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UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
General Certificate of Education Ordinary Level

SCIENCE (PHYSICS, CHEMISTRY) **5124/01**

Paper 1 Multiple Choice **October/November 2010**

1 hour

Additional Materials: Multiple Choice Answer Sheet
Soft clean eraser
Soft pencil (type B or HB is recommended)

* 3 5 2 1 2 1 1 9 2 1 *

READ THESE INSTRUCTIONS FIRST

Write in soft pencil.
Do not use staples, paper clips, highlighters, 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.

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.

This document consists of **15** printed pages and **1** blank page.

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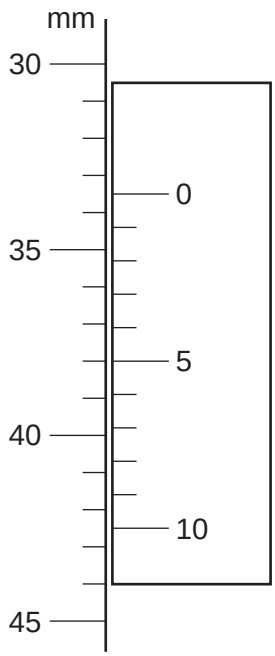
1 The diagram shows part of a vernier scale.



What is the correct reading?

A 30.5 mm **B** 33.5 mm **C** 38.0 mm **D** 42.5 mm

2 The gradient of the line on a graph gives the acceleration of a moving object.

What are the quantities on the horizontal and vertical axes of this graph?

	quantity on horizontal axis	quantity on vertical axis
A	speed	distance
B	speed	time
C	time	distance
D	time	speed

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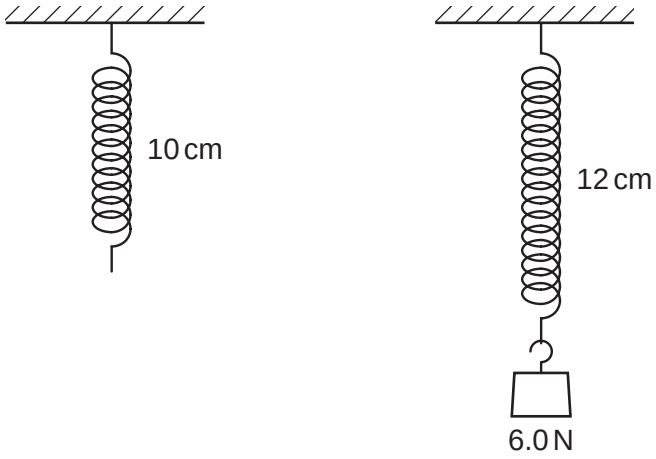
3 The gravitational field strength is 2 N / kg on the Moon and 10 N / kg on the Earth.

An astronaut returns from the Moon to the Earth.

What effect does this have on the astronaut's mass and weight?

	mass	weight
A	less on Earth	same on Earth and Moon
B	more on Earth	same on Earth and Moon
C	same on Earth and Moon	less on Earth
D	same on Earth and Moon	more on Earth

4 The diagrams show how a spring extends when a weight of 6.0 N is hung on it.



Which weight hanging from the spring causes the length to become 15 cm?

A 7.5 N **B** 15 N **C** 30 N **D** 45 N

5 A 2 kg mass is moving at constant speed.

The kinetic energy of the mass is 400 J.

What is the speed of the mass?

A 0.4 m / s **B** 20 m / s **C** 200 m / s **D** 400 m / s

6 An electric motor lifts a weight of 8 N through a height of 5 m in 4 s.

What is the power developed?

A 2.5 W **B** 6.4 W **C** 10 W **D** 40 W

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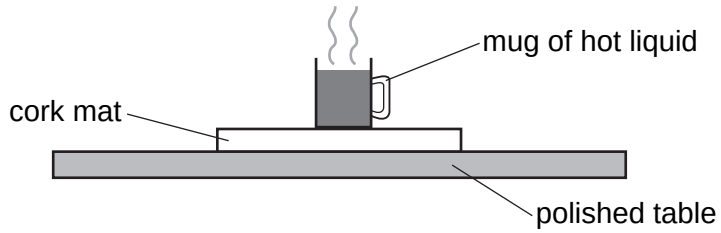
7 To protect a polished table, a cork mat may be put on the table underneath a mug containing hot liquid.



Why is this effective?

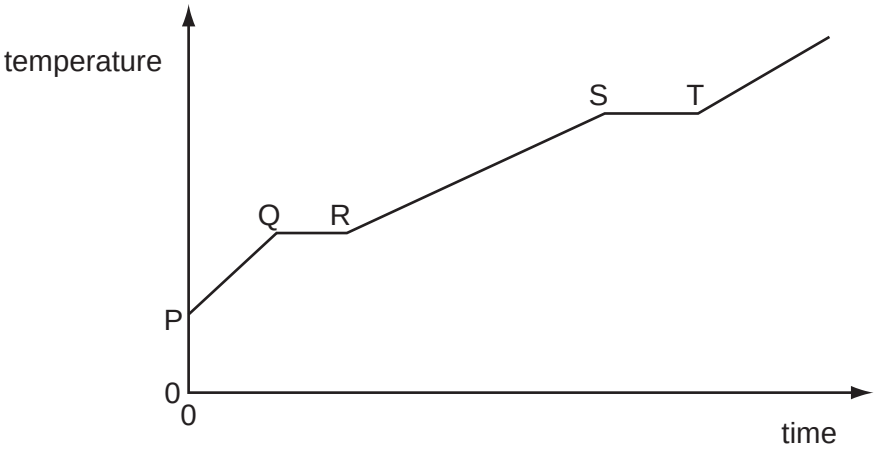
A Cork is a good conductor.

B Cork is a good radiator.

C Cork is a poor conductor.

D Cork is a poor radiator.

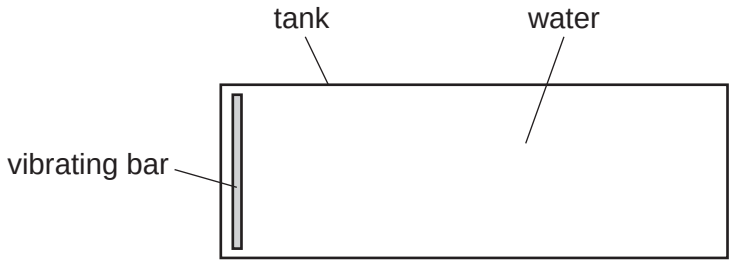
8 The diagram shows the temperature-time graph obtained when a substance, initially solid is heated steadily.



At which stage does boiling occur?

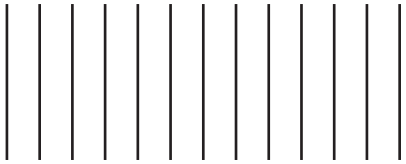
A PQ **B** QR **C** RS **D** ST

9 The diagram shows the view of a ripple tank from above. The bar vibrates up and down at constant frequency to produce waves.



Which wave pattern is seen in the tank?

A



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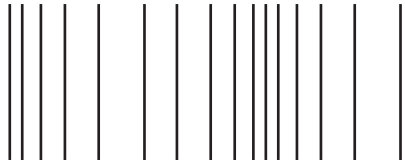

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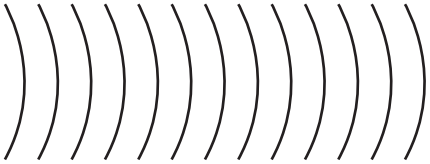
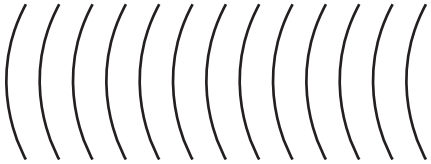
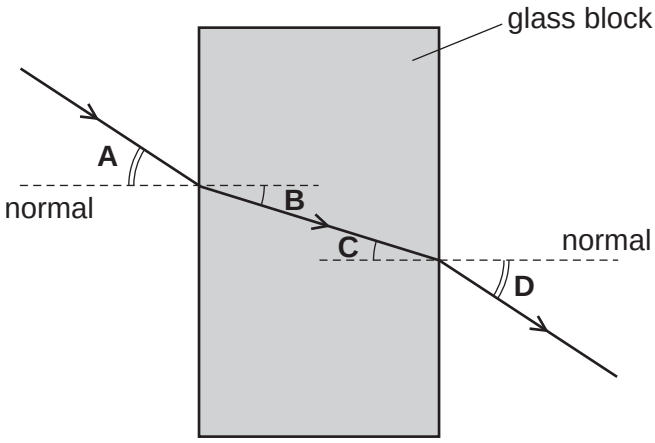


D



10 What is the angle of refraction for this ray of light moving from glass to air?



11 An object is placed 20 cm from a converging lens of focal length 40 cm.

Which describes the nature of the image formed by the lens?

A real, inverted, diminished

B real, upright, magnified

C virtual, inverted, diminished

D virtual, upright, magnified

12 In an experiment to measure the speed of sound in air, a boy stands 40 m from a wall and bangs two pieces of wood together. At the instant he hears the echo, he bangs them together again. He does this many times. The time taken for 50 intervals between bangs is 12 s.

Which calculation gives the speed of sound in air?

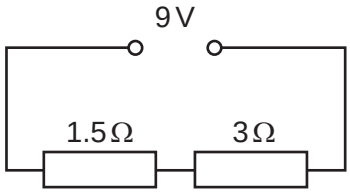
A $\frac{12}{40 \times 50}$ **B** $\frac{40 \times 50}{12}$ **C** $\frac{40 \times 2 \times 50}{12}$ **D** $\frac{40 \times 2 \times 12}{50}$

13 Electric current is defined as rate of flow of charge and is measured in amperes, A.

How can the unit of current also be written?

A Cm **B** C / m **C** Cs **D** C / s

14 Two resistors are connected in series with a 9 V supply.



What is the current flowing in the circuit?

A 2.0 A **B** 3.0 A **C** 4.5 A **D** 6.0 A

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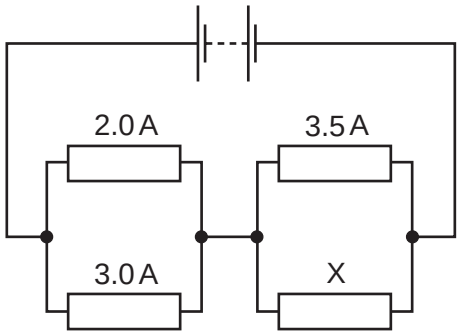
15 A circuit consists of a battery and four resistors.



The current in three of the resistors is shown.

What is the current in X?

A 1.5 A **B** 2.0 A **C** 3.0 A **D** 5.0 A

16 The kilowatt-hour is a unit of

A charge

B energy

C power

D voltage

17 A 2 kW appliance is to be connected to the 240 V mains supply.

Which fuse should be fitted in the plug?

A 1 A **B** 3 A **C** 5 A **D** 10 A

18 There are 2000 turns in the secondary coil of a transformer and 500 turns in the primary coil.

An alternating voltage of 240 V is applied across the primary coil.

What will be the voltage across the secondary coil?

A 60 V **B** 500 V **C** 960 V **D** 2000 V

19 What is the nucleon number of a nuclide?

A the number of neutrons

B the number of protons

C the total number of neutrons and protons

D the total number of protons and electrons

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20 A radioactive material gives a count rate of 8000 counts per minute.

After 20 days, it gives a count rate of 500 counts per minute.

What is the half-life of the material?

A 4 days **B** 5 days **C** 20 days **D** 80 days

21 A test-tube containing a liquid X is placed in a beaker of boiling water.

The liquid X starts to boil immediately.

The boiling point of liquid X is

A 100 °C.

B above 100 °C.

C between 0 °C and room temperature.

D between room temperature and 100 °C.

22 Why are sodium and chlorine in the same period of the Periodic Table?

A Sodium and chlorine combine together to form a compound of formula NaC*l*.

B Sodium is a reactive metal and chlorine is a reactive non-metal.

C The atoms of both elements have eight electrons in their second electron shell.

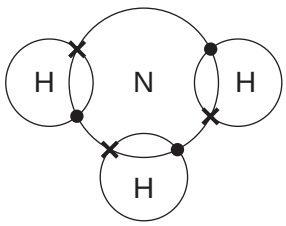
D The atoms of both elements have only three electron shells containing electrons.

23 Which substance could be sodium chloride?

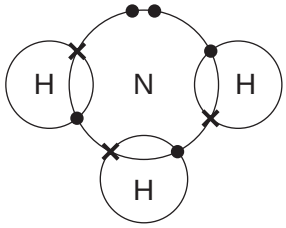
	melting point / °C	conduction of electricity	
		when liquid	in aqueous solution
A	–114	none	none
B	–114	none	good
C	180	none	insoluble
D	808	good	good

24 Which dot and cross diagram is correct for ammonia?

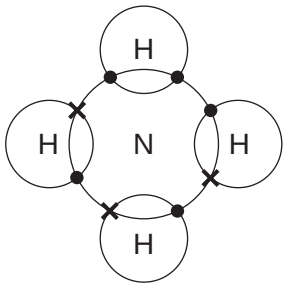
A



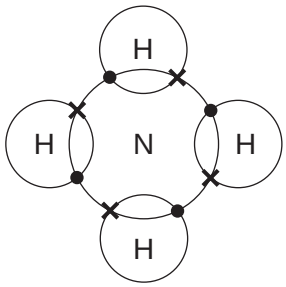
B



C



D



25 7.8 g of an element X react with oxygen to form 9.4 g of an oxide X_2O.

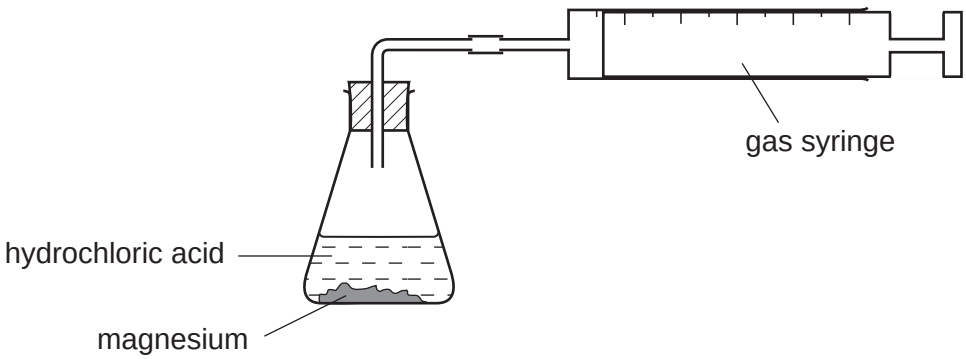
What is the relative atomic mass of X?

A 78 **B** 39 **C** 9.4 **D** 7.8

26 Magnesium reacts with hydrochloric acid as shown in the equation.

$$Mg(s) + 2HCl(aq) \rightarrow MgCl_2(aq) + H_2(g)$$

In an experiment the volume of hydrogen produced was measured.



The volume of hydrogen produced was 24 cm^3.

Which mass of magnesium was used?

A 24 g **B** 12 g **C** 0.12 g **D** 0.024 g

27 Which process is endothermic?

A the formation of a hydrogen-chlorine bond

B the formation of rust

C the formation of water from ice

D the formation of water from oxygen and hydrogen

28 Powdered zinc reacts with dilute sulfuric acid.

Which change will speed up this reaction?

A adding water to the mixture

B cooling the mixture

C heating the mixture

D using larger lumps of zinc

29 The approximate pH values of the aqueous solutions of four substances commonly used in cooking are shown.

Which substance could be taken to neutralise excess acid in the stomach?

	substance	pH
A	baking soda	9
B	salt	7
C	lemon juice	4
D	vinegar	3

30 A new halogen Z is discovered.

Its relative atomic mass is 370.

Which properties is Z likely to have?

A dark green gas, soluble in water

B black solid, high melting point

C grey solid, reacting violently with water

D white solid, reacting with acid giving hydrogen

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31 Two statements about argon are shown.

1 Argon is used in light bulbs.

2 Argon is a monatomic gas which has a full outer shell of electrons.

Which statements are correct?

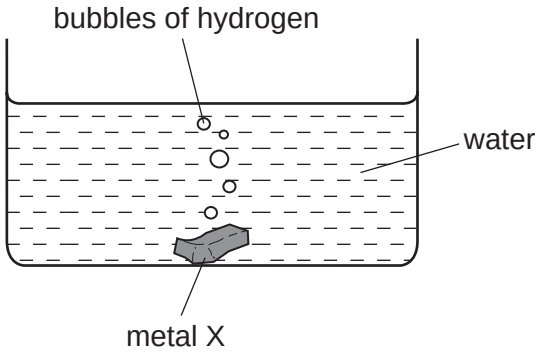
	statement 1	statement 2
A	✓	✓
B	✓	✗
C	✗	✓
D	✗	✗

key

✓ = correct

✗ = incorrect

32 The diagram shows a metal X reacting with water.



What is X?

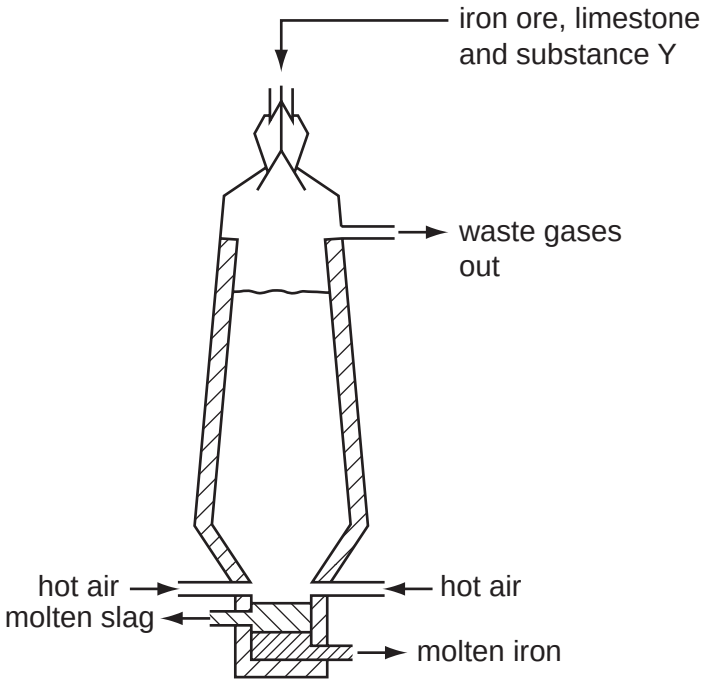
A calcium

B copper

C potassium

D sodium

33 The diagram shows a blast furnace used to extract iron from iron ore.



What is Y?

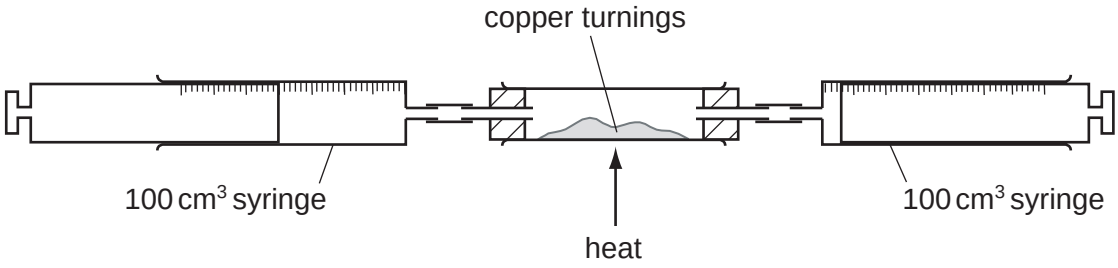
A bauxite

B coke

C oxygen

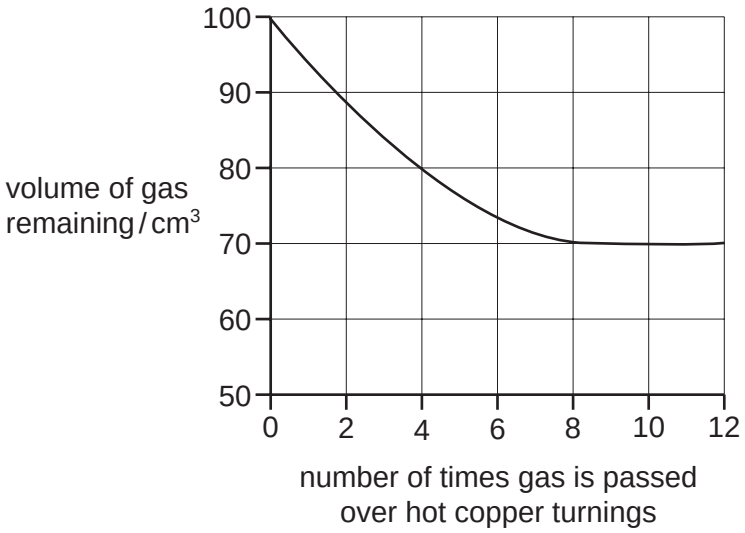
D sand

34 A 100 cm^3 sample of bottled gas, used for diving, was placed in a gas syringe in the apparatus shown.



The gas was passed backwards and forwards over the heated copper turnings.

The results obtained were used to plot the graph below.



What is the percentage of oxygen in the bottled gas?

A 20 % **B** 30 % **C** 70 % **D** 80 %

35 In the Haber process, nitrogen and hydrogen react to produce ammonia.

The reaction is represented by the equation shown.

$$N_2(g) + 3H_2(g) \rightleftharpoons 2NH_3(g)$$

Which conditions favour the production of ammonia?

A high temperature and high pressure

B high temperature and low pressure

C low temperature and high pressure

D low temperature and low pressure

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[Turn over

36 Which statement about a homologous series is correct?

A The boiling point increases with decreasing relative molecular mass.

B The members have the same empirical formula.

C The members have similar chemical properties.

D The relative molecular masses of consecutive members differ by 12.

37 Which formula represents a compound that undergoes an addition reaction with hydrogen?

A C_2H_6 **B** C_2H_4 **C** CH_4 **D** $C_2H_4Br_2$

38 The list shows reactions in which ethanol is either a reactant or a product.

1 combustion of ethanol

2 conversion of ethene to ethanol

3 fermentation of glucose

4 oxidation of ethanol to ethanoic acid

In which reactions is water also either a reactant or a product?

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

39 Which pair of organic compounds could react together and form an ester?

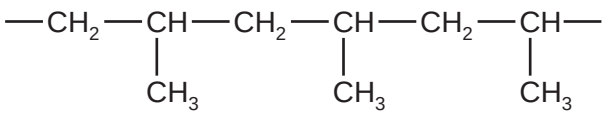
A CH_3CO_2H and HCHO

B CH_3CH_2OH and $HOCH_2CH_2OH$

C HCO_2H and CH_3CO_2H

D $HOCH_2CH_2OH$ and $HO_2CCH_2CO_2H$

40 A polymer has the structure shown.



What is the molecular formula of the monomer?

A C_2H_4 **B** C_2H_6 **C** C_3H_6 **D** C_3H_8

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BLANK SHEET

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DATA SHEET
The Periodic Table of the Elements

Group																	
I	II									III	IV	V	VI	VII	0
															4 He Helium 2
					1 H Hydrogen 1										
7 Li Lithium 3	9 Be Beryllium 4									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 11	24 Mg Magnesium 12									27 Al Aluminium 13	28 Si Silicon 14	31 P Phosphorus 15	32 S Sulfur 16	35.5 Cl Chlorine 17	40 Ar Argon 18
39 K Potassium 19	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 37	88 Sr Strontium 38	89 Y Yttrium 39	91 Zr Zirconium 40	93 Nb Niobium 41	96 Mo Molybdenum 42	Tc Technetium 43	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	127 I Iodine 53	131 Xe Xenon 54
133 Cs Caesium 55	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	Po Polonium 84	At Astatine 85	Rn Radon 86
Fr Francium 87	226 Ra Radium 88	227 Ac Actinium 89 †															

140 Ce Cerium 58	141 Pr Praseodymium 59	144 Nd Neodymium 60	Pm Promethium 61	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
232 Th Thorium 90	Pa Protactinium 91	238 U Uranium 92	Np Neptunium 93	Pu Plutonium 94	Am Americium 95	Cm Curium 96	Bk Berkelium 97	Cf Californium 98	Es Einsteinium 99	Fm Fermium 100	Md Mendelevium 101	No Nobelium 102	Lr Lawrencium 103

*58-71 Lanthanoid series
†90-103 Actinoid series

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

The volume of one mole of any gas is 24 dm^3 at room temperature and pressure (r.t.p.).

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