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Cambridge International Examinations
Cambridge International General Certificate of Secondary Education

COMBINED SCIENCE **0653/12**

Paper 1 Multiple Choice (Core) **February/March 2017**

45 minutes

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

* 2 6 2 3 7 2 7 1 8 9 *

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.

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1 One characteristic of all living organisms is that they carry out respiration.

What does this mean?

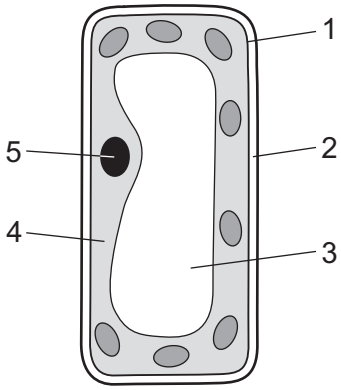
A They break down food to release energy.

B They breathe, exchanging gases with the environment.

C They release waste into the environment.

D They take in food from their surroundings.

2 The diagram shows a plant cell.

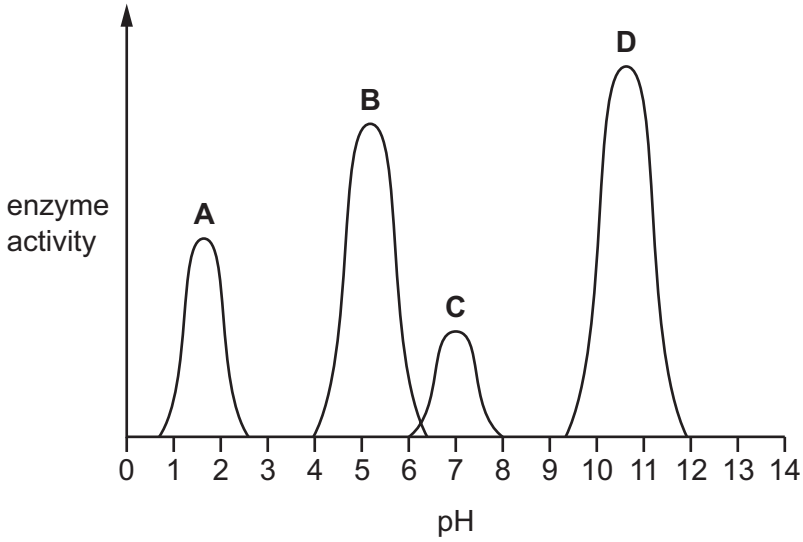


Which two parts are found in plant cells but **not** in animal cells?

A 1 and 5 **B** 2 and 3 **C** 2 and 4 **D** 3 and 5

3 The graph shows the effect of pH on the activity of four different enzymes.

Which enzyme is most active in the stomach?



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4 What must be present for photosynthesis to occur?

	chlorophyll	light	oxygen	water
A	✓	✓	✓	✓
B	✓	✓	✗	✓
C	✗	✓	✓	✗
D	✗	✗	✗	✓

key

✓ = is necessary

✗ = not necessary

5 Which row shows where starch is digested in the alimentary canal?

	duodenum	liver	pancreas
A	digested	digested	digested
B	digested	not digested	not digested
C	not digested	digested	not digested
D	not digested	not digested	digested

6 Which statement describes transpiration?

A evaporation of water from leaf mesophyll cells

B intake of water from the atmosphere through the stomata

C transport of water through xylem tissue to the leaves

D uptake of water by root hairs in the soil

7 Oxygenated blood returns to the heart from the lungs in vessel X and leaves the heart to circulate around the body in vessel Y.

What are X and Y?

	X	Y
A	aorta	pulmonary vein
B	pulmonary artery	vena cava
C	pulmonary vein	aorta
D	vena cava	pulmonary artery

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8 Limewater is a colourless liquid.

What happens to limewater when you breathe into it?

A It stays colourless.

B It turns blue.

C It turns cloudy.

D It turns yellow.

9 Which row shows an effect of the hormone adrenaline, and the organ where adrenaline is broken down?

	effect of adrenaline	organ where adrenaline is broken down
A	decreases blood glucose concentration	heart
B	decreases blood glucose concentration	liver
C	increases blood glucose concentration	heart
D	increases blood glucose concentration	liver

10 What is a product of asexual reproduction?

A a diploid nucleus due to fertilisation

B a zygote

C genetically dissimilar offspring

D genetically identical offspring

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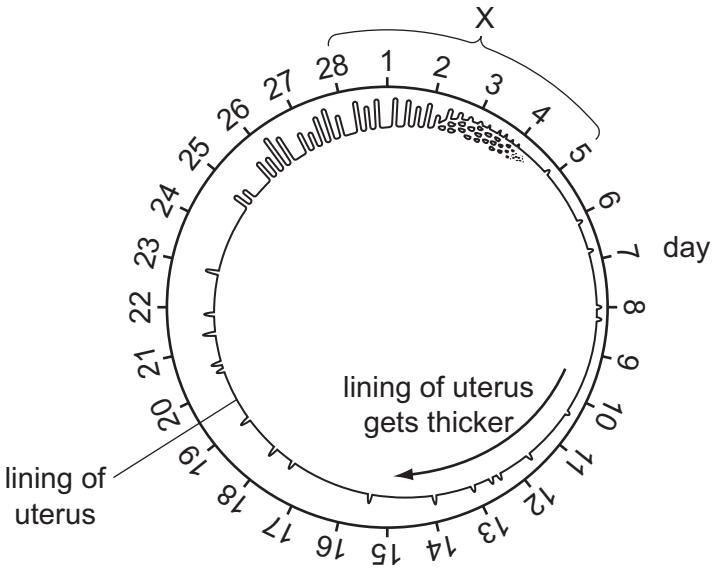
11 The diagram shows the changes that occur to the uterus lining during the menstrual cycle.



Which stage of the cycle is represented by X?

A fertilisation

B implantation

C ovulation

D menstruation

12 Energy flows along a food chain.

What does every food chain start with?

A carnivore

B consumer

C herbivore

D producer

13 Which two gases contribute most to global warming?

A carbon dioxide and methane

B carbon monoxide and carbon dioxide

C methane and oxygen

D oxygen and carbon monoxide

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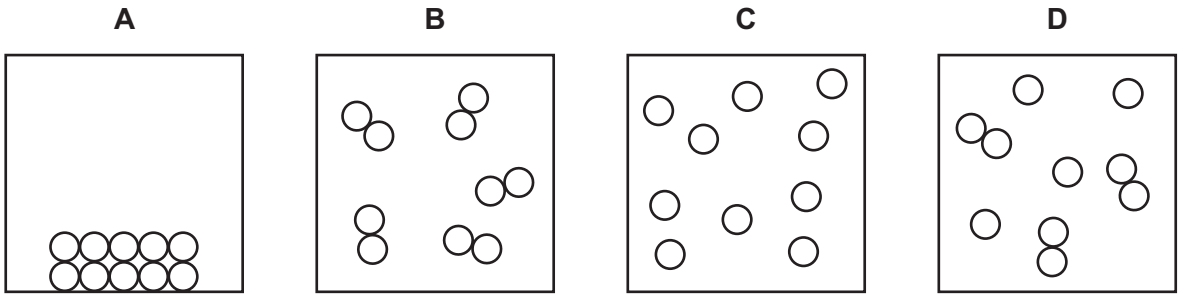
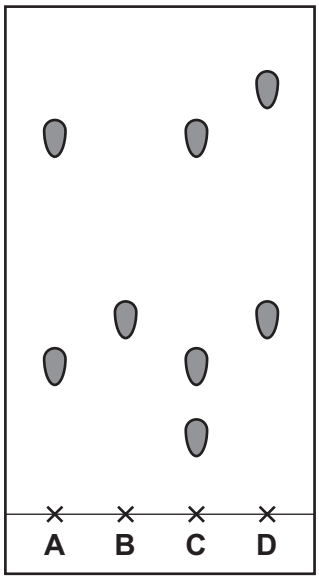
14 Which diagram represents molecules of hydrogen gas?



15 Which substance on the chromatogram is a pure substance?



16 The atomic (proton) number of potassium is 19.

The mass (nucleon) number of potassium is 39.

Which statement describes a neutral atom of potassium?

A It contains 19 electrons and 20 neutrons.

B It contains 19 electrons and 39 neutrons.

C It contains 20 electrons and 19 neutrons.

D It contains 39 electrons and 19 neutrons.

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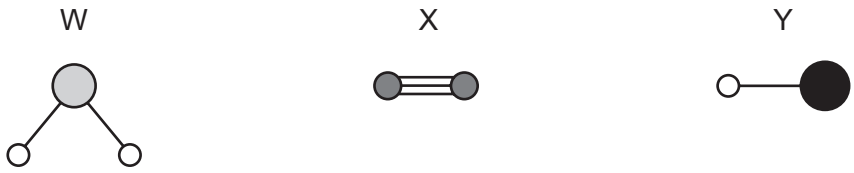
17 Molecules of W, X and Y are shown.



What are W, X and Y?

	W	X	Y
A	hydrogen chloride	nitrogen	water
B	hydrogen chloride	water	nitrogen
C	nitrogen	hydrogen chloride	water
D	water	nitrogen	hydrogen chloride

18 Which row shows the formulae of sodium hydroxide and of potassium hydroxide?

	sodium hydroxide	potassium hydroxide
A	NaOH	KOH
B	NaOH	POH
C	SOH	KOH
D	SOH	POH

19 Copper chloride and lead(II) bromide are ionic compounds.

Glucose is a covalent compound.

Which substance undergoes electrolysis?

A aqueous copper chloride

B aqueous glucose

C solid glucose

D solid lead(II) bromide

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20 Solid ammonium nitrate is soluble in water.

When a large quantity of ammonium nitrate is added to water, the water freezes.

Which statement describes this change?

A an endothermic chemical change

B an endothermic physical change

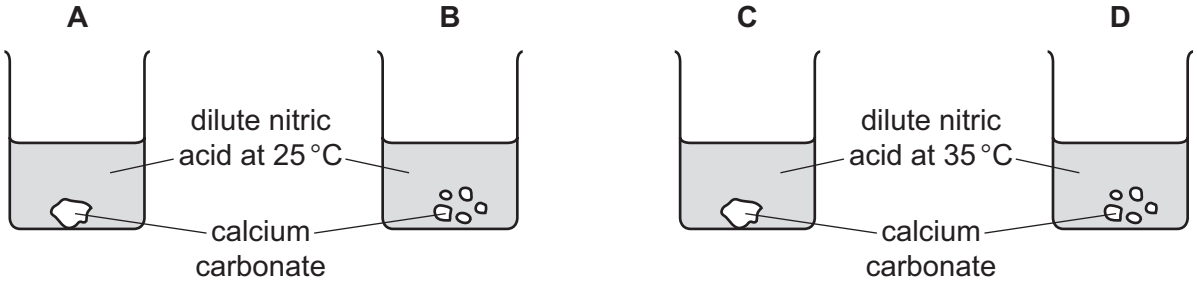
C an exothermic chemical change

D an exothermic physical change

21 Four experiments, each using 2 g of calcium carbonate and dilute nitric acid, are set up.

In each experiment, the volume and concentration of the dilute nitric acid is the same.

Which reaction is fastest?



22 Which compound reacts with dilute sulfuric acid?

A magnesium chloride

B potassium carbonate

C sodium sulfate

D zinc nitrate

23 Which aqueous reagents give a white precipitate when added to aqueous zinc chloride?

	sodium hydroxide	barium nitrate	silver nitrate
A	✓	✓	✓
B	✓	✓	✗
C	✓	✗	✓
D	✗	✓	✓

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24 Element X is a very soft solid.

It reacts violently with water.

A purple flame is seen as it reacts with water.

What is X?

A iodine

B potassium

C sodium

D zinc

25 Iron occurs in the ground as iron oxide.

Gold occurs in the ground as the element.

Which statement explains this observation?

A Gold is more reactive than iron.

B Gold oxide is more reactive than iron oxide.

C Iron is more reactive than gold.

D Iron oxide is more reactive than gold oxide.

26 Which chemical test shows the presence of water?

A Water has a boiling point of 100 °C.

B Water has a freezing point of 0 °C.

C Water turns anhydrous cobalt chloride from blue to pink.

D Water turns anhydrous copper sulfate from blue to white.

27 A hydrocarbon fuel is burned completely.

$$\text{hydrocarbon fuel} + \text{oxygen} \rightarrow X + Y$$

What are X and Y?

	X	Y
A	CO	H_2
B	CO	H_2O
C	CO_2	H_2
D	CO_2	H_2O

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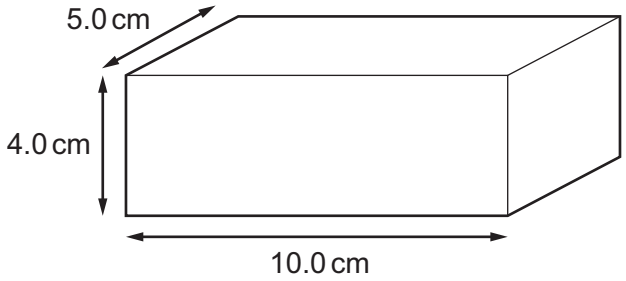
28 A car travels between two towns. After 1 hour the driver has travelled 120 km. She then stops and rests for 1 hour. She takes another 1 hour to travel a further 60 km to reach her destination.

What is the average speed of the car for the whole journey?

A 60 km / h **B** 90 km / h **C** 120 km / h **D** 180 km / h

29 A solid rectangular metal block has the dimensions shown. The density of the metal is 8.0 g / cm^3.



What is the mass of the metal block?

A 160 g **B** 320 g **C** 400 g **D** 1600 g

30 In which unit is the kinetic energy of a car measured?

A joule

B joule / second

C metre / second

D metre / $second^2$

31 Which energy resource is **not** renewable?

A geothermal

B nuclear

C solar

D wind

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32 Diagram 1 shows a force *F* lifting a weight through a height *h*.

Diagram 2 shows the same force *F* lifting the same weight through a height 2*h*.

In both cases, air resistance and friction are negligible.

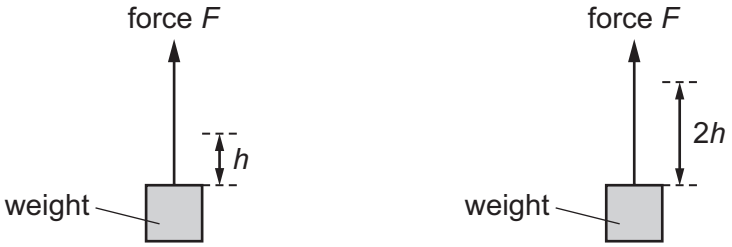

diagram 1 diagram 2

Each lift can take either 1 s or 10 s.

Which row shows the greatest power being developed when the weight is lifted?

	height lifted	time taken for the lift / s
A	*h*	1
B	*h*	10
C	2*h*	1
D	2*h*	10

33 In which states of matter is convection the main heat transfer process?

A gases and solids only

B liquids and gases only

C solids and liquids only

D solids, liquids and gases

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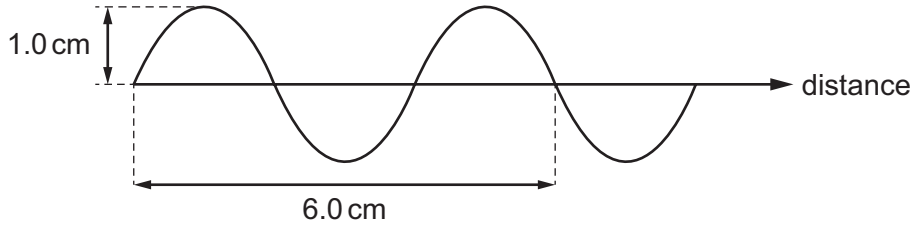
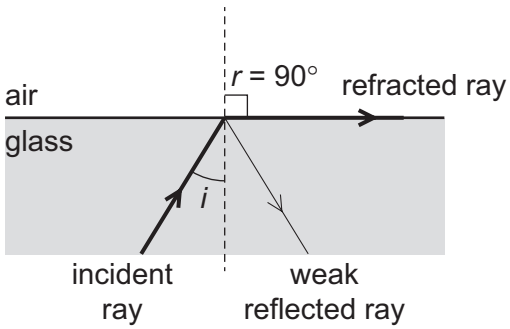
34 The diagram represents a wave, with two measurements given.



Which row gives the amplitude of the wave and the wavelength of the wave?

	amplitude / cm	wavelength / cm
A	1.0	4.0
B	1.0	8.0
C	2.0	4.0
D	2.0	8.0

35 The diagram shows a ray of light hitting the edge of a glass block. Three rays, the angle of incidence *i* and the angle of refraction *r* are labelled.



Angle *i* is decreased slightly.

What happens?

A Angle *r* becomes equal to the critical angle.

B Angle *r* becomes less than 90°.

C The weak reflected ray disappears.

D Total internal reflection occurs.

36 Which of these uses electromagnetic waves with the highest frequency?

A airport security scanners

B radio communication

C satellite television

D television remote controllers

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37 Four loudspeakers each vibrate at the frequencies shown.

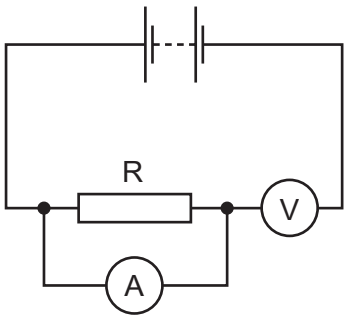
Which loudspeaker produces the lowest-pitched sound that can be heard by a human?

A 5.0 Hz **B** 10 Hz **C** 5.0×10^3 Hz **D** 10×10^3 Hz

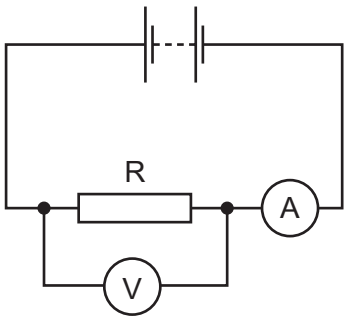
38 The diagrams show four circuits.

Which circuit can be used to find the resistance of resistor R?

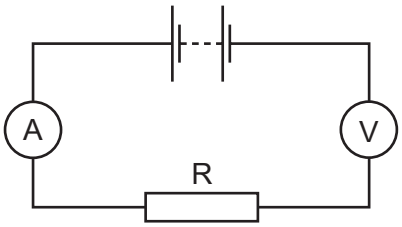
A



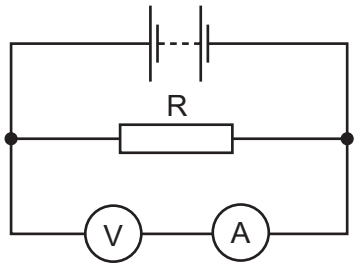
B



C



D



39 What is the purpose of a 3 A fuse?

A to keep the average current at 3.0 A

B to keep the current constant at 3.0 A

C to stop the current decreasing below 3.0 A

D to stop the current increasing above 3.0 A

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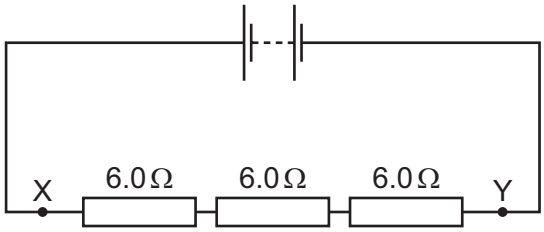
40 The diagram shows a battery connected to three 6.0 Ω resistors.

Two points X and Y are marked on the circuit.



What is the combined resistance of the three resistors, and how does the current at point Y compare with the current at point X?

	combined resistance / Ω	current at point Y
A	6.0	less than current at point X
B	6.0	the same as current at point X
C	18	less than current at point X
D	18	the same as current at point X

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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.).

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