NAMIBIA SENIOR SECONDARY CERTIFICATE

PHYSICAL SCIENCE ORDINARY LEVEL 4323/1

PAPER 1 Multiple Choice 1 hour

Marks 40 **2019**

Additional Materials: Multiple choice answer sheet
Non-programmable calculator
Soft clean eraser
Soft pencil (type B or HB is recommended)

INSTRUCTIONS AND INFORMATION TO CANDIDATES

- Write in soft pencil.
- Make sure that you receive the multiple choice answer sheet with **your examination number** on it.

- 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.
- If you want to change an answer, thoroughly erase the one you wish to delete.
- The Periodic Table is printed on page 13.

- **Read the instructions on the answer sheet carefully.**

- Each correct answer will score one mark.
- Any rough working should be done in this booklet.
- All questions in this paper carry equal marks.
- You may use a non-programmable calculator.

This document consists of **13** printed pages and **3** blank pages.

Republic of Namibia

MINISTRY OF EDUCATION, ARTS AND CULTURE

CHEMISTRY

1 Which method is used in obtaining a pure, dry sample of sodium chloride from a mixture of sodium chloride and sand?

A Heat the mixture and collect the substance that boils off.

B Heat the mixture gently and collect the substance which melts.

C Shake the mixture with water and distil off the liquid.

D Shake the mixture with water, filter and evaporate the filtrate.

2 Diesel and petrol are accidentally mixed in an oil refinery.

Which method is used to separate the two?

A evaporation

B filtration

C fractional distillation

D simple distillation

3 Which statement explains why molten sodium chloride conducts electricity?

A It has free electrons.

B It has free ions.

C It has free protons.

D It is a covalent compound.

4 What is the formula of iron(III) carbonate?

A $FeCO_3$

B Fe_2CO_3

C $Fe_2(CO_3)_3$

D Fe_3CO_3

5 What do the following atoms have in common?

$^{74}_{33}As$ $^{73}_{32}Ge$ $^{71}_{30}Zn$

A same number of electrons

B same number of neutrons

C same number of protons

D same number of protons and neutrons

6 Which of the following shows the correct structure of carbon dioxide?

A :Ö – Ċ – Ö:

B :Ö = Ċ – Ö:

C :Ö = C = Ö:

D :O ≡ C – Ö:

7 What happens when an aluminium atom becomes an aluminium ion in a chemical reaction?

A It gains 3 electrons.

B It gains 3 protons.

C It loses 3 electrons.

D It loses 3 protons.

8 Which substance has the highest molar mass?

[H=1, O=16, Na=23, S=32, C*l*=35.5]

A Na_2SO_4

B NaC*l*

C NaOH

D Na

9 3 moles of battery acid (H_2SO_4) spilled on a laboratory floor is neutralised by baking soda ($NaHCO_3$) [RMM: $NaHCO_3$ = 84]. The equation shows the reaction.

$$H_2SO_4(aq) + 2NaHCO_3(aq) \rightarrow Na_2SO_4(aq) + 2CO_2(g) + 2H_2O(l)$$

How many grams of baking soda was used in this reaction?

A 252 g

B 504 g

C 1 008 g

D 2 016 g

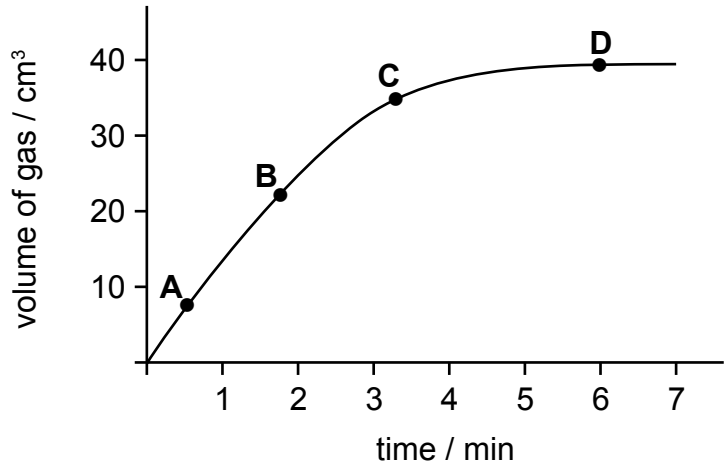
10 Which species, with a correct reason, is oxidised in the following reaction?

$$Cl_2 + 2I^- \rightarrow I_2 + 2Cl^-$$

	species	reason
A	Cl_2	oxidation number decreases
B	Cl_2	oxidation number increases
C	I^-	oxidation number decreases
D	I^-	oxidation number increases

11 The graph shows the volume of carbon dioxide gas collected over time for the decomposition of calcium carbonate.

At which point on the graph has the reaction stopped?



12 Why is acetic acid classified as a weak acid?

A It does not ionise in water.

B It does not neutralise a base.

C It gives vinegar a sour taste.

D It only ionises slightly in water.

13 Which oxide reacts with both dilute hydrochloric acid and aqueous sodium hydroxide?

A aluminium oxide

B calcium oxide

C copper(II) oxide

D iron(III) oxide

14 What is the name given to elements in group one?

A alkali metals

B alkaline earth metals

C halogens

D noble gases

15 Which row in the table shows a property of halogens and how it changes as you go down the group?

	property	**changes**
A	density	decreases
B	colour	becomes lighter
C	reactivity	decreases
D	boiling point	decreases

16 Aluminium is extracted from its ore by electrolysis.

Why is the molten ore dissolved in cryolite?

A To decompose the ore into aluminium and oxygen at a higher temperature.

B To help keep the aluminium molten at a higher temperature.

C To help stop the electrodes from corroding at high temperature.

D To lower the melting point of the ore and to reduce the temperature of the process.

17 The table shows the effect of salt and acid rain on the rate of rusting of iron based metals.

Which row in the table is correct?

	effect of salt	**effect of acid rain**
A	decreases	increases
B	decreases	decreases
C	increases	decreases
D	increases	increases

18 Which two gases are emitted from a car exhaust fitted with a catalytic converter?

A carbon dioxide and nitrogen dioxide

B carbon monoxide and nitrogen dioxide

C methane and water vapour

D nitrogen and carbon dioxide

19 Air is liquefied by fractional distillation.

Which row in the table names the first two gases to liquefy and explains why they are first?

	gases	**explanation**
A	argon and carbon dioxide	have higher boiling points
B	argon and helium	condense at the highest temperatures
C	carbon dioxide and water vapour	condense at the highest temperatures
D	carbon dioxide and water vapour	have higher freezing points

20 Which statement is correct about alkanes and alcohols?

A They are saturated hydrocarbons.

B They decolourise bromine water.

C They burn to produce carbon dioxide and water.

D They react with steam to form an acid.

PHYSICS

21 A nichrome wire has a diameter of about 0.05 mm.

Which instrument is used to give the most accurate measurement of the diameter of a thin wire?

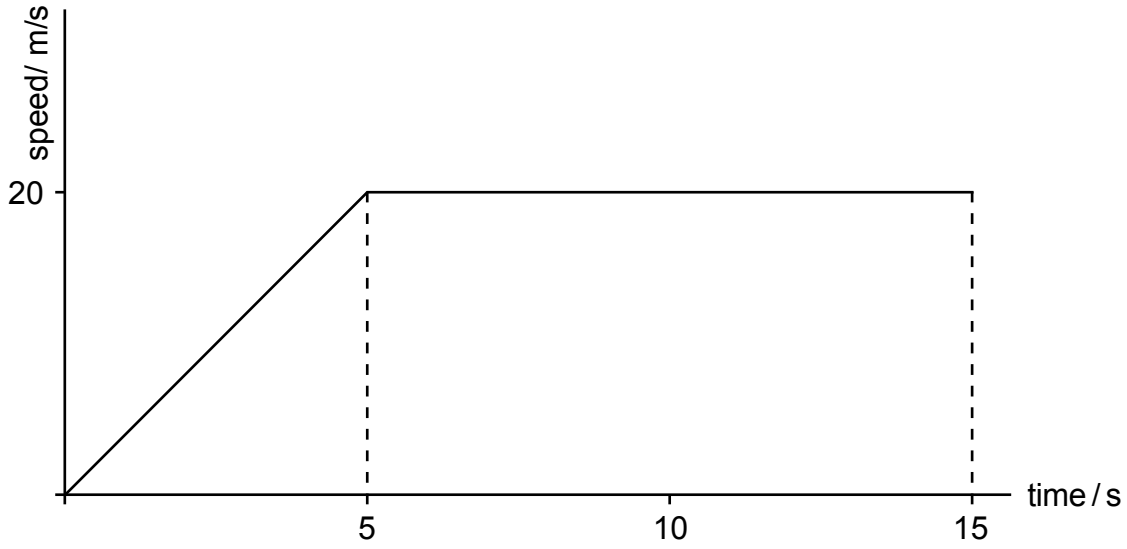
A measuring tape

B micrometer

C ruler

D vernier calipers

22 A car travels from rest at a uniform acceleration for 5 seconds until it reaches a speed of 20 m/s. It then continues with this speed for another 10 seconds as shown in the graph.



What is the distance travelled by the car in 15 seconds?

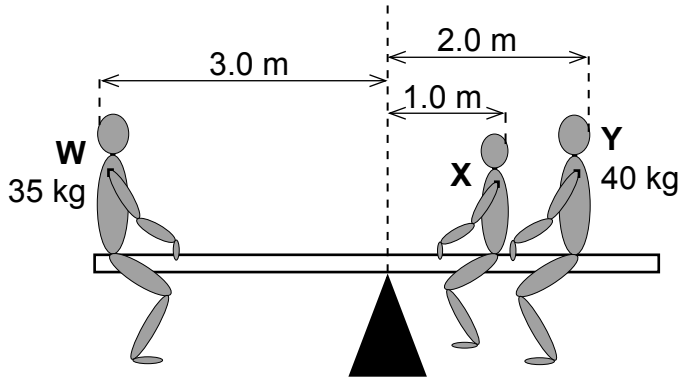
A 50 m

B 100 m

C 250 m

D 300 m

23 Three children, **W**, **X**, and **Y** are sitting on a seesaw. The seesaw is balanced as shown in the diagram.



What is the mass of child **X**?

A 15 kg

B 25 kg

C 150 kg

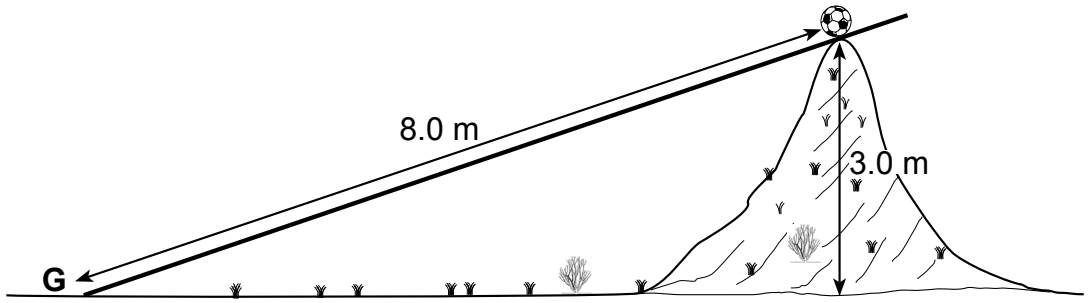
D 250 kg

24 An astronaut travels from Earth to the Moon.

Which row in the table is correct?

	mass on Earth and Moon	weight on Earth and Moon
A	different	different
B	different	the same
C	the same	different
D	the same	the same

25 A soccer ball of mass 0.43 kg starts from rest and rolls down on a slope of 8 m long as shown in the diagram. The height of the soccer ball from the ground is 3 m.



What is its kinetic energy before it comes to rest at point **G**?

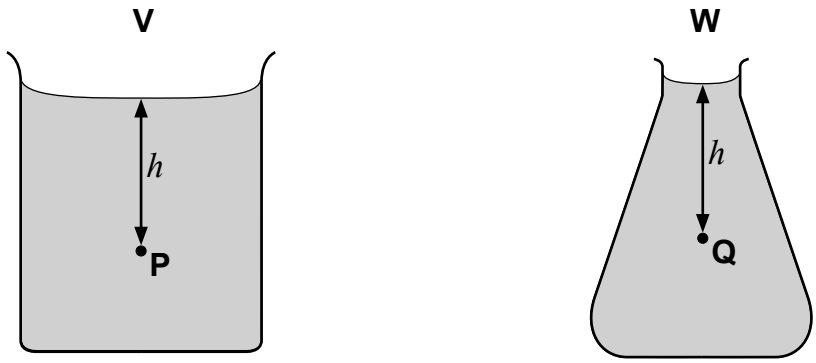
A 1.29 J

B 3.44 J

C 12.9 J

D 34.4 J

26 Two glass containers, **V** and **W**, filled with different liquids are placed next to each other. Points **P** and **Q** are a distance h below the surface of the liquids in the containers.



Why is the pressure at **P** different from the pressure at **Q**?

A The atmospheric pressure is different at **P**.

B The densities of the liquids are different.

C The gravitational field strength is different at **P**.

D The shapes of the containers are different.

27 A cold water bottle was taken from a freezer. Water forms on the outside of the outer surface of the bottle.

What is the name of the effect by which the water forms?

A condensation

B conduction

C convection

D evaporation

28 Which statement about melting is correct?

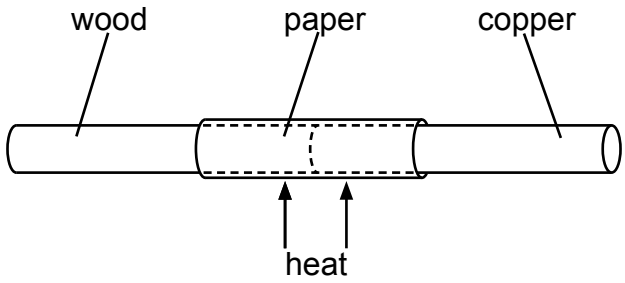
A Energy is required to decrease the average kinetic energy of the molecules.

B Energy is required to decrease the average potential energy of the molecules.

C Energy is required to increase the average kinetic energy of the molecules.

D Energy is required to increase the average potential energy of the molecules.

29 A copper bar and a wooden bar are joined and a piece of paper is wrapped around the bars. The bars are heated strongly at the centre and the paper becomes brown on the side of the wood, while the paper on the copper side does not go brown.



Which statement explains this observation?

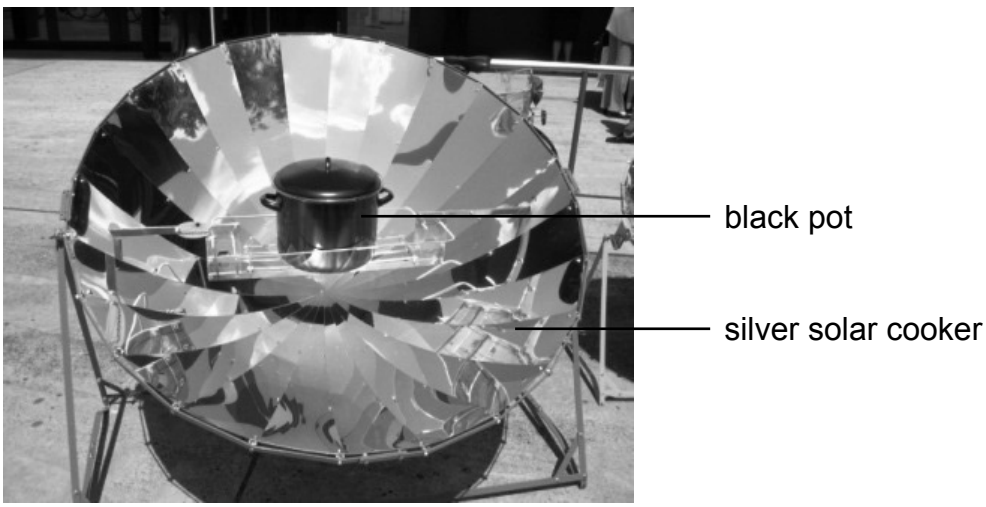
A Copper is a good conductor and thus absorbed thermal energy from the paper.

B Copper is an insulator and thus absorbed thermal energy from the paper.

C Wood is a good conductor and thus absorbed thermal energy from the paper.

D Wood is a good insulator and thus absorbed thermal energy from the paper.

30 The photograph shows a black pot with water being heated in a solar cooker.



What is the main method of heat transfer from the sun to the pot and from the pot to the water?

	sun to the pot	pot to the water
A	conduction	radiation
B	convection	convection
C	radiation	conduction
D	radiation	convection

31 Which waves are longitudinal?

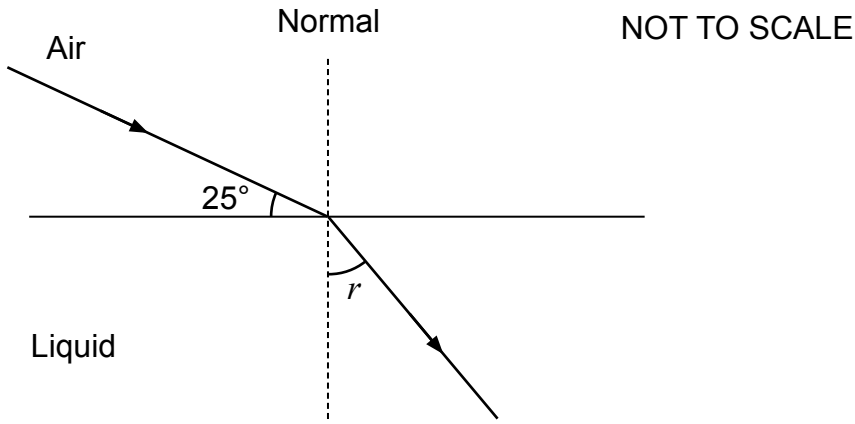
A infra-red waves in vacuum

B microwaves in air

C sound waves in water

D water waves

32 Light strikes the surface of a liquid at an angle of 25° as shown. The refractive index of the liquid is 1.3.



What is the angle of refraction r?

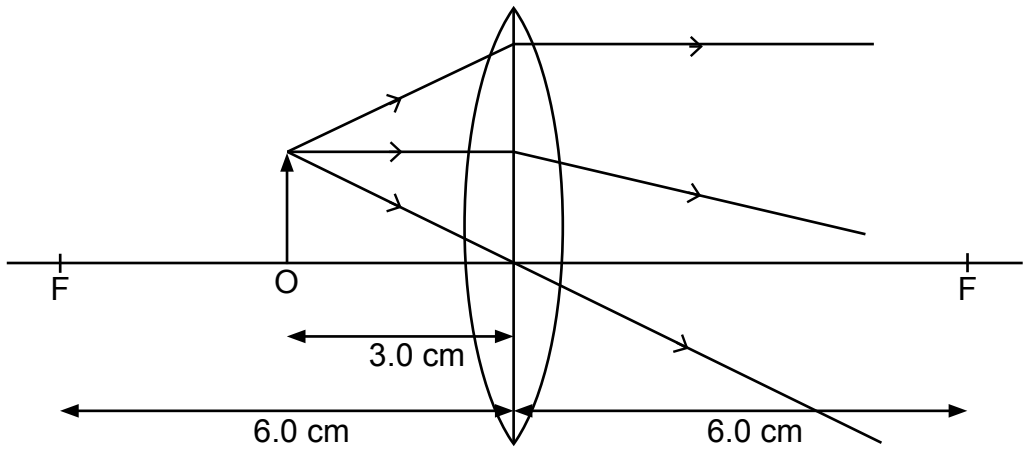
A 19°

B 33°

C 44°

D 50°

33 The diagram shows an object O placed 3.0 cm away from a converging lens of focal length 6.0 cm.



What are the properties of the image produced?

A real, erect and diminished

B real, inverted and enlarged

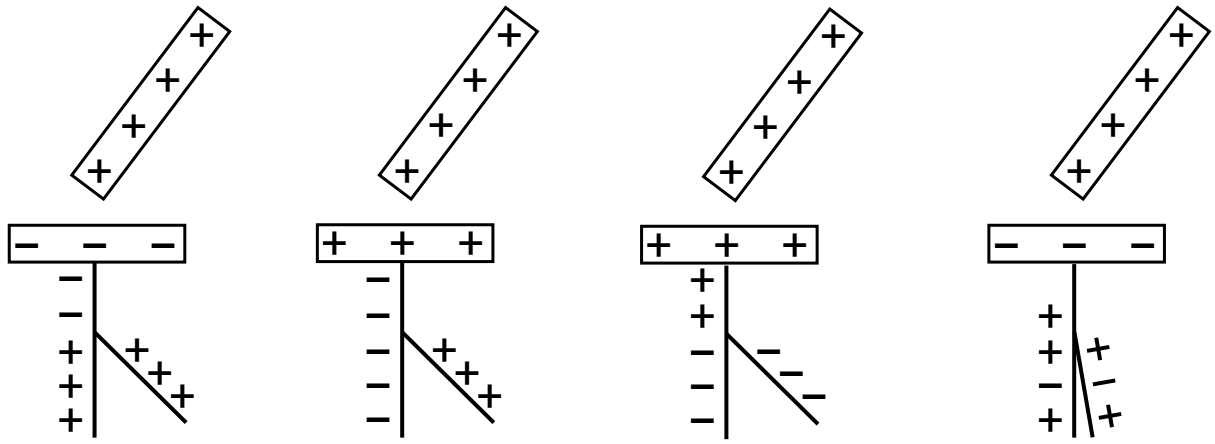
C virtual, erect and enlarged

D virtual, inverted and diminished

34 A positively charged rod is brought closer to an uncharged electroscope's metal cap.

Which diagram shows the induced charges on the electroscope?

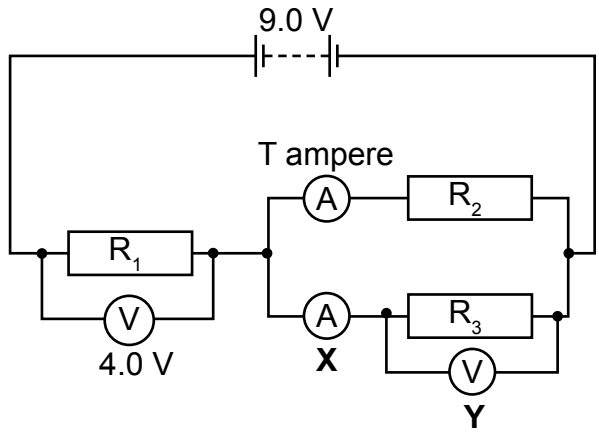
A **B** **C** **D**



35 Which row in the table shows the correct symbol and unit for electric resistance?

	symbol	unit
A	R	R
B	R	Ω
C	Ω	Ω
D	Ω	R

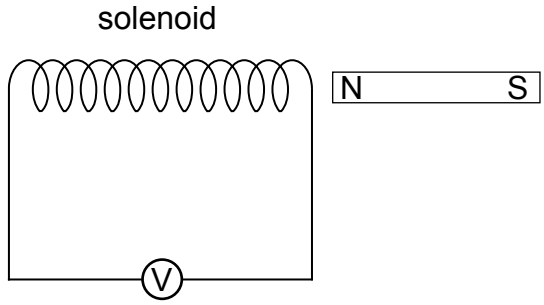
36 A battery of e.m.f. 9.0 V is connected in a circuit containing three resistors R_1, R_2, R_3. The total current in the circuit is S ampere and the resistance across R_1 is 4.0 V.



Which row in the table represents the readings of ammeter **X** and voltmeter **Y**?

	reading on X	reading on Y
A	S – T	9 + 4
B	S – T	9 – 4
C	S + T	9 + 4
D	S + T	9 – 4

37 The N-pole of a bar magnet is moved into a solenoid and an e.m.f. is induced.



Which change increases the e.m.f. induced?

A Increasing the speed of the movement.

B Reducing the number of turns in the solenoid.

C Reversing the direction of the magnet.

D Using a weaker magnet.

38 Why is electrical energy usually transmitted at high voltage?

A Less energy is wasted in the transmission cables.

B The current in the transmission cables is as large as possible.

C The resistance of the transmission cable is as large as possible.

D The transmission system does not require transformers.

39 A Nuclide is represented by ${}^{230}_{91}X$. It emits one alpha-particle and then one beta-particle.

What is the resulting Nuclide?

A ${}^{226}_{88}X$

B ${}^{226}_{89}X$

C ${}^{226}_{90}X$

D ${}^{230}_{90}X$

40 A radioactive isotope has a half-life of 3 000 years.

How long will it take for the mass of this isotope, in any sample, to fall to $\frac{1}{8}$ of its original value?

A 3 000 years

B 9 000 years

C 12 000 years

D 24 000 years

DATA SHEET
The Periodic Table of the Elements

Group																	
I	II											III	IV	V	VI	VII	0
							1 H Hydrogen 1										4 He Helium 2
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
X
b

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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