What does he see?



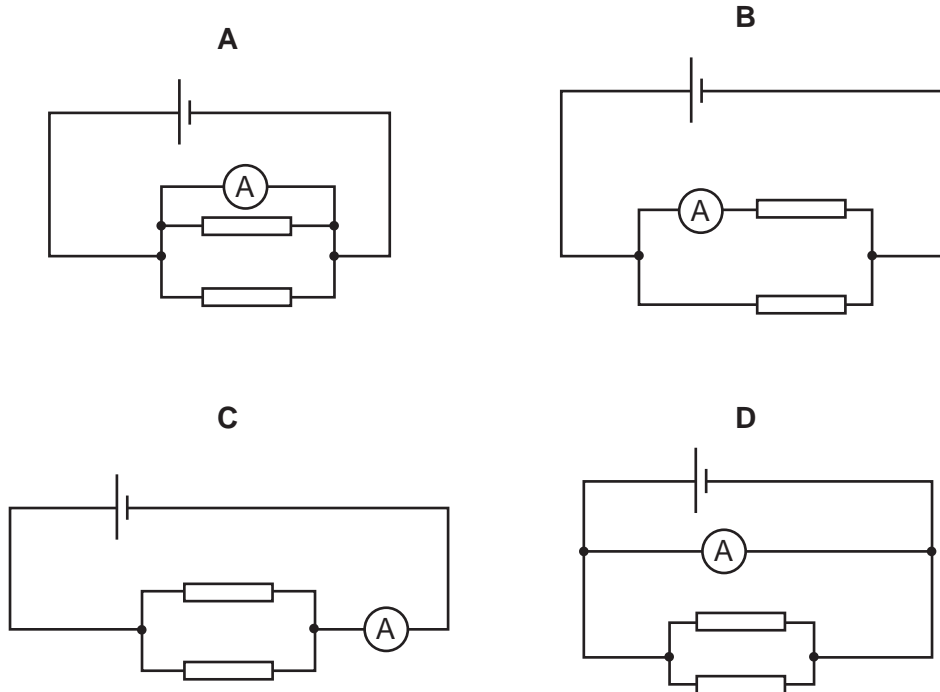
32 A permanent magnet is placed close to a bar of soft iron PQ.



What happens?

- A P becomes a north pole.
- B P becomes a south pole.
- C PQ does not become magnetised.
- D The poles of the magnet are reversed.

33 In which circuit does the ammeter read the total current through both resistors?



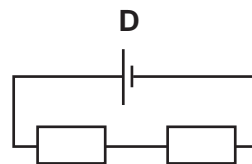
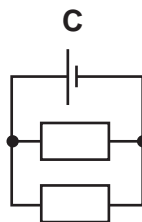
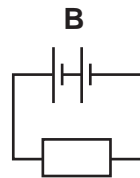
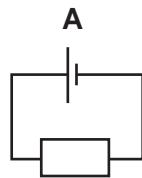
34 The table shows the voltage and current ratings for four light bulbs.

Which bulb has the greatest resistance when used normally?

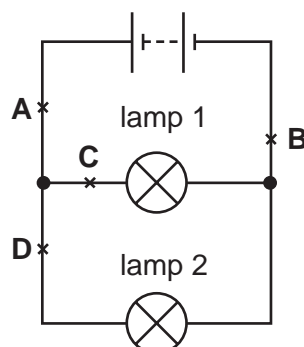
	voltage / V	current / A
A	2	0.5
B	3	0.2
C	6	12
D	12	1.0

35 In the following circuits the resistors have the same value, and the cells are identical.

Which circuit has the smallest resistance?

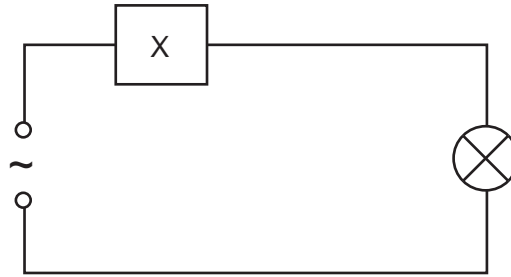


36 The diagram shows a circuit, with four possible positions to place a switch.



At which labelled point should a switch be placed so that lamp 1 remains on all the time and lamp 2 can be switched on and off?

37 The device X in this circuit is designed to cut off the electricity supply automatically when the current flows.



What is device X?

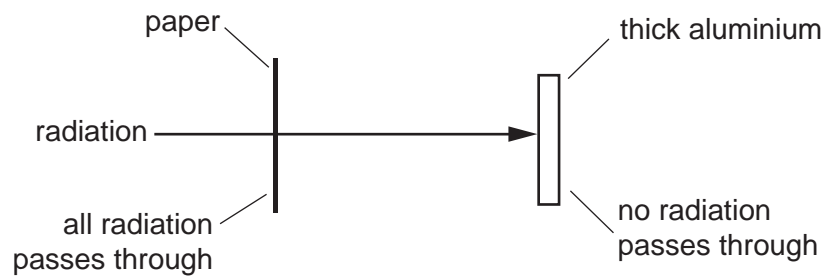
- A a fuse
- B a relay
- C a resistor
- D an ammeter

38 Charged particles are emitted from the cathode of an oscilloscope.

What is the name and charge of these particles?

	name of particles	charge of particles
A	electrons	negative
B	electrons	positive
C	protons	negative
D	protons	positive

- 39 A radioactive source emits radiation that can pass through a sheet of paper but not aluminium.



What does this show about the radiation?

- A It is alpha-particles.
 - B It is beta-particles.
 - C It is gamma-rays.
 - D It is a mixture of alpha-particles and gamma-rays.
- 40 A sample of a radioactive isotope is decaying.
- Which atoms will decay first?
- A impossible to know, because radioactive decay is random
 - B impossible to know, unless the age of the material is known
 - C atoms near the centre, because they are surrounded by more atoms
 - D atoms near the surface, because the radiation can escape more easily

DATA SHEET
The Periodic Table of the Elements

		Group																																																																																																
I	II	III	IV	V	VI	VII	0					0																																																																																						
7 Li Lithium 4	9 Be Beryllium 4	1 H Hydrogen 1	11 B Boron 5	12 C Carbon 6	14 N Nitrogen 7	16 O Oxygen 8	19 F Fluorine 9	20 Ne Neon 10	23 Na Sodium 12	24 Mg Magnesium 12	27 Al Aluminium 13	28 Si Silicon 14	31 P Phosphorus 15	32 S Sulphur 16	35.5 Cl Chlorine 17	40 Ar Argon 18	39 K Potassium 20	40 Ca Calcium 20	45 Sc Scandium 21	48 Ti Titanium 22	51 V Vanadium 23	52 Cr Chromium 24	55 Mn Manganese 25	56 Fe Iron 26	59 Co Cobalt 27	59 Ni Nickel 28	64 Cu Copper 29	65 Zn Zinc 30	70 Ga Gallium 31	73 Ge Germanium 32	75 As Arsenic 33	79 Se Selenium 34	80 Br Bromine 35	84 Kr Krypton 36	85 Rb Rubidium 38	88 Sr Strontium 38	89 Y Yttrium 39	91 Zr Zirconium 40	93 Nb Niobium 41	96 Mo Molybdenum 42	101 Ru Ruthenium 44	103 Rh Rhodium 45	106 Pd Palladium 46	108 Ag Silver 47	112 Cd Cadmium 48	115 In Indium 49	119 Sn Tin 50	122 Sb Antimony 51	128 Te Tellurium 52	131 Xe Xenon 54	133 Cs Caesium 56	137 Ba Barium 56	139 La Lanthanum 57	178 Hf Hafnium 72	181 Ta Tantalum 73	184 W Tungsten 74	186 Re Rhenium 75	190 Os Osmium 76	192 Ir Iridium 77	195 Pt Platinum 78	197 Au Gold 79	201 Hg Mercury 80	204 Tl Thallium 81	207 Pb Lead 82	209 Bi Bismuth 83	210 Po Polonium 84	210 At Astatine 85	210 Rn Radon 86	226 Fr Francium 88	226 Ra Radium 88	227 Ac Actinium 89	232 Th Thorium 90	232 Pa Protactinium 91	238 U Uranium 92	238 Np Neptunium 93	238 Pu Plutonium 94	238 Am Americium 95	238 Cm Curium 96	238 Bk Berkelium 97	238 Cf Californium 98	238 Es Einsteinium 99	238 Fm Fermium 100	238 Md Mendelevium 101	238 No Nobelium 102	238 Lr Lawrencium 103	140 Ce Cerium 58	141 Pr Praseodymium 59	144 Nd Neodymium 60	150 Sm Samarium 62	152 Eu Europium 63	157 Gd Gadolinium 64	159 Tb Terbium 65	162 Dy Dysprosium 66	165 Ho Holmium 67	167 Er Erbium 68	169 Tm Thulium 69	173 Yb Ytterbium 70	175 Lu Lutetium 71

3-71 Lanthanoid series
0-103 Actinoid series

a = relative atomic mass
 X = atomic symbol
 b = proton (atomic) number

The volume of one mole of any gas is 24 dm³ at room temperature and pressure (r.t.p.).