Cambridge International Examinations
Cambridge International General Certificate of Secondary Education

COMBINED SCIENCE **0653/12**

Paper 1 Multiple Choice (Core) **May/June 2018**

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 **15** printed pages and **1** blank page.

1 Which pair of structures is found in a typical plant cell but **not** in a typical animal cell?

A cell membrane and chloroplasts

B cell membrane and cytoplasm

C cell wall and chloroplasts

D cell wall and cytoplasm

2 A student investigates the effect of temperature on the digestion of starch by an enzyme.

The student mixes an enzyme solution with a starch solution.

He removes samples of the mixture every two minutes and tests with iodine solution.

The experiment is repeated at different temperatures, **A**, **B**, **C** and **D**.

Which row shows the results for the temperature in which starch is digested most quickly?

	two minutes	four minutes	six minutes	eight minutes
A	blue-black	blue-black	blue-black	blue-black
B	blue-black	blue-black	brown	brown
C	blue-black	brown	brown	brown
D	brown	brown	brown	brown

3 When biuret solution is added to a food sample it turns purple.

What must the food sample contain?

A fat

B glycerol

C protein

D vitamin

4 Which two chemical substances are required for photosynthesis?

A carbon dioxide and glucose

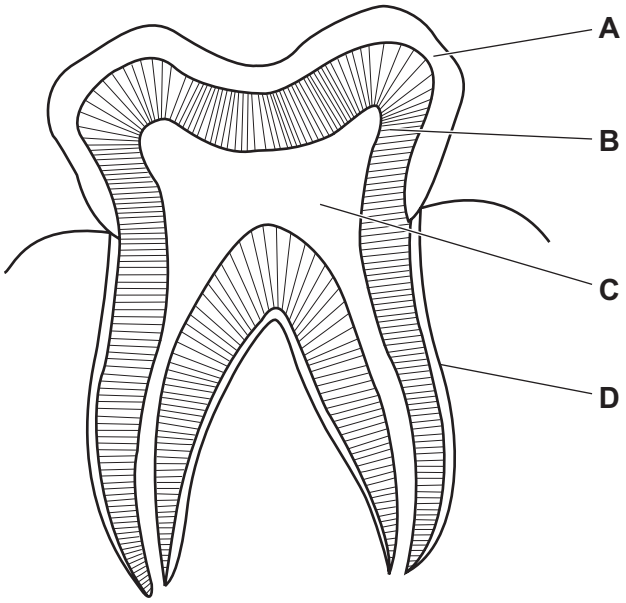
B glucose and oxygen

C oxygen and water

D water and carbon dioxide

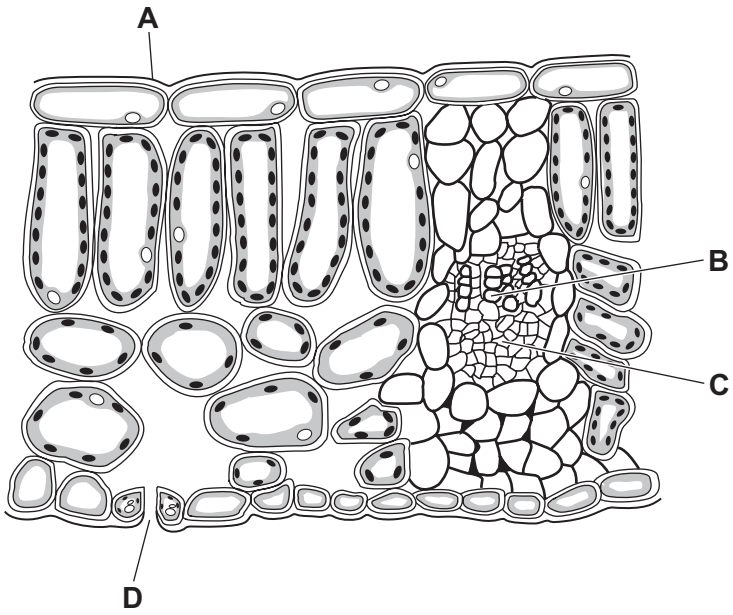
5 The diagram shows a section through a human tooth.

Which part is made of the hardest material?

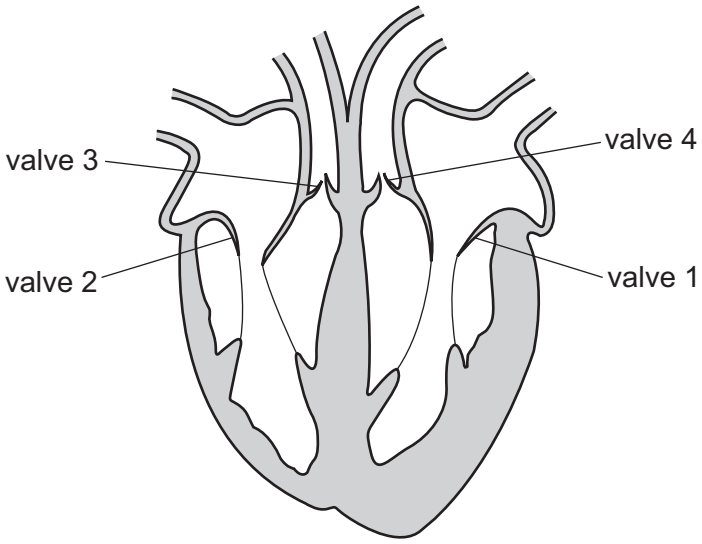


6 The diagram shows a section through a leaf.

Where does water enter the leaf?



7 The diagram shows a section through the human heart.



What happens to the valves as blood is being pumped to the lungs?

	valve 1	valve 2	valve 3	valve 4
A	closed	closed	open	closed
B	closed	closed	open	open
C	open	open	closed	closed
D	open	open	closed	open

8 Which equation represents aerobic respiration?

A carbon dioxide + oxygen → glucose + water

B carbon dioxide + water → glucose + oxygen

C glucose + oxygen → carbon dioxide + water

D glucose + water → carbon dioxide + oxygen

9 Adrenaline is sometimes called the 'fight or flight' hormone.

Which is an effect of adrenaline that helps prepare the body to fight or to take flight when frightened?

A It increases blood glucose concentration.

B It increases the rate of digestion.

C It maintains a constant body temperature.

D It slows down the heart rate.

10 Which row describes sexual reproduction?

	number of parents	offspring genetically identical to parents	involves zygote production
A	1	✓	✓
B	1	✗	✗
C	2	✓	✗
D	2	✗	✓

11 The anthers are part of which flower structure?

A carpels

B sepals

C stamens

D stigma

12 The diagram shows a food chain.

maize → mouse → owl

Which terms describe the organisms in this food chain?

	maize	mouse	owl
A	consumer	carnivore	producer
B	consumer	herbivore	carnivore
C	producer	carnivore	herbivore
D	producer	herbivore	carnivore

13 Which two gases contribute towards global warming?

A carbon dioxide and methane

B carbon dioxide and nitrogen

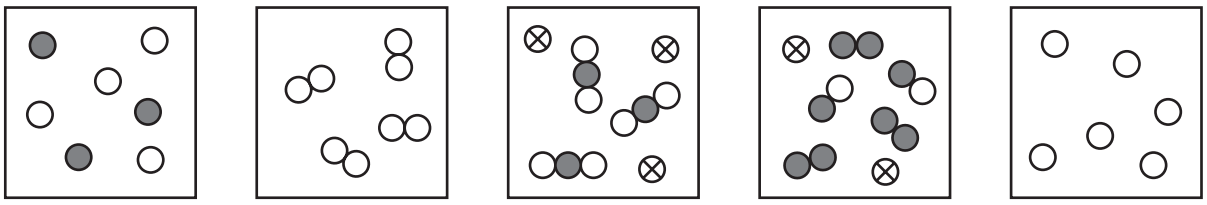
C nitrogen and water vapour

D oxygen and methane

[Turn over

14 The diagrams represent different substances.

P Q R S T



Which row describes the substances?

	only separate atoms	only molecules	mixture of atoms and molecules
A	P	Q	S
B	Q	T	R
C	T	P	R
D	T	Q	P

15 Which method is used to separate a mixture of two liquids?

A chromatography

B crystallisation

C filtration

D fractional distillation

16 Which process involves a physical change?

A adding magnesium to nitric acid

B burning methane

C evaporating petroleum

D rusting iron

17 Which statement about the formation of ions is correct?

A Anions are formed when atoms gain electrons.

B Anions are formed when atoms lose electrons.

C Cations are formed when atoms gain protons.

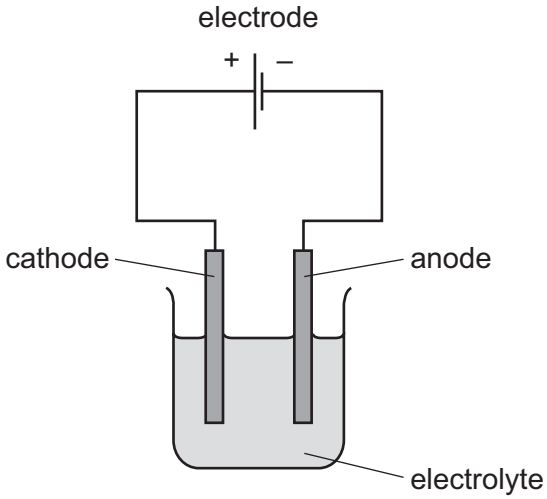
D Cations are formed when atoms lose protons.

18 Which formula represents a molecule that contains three different elements?

A CO_2 **B** H_2O **C** O_3 **D** $NOCl$

19 The diagram shows apparatus for electrolysis.

Only one label is correct.



Which label on the diagram is correct?

A anode

B cathode

C electrode

D electrolyte

20 Which change **must** take place in an endothermic reaction?

A Bubbles of gas are released.

B The mass decreases.

C The temperature decreases.

D The temperature increases.

21 Magnesium reacts with steam to form magnesium oxide and hydrogen gas.

$$\text{magnesium} + \text{water} \rightarrow \text{magnesium oxide} + \text{hydrogen}$$

Which statement about this reaction is correct?

A Hydrogen gas is reduced.

B Magnesium is oxidised.

C Magnesium is reduced.

D Water is oxidised.

22 Which chemicals are used in the test for nitrate ions?

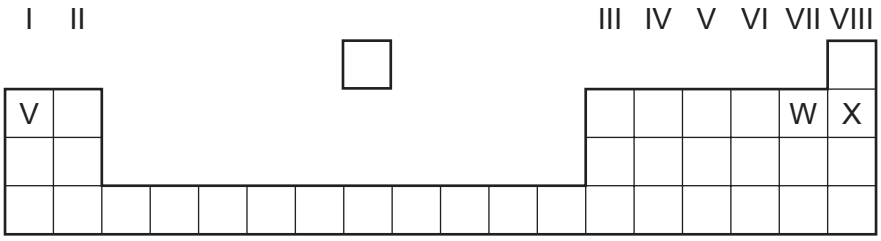
A aqueous barium nitrate and dilute nitric acid

B aqueous silver nitrate and dilute nitric acid

C dilute acid and limewater

D aqueous sodium hydroxide and aluminium

23 Part of the Periodic Table is shown.



Which element forms an anion and which element forms a cation?

	forms an anion	forms a cation
A	V	W
B	V	X
C	W	V
D	X	W

24 Which statement about transition metals is **not** correct?

A They are often used as catalysts.

B They form colourless compounds.

C They have high densities.

D They have high melting points.

25 Constantan is a mixture of copper and another metal.

Which type of substance is constantan?

A a compound

B a molecule

C a salt

D an alloy

26 A sample of clean air is bubbled through sodium hydroxide to remove carbon dioxide.

It is then passed over heated copper to remove oxygen.

Which gases are left in the air at the end of the experiment?

A nitrogen, noble gases and water vapour

B nitrogen and noble gases only

C nitrogen only

D noble gases and water vapour only

27 What are the products of the complete combustion of a hydrocarbon?

A carbon dioxide, carbon monoxide and water

B carbon dioxide and water only

C carbon dioxide only

D carbon monoxide and water only

28 A vehicle takes 30 minutes to travel a distance of 60 km.

What is the average speed of the vehicle?

A 2.0 km / hour

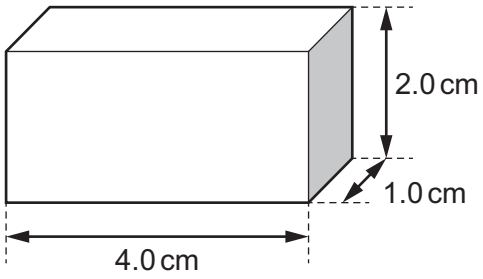
B 30 km / hour

C 120 km / hour

D 1800 km / hour

29 The diagram shows a solid rectangular block with the dimensions shown.

The block is made from a material of density 4.0 g / cm^3.



What is the mass of the block?

A 0.50 g **B** 1.0 g **C** 16 g **D** 32 g

[Turn over

30 A ball moves along hard, horizontal ground. The ball reaches a horizontal patch of mud. The mud causes the ball to stop.

What is the main energy change as the ball moves in the mud?

A gravitational energy to kinetic energy

B gravitational energy to thermal energy

C kinetic energy to gravitational energy

D kinetic energy to thermal energy

31 A train is travelling along a straight, horizontal track at constant speed.

The work done by the train is recorded as it travels through a measured distance.

Which quantity can be calculated using only these two pieces of information?

A force exerted by the train

B speed of the train

C time taken to travel this distance

D weight of the train

32 A liquid at room temperature is in an open dish. The liquid is evaporating.

Which statement about the evaporation is correct?

A It causes the liquid's surroundings to become warmer.

B It happens only at the surface of the liquid.

C It happens only when the room reaches a certain temperature.

D It involves the molecules with the least energy escaping from the liquid.

33 On a summer's day, hot air rises above hot roofs.

What is the name of this process?

A concentration

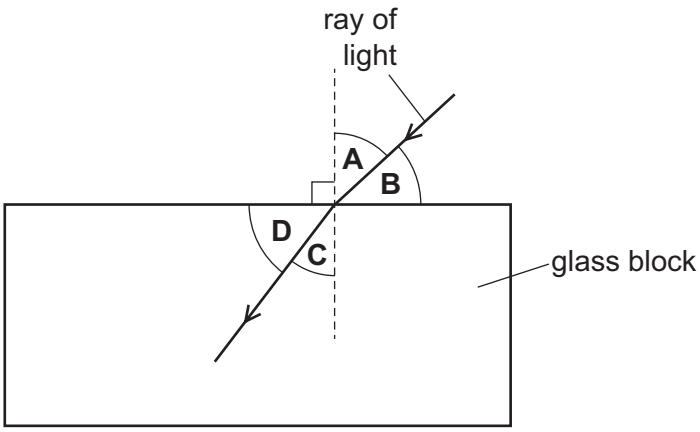
B condensation

C conduction

D convection

34 The diagram shows a ray of light as it enters a glass block.

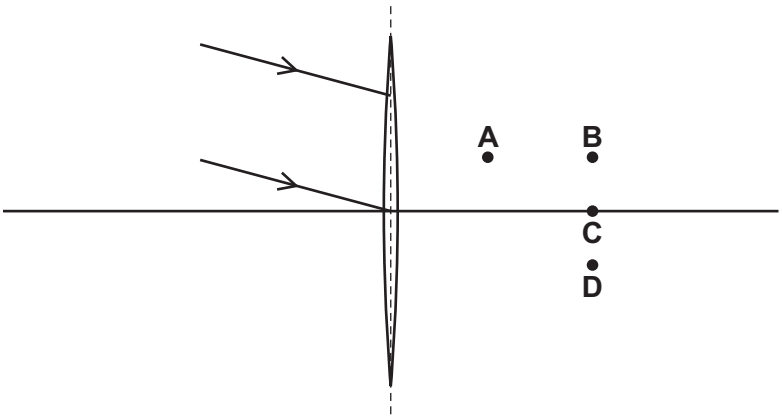
Which labelled angle is the angle of refraction?



35 The diagram represents two parallel rays of light striking a converging lens.

The rays pass through the lens.

Through which labelled point do both rays pass?



36 Infra-red waves, microwaves, ultraviolet waves and visible light are all electromagnetic waves.

Which of these has the smallest wavelength?

A infra-red

B microwaves

C ultraviolet

D visible light

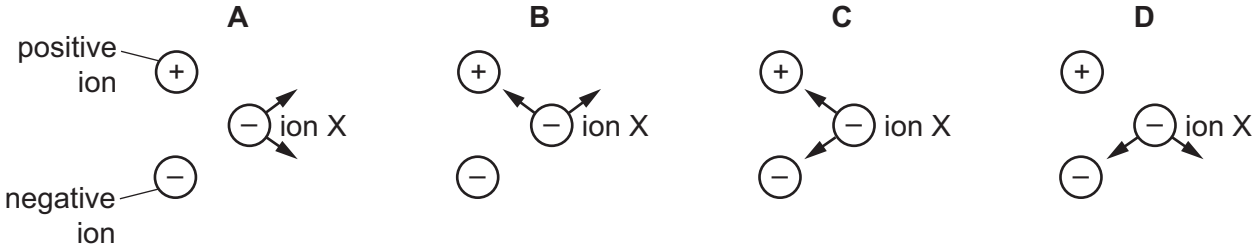
37 A singer sings two different notes. The first note is quiet and high-pitched. The second note is louder and lower-pitched.

Which row describes how the amplitude and the frequency of the second note compare with the amplitude and the frequency of the first note?

	amplitude	frequency
A	greater	greater
B	greater	smaller
C	smaller	greater
D	smaller	smaller

38 A negative ion X is close to a positive ion and another negative ion. Electrical forces act on ion X because of the charges in the other two ions.

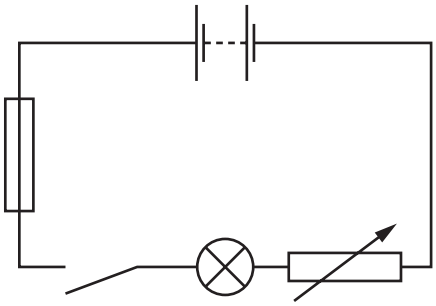
Which diagram shows the directions of the two forces acting on ion X?



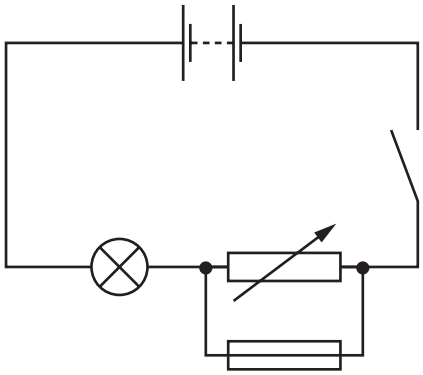
39 A lamp can be dimmed or switched off. Its circuit is protected by a fuse.

Which diagram shows this circuit?

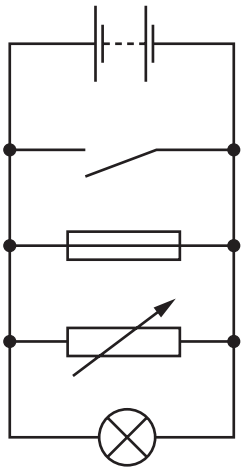
A



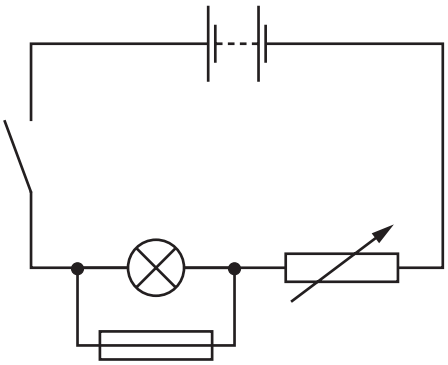
B



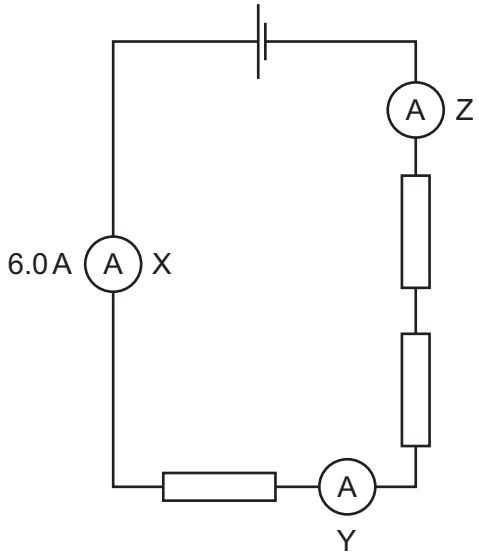
C



D



40 The diagram shows a circuit containing three identical resistors and three ammeters X, Y and Z.



The reading on ammeter X is 6.0 A.

What are the readings on ammeters Y and Z?

	reading on ammeter Y / A	reading on ammeter Z / A
A	2.0	4.0
B	3.0	3.0
C	4.0	2.0
D	6.0	6.0

BLANK PAGE

The Periodic Table of Elements

Group																	
I	II											III	IV	V	VI	VII	VIII
							1 H hydrogen 1										2 He helium 4
3 Li lithium 7	4 Be beryllium 9											5 B boron 11	6 C carbon 12	7 N nitrogen 14	8 O oxygen 16	9 F fluorine 19	10 Ne neon 20
11 Na sodium 23	12 Mg magnesium 24											13 Al aluminium 27	14 Si silicon 28	15 P phosphorus 31	16 S sulfur 32	17 Cl chlorine 35.5	18 Ar argon 40
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 –		

Key

atomic number
atomic symbol
name
relative atomic mass

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 dm^3 at room temperature and pressure (r.t.p.).