Cambridge Assessment International Education
Cambridge International General Certificate of Secondary Education

COMBINED SCIENCE **0653/22**

Paper 2 Multiple Choice (Extended) **February/March 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 **14** printed pages and **2** blank pages.

1 The following are features of palisade mesophyll cells:

1 column shaped

2 have a nucleus

3 have large vacuoles

4 have many chloroplasts

Which features of these cells help them to absorb maximum light and carry out photosynthesis?

A 1, 2, 3 and 4

B 1 and 4 only

C 2 and 4 only

D 4 only

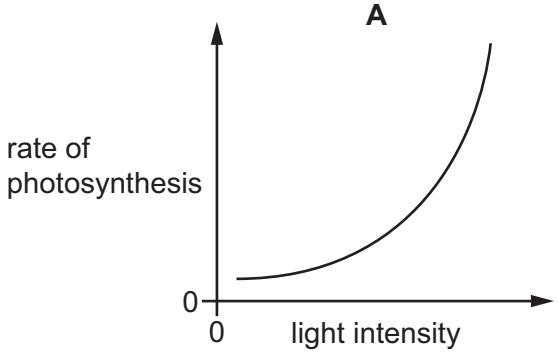
2 In an experiment, an enzyme from the human alimentary canal is found to work slowly at 20 °C.

What is the optimum temperature for enzymes working in the human alimentary canal?

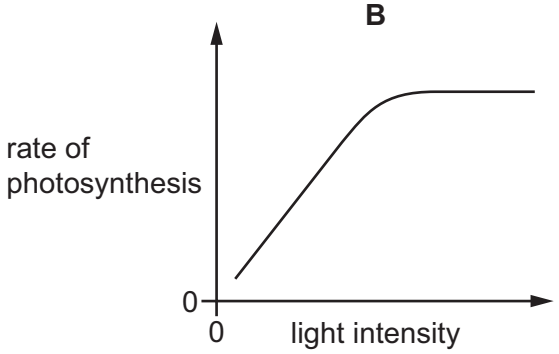
A 17 °C **B** 27 °C **C** 37 °C **D** 77 °C

3 Which graph shows the effect of light intensity on the rate of photosynthesis?

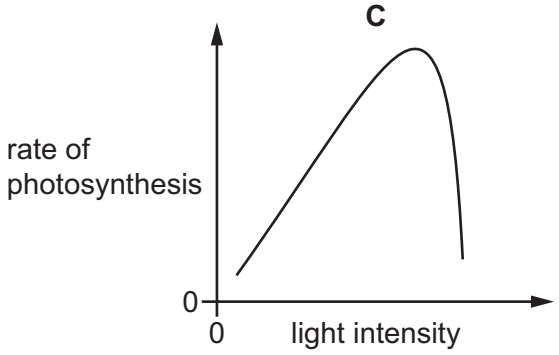
A



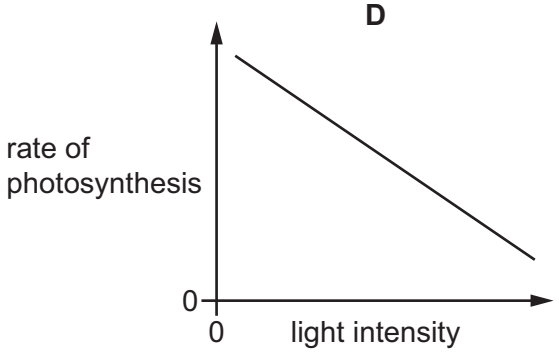
B



C



D



4 What is caused by an iron deficiency in the diet of a human?

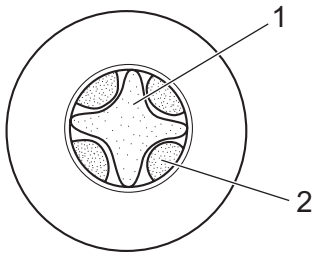
A bleeding gums

B rickets

C cannot form white blood cells

D anaemia

5 The diagram shows a transverse section through a plant root.



In which tissue is water transported from the root to the leaves?

A 1 and 2 **B** 1 only **C** 2 only **D** neither 1 or 2

6 What will give the **lowest** rate of transpiration?

1 high temperature

2 high humidity in the atmosphere

3 high rate of movement of water molecules

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

7 What are the reactants in aerobic respiration?

A carbon dioxide and oxygen

B carbon dioxide and water

C glucose and oxygen

D glucose and water

8 What controls phototropism and gravitropism in the shoot of a plant?

A auxin in the cells

B carbon dioxide in the air

C minerals in the soil

D water in the cells

[Turn over

9 Which row is correct for sexual reproduction?

	genetically different offspring produced	one parent	zygote produced
A	✓	✓	✗
B	✓	✗	✓
C	✗	✓	✗
D	✗	✗	✓

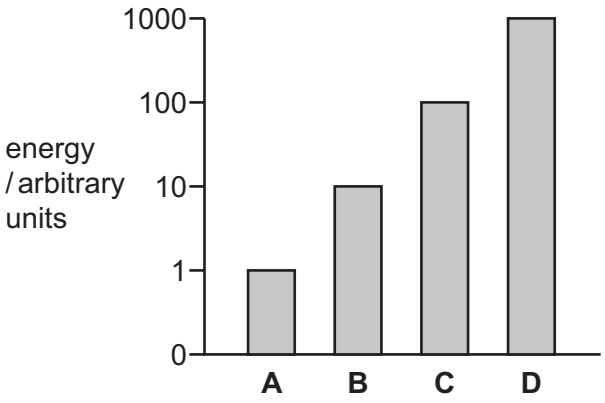
10 Four students are comparing the human male and female gametes.

Which student has the correct comparison?

	size	movement	number
A	egg bigger	sperm mobile	usually one egg
B	sperm bigger	sperm not mobile	many eggs
C	egg bigger	sperm not mobile	one sperm
D	sperm bigger	sperm mobile	many sperm

11 The graph shows the energy content of organisms at each trophic level in a food chain.

Which letter represents the primary consumers?



12 A farmer chops down a tree to provide firewood. He gets warm when chopping down the tree. The farmer then burns the wood to keep warm.

What is the original source of the energy that warms the farmer in both cases?

A photosynthesis by the tree growing the wood

B respiration

C the match used to light the fire

D the Sun

13 Eutrophication causes the death of organisms in water.

Which row shows the changes that take place during eutrophication?

	decomposition	respiration	oxygen concentration
A	decreases	increases	decreases
B	increases	decreases	decreases
C	decreases	decreases	increases
D	increases	increases	decreases

14 Which statement describes oxygen molecules at room temperature and pressure?

A They are closely packed and move around slowly.

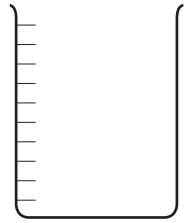
B They are closely packed and vibrate about a fixed point.

C They are loosely packed and move around rapidly.

D They are loosely packed and vibrate about a fixed point.

15 Which piece of equipment can be used to measure exactly 21.6 cm^3 of dilute sulfuric acid?

A

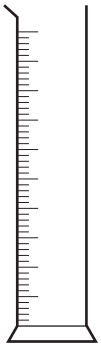


beaker

B

burette

C



measuring cylinder

D

pipette

16 Which statement about the compound formed between a metal and a non-metal is correct?

A It forms strong bonds by sharing electrons.

B It has strong bonds between its atoms.

C It has strong bonds between metal ions and delocalised electrons.

D It has strong bonds between oppositely charged ions.

17 Which statement about the electrolysis of molten lead(II) bromide is correct?

A Bromide ions gain electrons to form bromine at the cathode.

B Bromine loses electrons to form bromide ions at the anode.

C Lead atoms lose electrons to form lead ions at the anode.

D Lead ions accept electrons to form lead at the cathode.

18 Four statements about reactions are listed.

1 Burning a fuel is an exothermic reaction.

2 Endothermic reactions heat up the surroundings.

3 Endothermic reactions take in energy.

4 When exothermic reactions take place the reactants gain energy.

Which statements are correct?

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

19 Which statement about the rate of a reaction is **not** correct?

A Decreasing the concentration of a reactant solution decreases the frequency of collisions between particles.

B Decreasing the temperature of a reaction mixture decreases the frequency of collisions between particles.

C Increasing the particle size of a solid reactant increases the rate of the reaction.

D Increasing the temperature of a reaction mixture increases the rate of the reaction.

20 A solution is tested for the presence of cations.

test	result
add excess aqueous ammonia	green precipitate

Which cation is present?

A Cu^{2+} **B** Fe^{2+} **C** Fe^{3+} **D** Zn^{2+}

21 Chlorine, bromine and iodine are elements in Group VII of the Periodic Table.

Which trend is observed going down Group VII?

A Each element has the same physical state.

B The colour of the element becomes lighter.

C The reactivity of the element decreases.

D The state of the element changes from solid to liquid to gas.

22 Hydrogen reacts very slowly with nitrogen to form ammonia.

Metal X is a catalyst for this reaction.

What is another property of metal X?

A It forms coloured compounds.

B It forms covalent compounds.

C It has a low density.

D It has a low melting point.

23 The reactivity series for some metals and carbon is shown.

potassium sodium calcium magnesium aluminium carbon zinc copper

most reactive ⟶ least reactive

Which process is used to extract calcium from its ore?

A reducing the ore with carbon

B electrolysis of the molten ore

C heating the ore with aluminium

D heating the ore in an inert atmosphere

24 A colourless liquid turns blue cobalt chloride paper to pink.

The colourless liquid boils at 78 °C.

Which statement about the colourless liquid is correct?

A It does not contain water.

B It is a hydrocarbon.

C It contains some water.

D It is pure water.

[Turn over

25 Some statements about gases in the air are listed.

1 The amount of carbon dioxide in the atmosphere is increased by burning fossil fuels.

2 Methane is a greenhouse gas.

3 Increasing carbon dioxide in the atmosphere decreases the greenhouse effect.

4 Methane is a product of respiration.

Which statements describe factors that contribute to climate change?

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

26 Which of hydrogen, petroleum and wood are fossil fuels?

	hydrogen	petroleum	wood
A	✓	✓	✓
B	✓	✗	✗
C	✗	✓	✗
D	✗	✗	✓

27 Which statement describes compounds in the same homologous series?

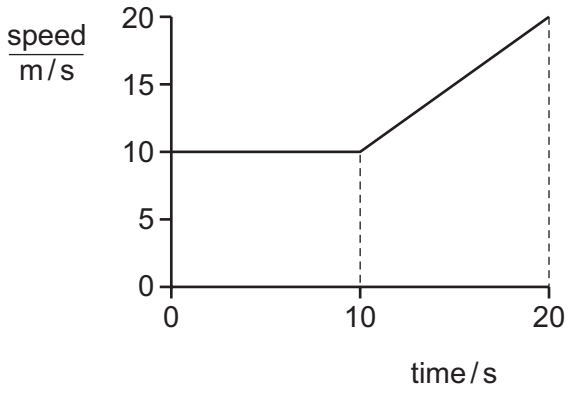
A They have different general formulae and different chemical properties.

B They have different general formulae and similar chemical properties.

C They have the same general formula and different chemical properties.

D They have the same general formula and similar chemical properties.

28 The speed-time graph represents part of the journey of a car.



How far does the car travel between 0 s and 20 s?

A 150 m **B** 200 m **C** 250 m **D** 400 m

29 A vehicle moves in a straight line.

The table shows how its speed varies over a time of 40 s.

time / s	0	10	20	30	40
speed / m/s	26	24	18	10	2

What describes the motion of the vehicle during the 40 s?

A constant acceleration

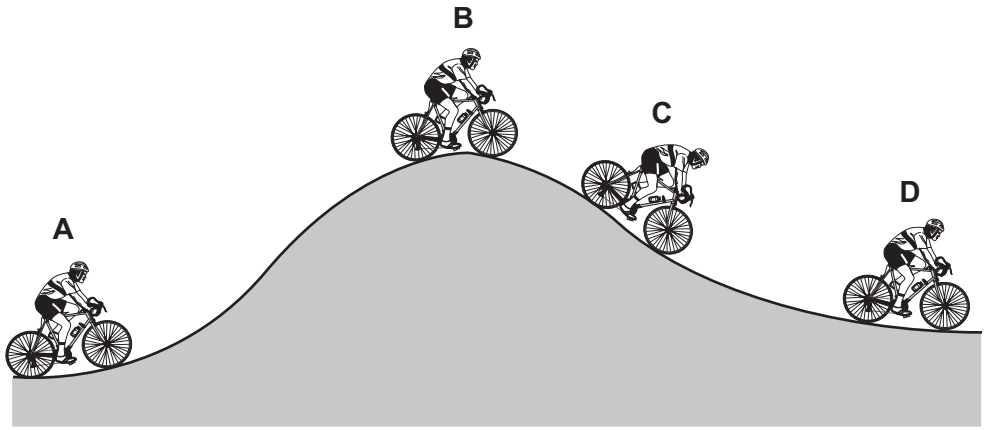
B constant deceleration

C non-constant deceleration

D positive acceleration

30 The diagram shows a cyclist riding along a hilly road.

At which position does the cyclist have the least gravitational potential energy?

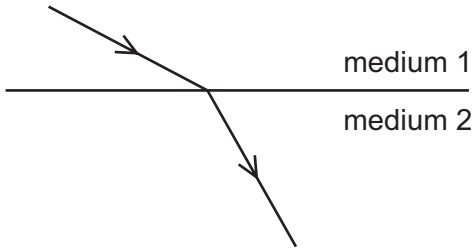


31 Which row gives thermal properties of air and aluminium?

	air	aluminium
A	a bad thermal conductor	a bad thermal conductor
B	a bad thermal conductor	a good thermal conductor
C	a good thermal conductor	a bad thermal conductor
D	a good thermal conductor	a good thermal conductor

[Turn over

32 The diagram shows the direction of a wave passing from medium 1 into medium 2.



How do the speed and the wavelength of the wave in medium 2 compare with the speed and the wavelength of the wave in medium 1?

A In medium 2, both the speed and the wavelength are greater.

B In medium 2, both the speed and the wavelength are smaller.

C In medium 2, the speed is greater but the wavelength stays the same.

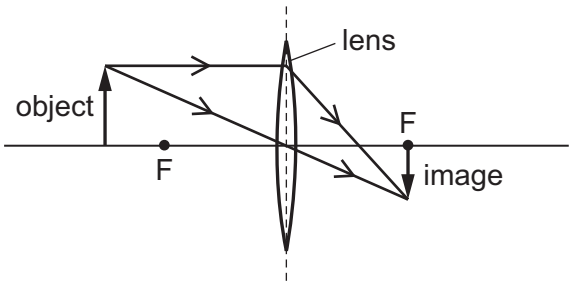
D In medium 2, the speed is smaller but the wavelength stays the same.

33 A thin converging lens forms a real image.

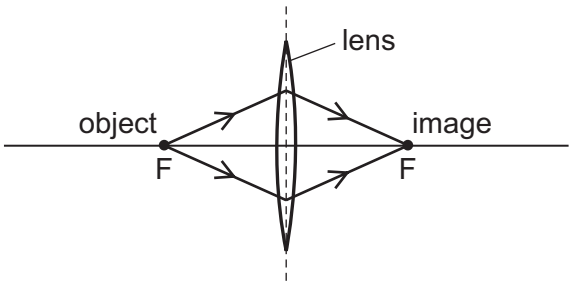
In the diagrams F indicates each principal focus of the lens.

Which diagram shows how a real image of the object is formed?

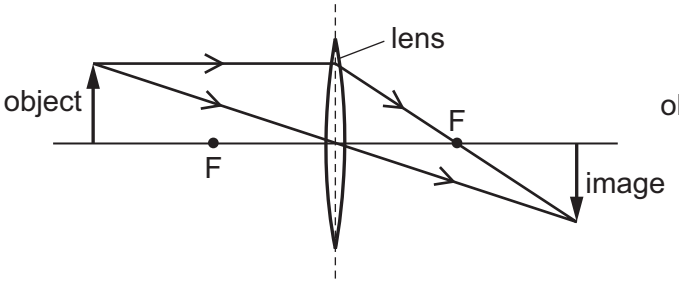
A



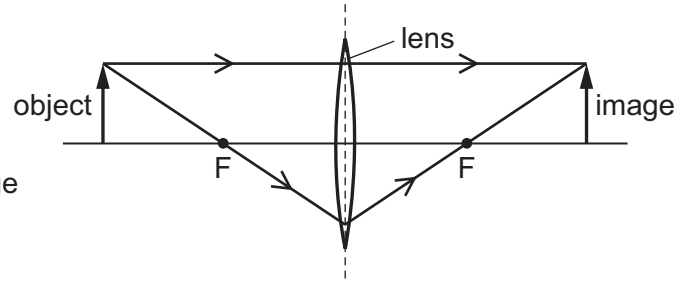
B



C



D



34 Which statement about light and infra-red radiation is correct?

A Their wavelengths in a vacuum are equal.

B They are longitudinal waves.

C They need a medium through which to travel.

D They travel at 3.0×10^8 m / s in a vacuum.

35 There is a current of 6.0 A in a wire.

How much charge flows through the wire in 2.0 minutes?

A 0.050 coulomb

B 3.0 coulomb

C 12 coulomb

D 720 coulomb

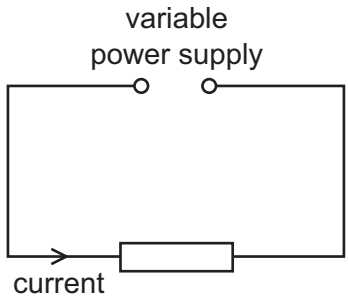
36 A resistance wire of length l has cross-sectional area A and resistance R.

A second resistance wire of the same material has length $0.50\,l$ and cross-sectional area $2.0\,A$.

What is the resistance of the second wire?

A $0.25\,R$ **B** $0.50\,R$ **C** R **D** $2.0\,R$

37 A variable power supply is connected to a resistor and there is a current in the resistor.



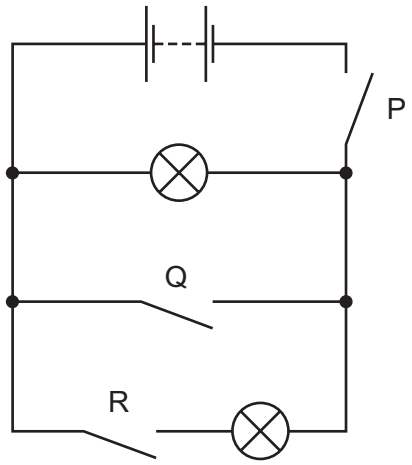
The potential difference across the resistor is decreased.

The temperature of the resistor does not change.

What happens to the current in the resistor and what happens to the resistance of the resistor?

	current	resistance
A	decreases	increases
B	decreases	stays the same
C	increases	decreases
D	increases	stays the same

38 The diagram shows a circuit with three switches P, Q and R.



Which switches must be closed so that both lamps light?

A P and Q only

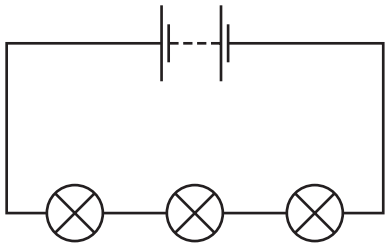
B P and R only

C Q and R only

D P, Q and R

39 The diagram shows three identical lamps connected in series to a battery.

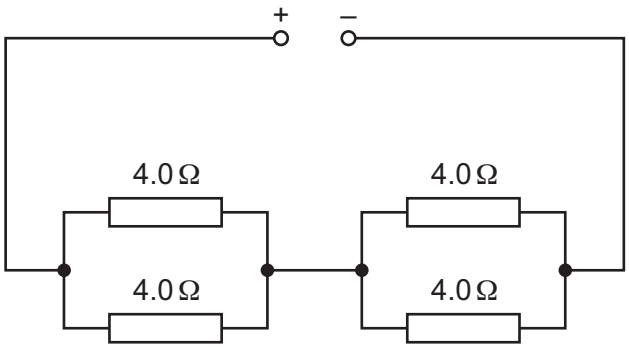
Each lamp is labelled 0.60 V, 0.30 A. The lamps are working at normal brightness.



What is the potential difference across the battery and the current in the battery?

	potential difference / V	current / A
A	0.60	0.30
B	0.60	0.90
C	1.80	0.30
D	1.80	0.90

40 The diagram shows four 4.0 Ω resistors connected to a power supply.



What is the resistance of the circuit?

A 1.0 Ω **B** 2.0 Ω **C** 4.0 Ω **D** 16 Ω

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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.).