



Cambridge IGCSE™

COMBINED SCIENCE

0653/12

Paper 1 Multiple Choice (Core)

February/March 2021

45 minutes

You must answer on the multiple choice answer sheet.

You will need: Multiple choice answer sheet
Soft clean eraser
Soft pencil (type B or HB is recommended)

INSTRUCTIONS

- 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 multiple choice answer sheet.
- Follow the instructions on the multiple choice answer sheet.
- Write in soft pencil.
- Write your name, centre number and candidate number on the multiple choice answer sheet in the spaces provided unless this has been done for you.
- Do **not** use correction fluid.
- Do **not** write on any bar codes.
- You may use a calculator.

INFORMATION

- The total mark for this paper is 40.
- Each correct answer will score one mark.
- Any rough working should be done on this question paper.
- The Periodic Table is printed in the question paper.

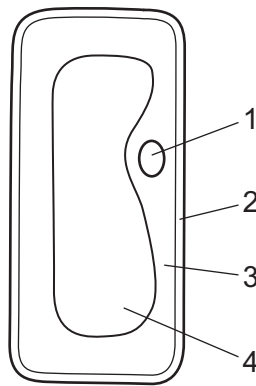
This document has **16** pages.



1 What are the characteristics of living organisms?

	excretion	growth	movement	nutrition	reproduction	respiration	sensitivity / response
A	✓	✓	✓	✓	✓	✓	✓
B	✓	✓	x	✓	✓	✓	✓
C	✓	x	x	✓	x	✓	✓
D	x	✓	✓	✓	✓	✓	x

2 The diagram shows a plant cell.



Which structures are also found in an animal cell?

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

3 What are the smaller molecules that make up fats, protein and starch?

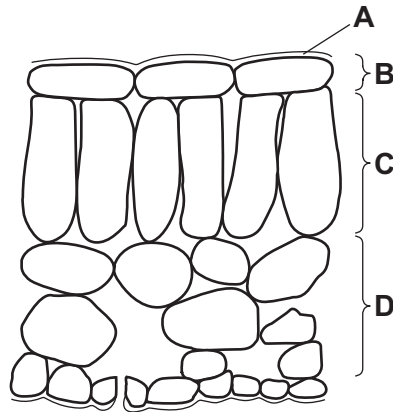
	fats	protein	starch
A	glucose	glycogen	fatty acids and glycerol
B	glucose	amino acids	glycogen
C	fatty acids and glycerol	amino acids	glucose
D	fatty acids and glycerol	glycogen	amino acids

4 What are enzymes made from?

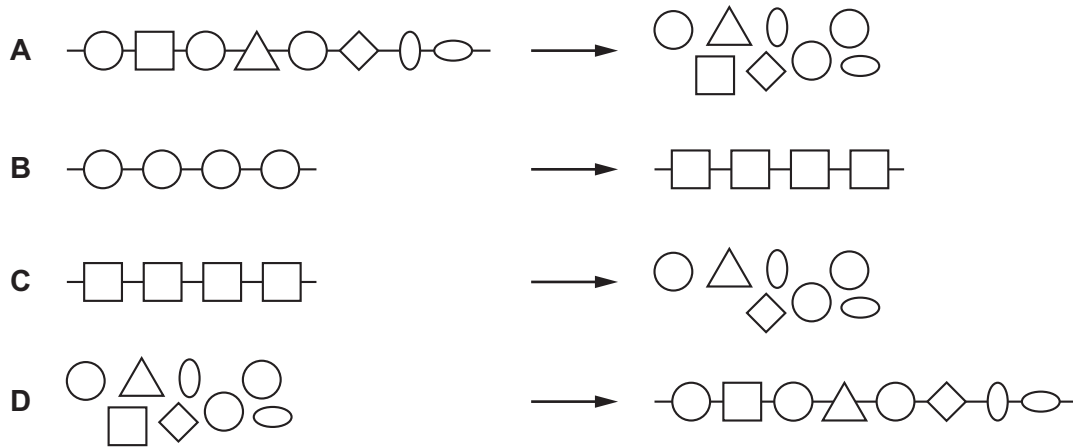
- A** carbohydrates
B fats
C proteins
D sugars

5 The diagram shows a section of a leaf.

Which letter is the epidermis?



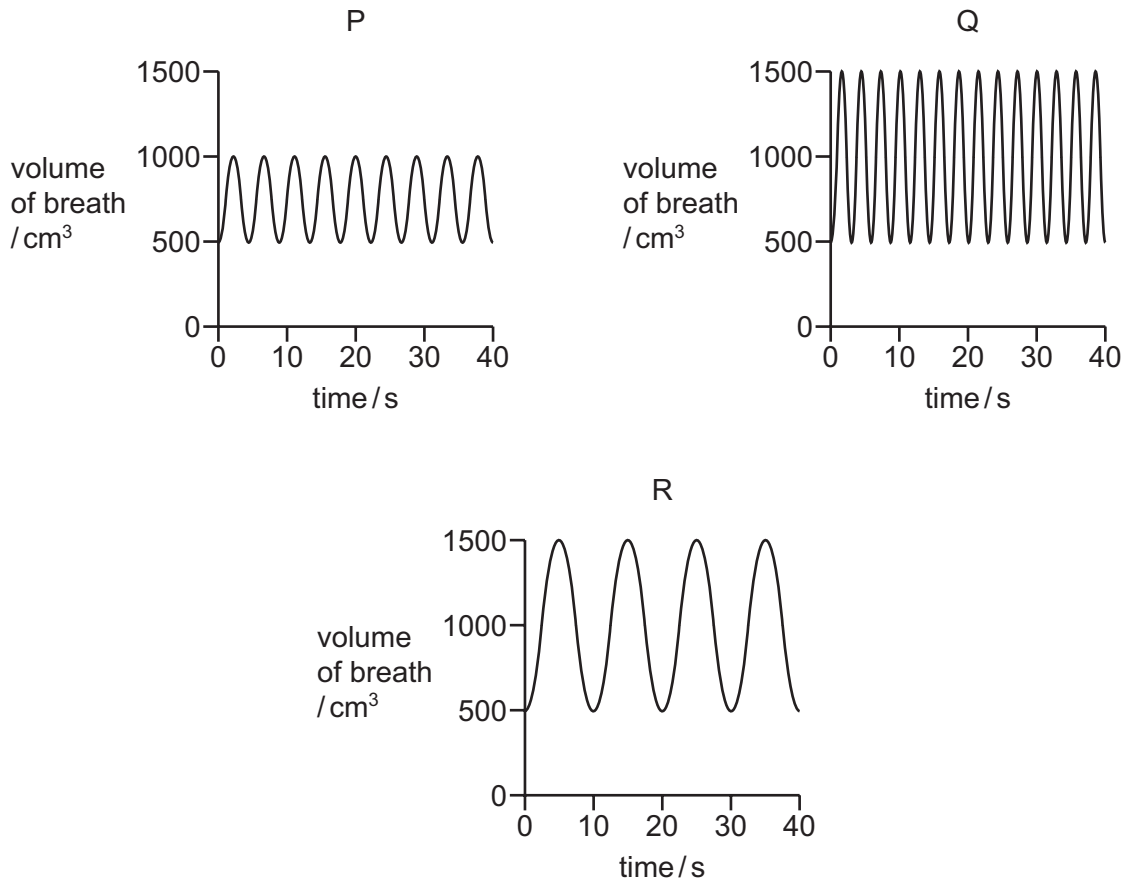
6 Which diagram represents the digestion of food molecules in the alimentary canal?



7 What is the function of valves in the circulatory system?

- A to act as a pump
- B to ensure blood only flows one way
- C to provide a large surface area
- D to stop blood vessels bursting

8 The graphs show the effects of different levels of activity on the rate and depth of breathing.




Which graphs show the rate and depth of breathing during exercise and during rest?

	exercise	rest
A	P	Q
B	P	R
C	Q	P
D	Q	R

9 If the aerobic respiration equation was 1 + 2 → 3 + 4, which row would show the correct equation?





	1	2	3	4
A	carbon dioxide	glucose	oxygen	water
B	glucose	oxygen	water	carbon dioxide
C	oxygen	water	carbon dioxide	glucose
D	water	carbon dioxide	glucose	oxygen

10 The table shows some data recorded by a scientist about a student.

pupil size in eye	pulse rate /beats per minute
	68

The scientist then frightens the student with a sudden loud noise.

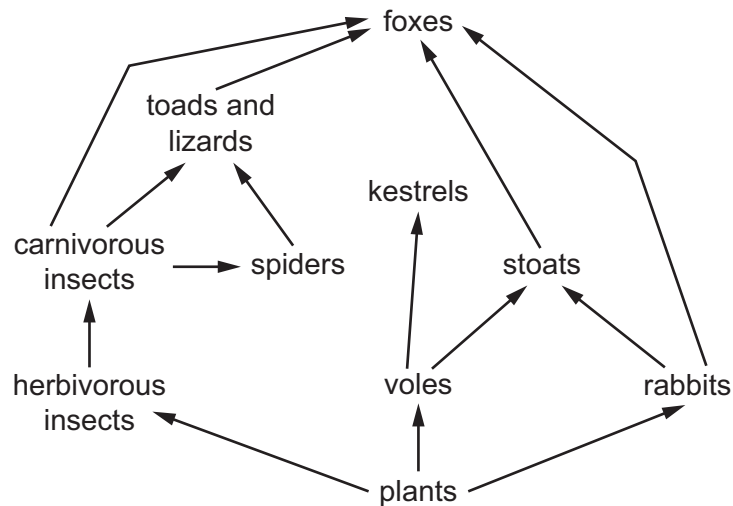
Which row shows the results immediately after the loud noise?

	pupil size in eye	pulse rate /beats per minute
A		60
B		80
C		60
D		80

11 Which row is correct for asexual reproduction?

	offspring are genetically identical	number of parents
A	yes	one
B	yes	two
C	no	one
D	no	two

12 The diagram shows a food web.



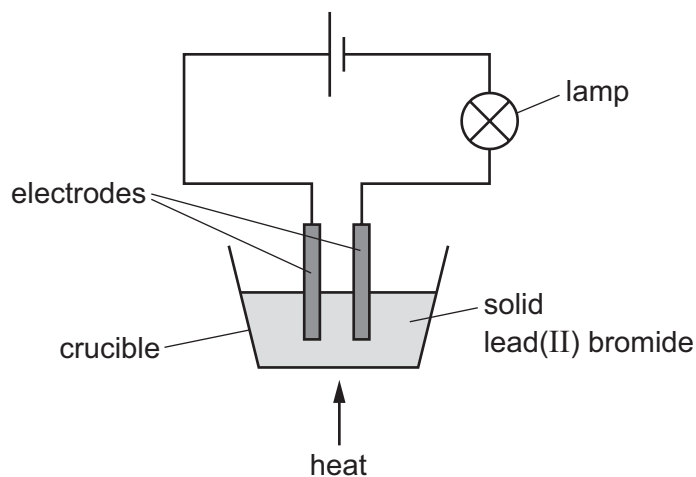
Which organisms in this food web are secondary consumers?

- A carnivorous insects and voles
 - B foxes and lizards
 - C kestrels and stoats
 - D spiders and stoats
- 13 Which process in the carbon cycle releases carbon back into the atmosphere?
- A feeding
 - B fossilisation
 - C photosynthesis
 - D respiration
- 14 Which methods of separation depend on the substances in a mixture having different boiling points?
- A crystallisation and distillation
 - B evaporation and filtration
 - C fractional distillation and chromatography
 - D fractional distillation and distillation

15 Which row describes an element and a compound?

	element	compound
A	contains more than one type of atom	contains elements chemically combined
B	contains more than one type of atom	contains elements mixed together
C	contains only one type of atom	contains elements chemically combined
D	contains only one type of atom	contains elements mixed together

16 The apparatus shown is set up.



The crucible needs to be heated for the lamp to give out light.

Why is heat needed?

- A** An exothermic reaction takes place in the crucible.
- B** Electrodes only conduct electricity when hot.
- C** Heat causes the lead(II) bromide to react with air.
- D** The lead(II) bromide must be molten.

17 Which word is used to describe a reaction that takes in heat energy from the surroundings?

- A** endothermic
- B** exothermic
- C** oxidation
- D** reduction

- 18** Four separate samples of magnesium are reacted with dilute hydrochloric acid. In each reaction the concentration of the hydrochloric acid is the same.

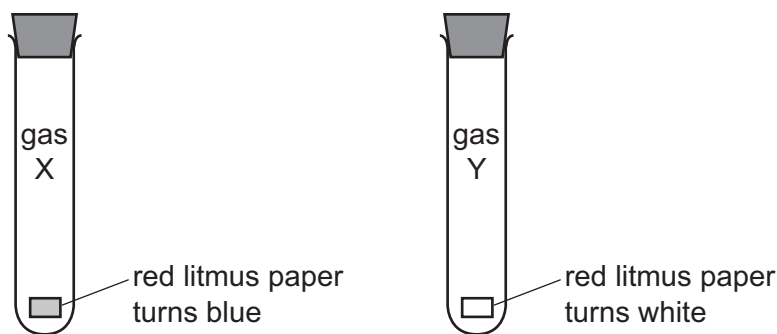
Which experiment gives the highest rate of reaction?

- A** 2 g of magnesium powder in 25 cm³ of dilute hydrochloric acid at 50 °C
 - B** 2 g of magnesium powder in 50 cm³ of dilute hydrochloric acid at 25 °C
 - C** 2 g of magnesium ribbon in 25 cm³ of dilute hydrochloric acid at 25 °C
 - D** 2 g of magnesium ribbon in 50 cm³ of dilute hydrochloric acid at 50 °C
- 19** Which equation represents a reaction in which oxidation and reduction occur?
- A** $\text{CaCO}_3 \rightarrow \text{CaO} + \text{CO}_2$
 - B** $2\text{H}_2 + \text{O}_2 \rightarrow 2\text{H}_2\text{O}$
 - C** $\text{Na}_2\text{CO}_3 + \text{ZnSO}_4 \rightarrow \text{Na}_2\text{SO}_4 + \text{ZnCO}_3$
 - D** $\text{NaOH} + \text{HCl} \rightarrow \text{NaCl} + \text{H}_2\text{O}$
- 20** A mixture of ammonium carbonate and ammonium chloride is heated with aqueous sodium hydroxide.

Which gas is produced?

- A** ammonia
- B** carbon dioxide
- C** chlorine
- D** hydrogen chloride

- 21 The diagram shows what happens when damp red litmus paper is placed into two different gases, X and Y.



What are gases X and Y?

	X	Y
A	ammonia	carbon dioxide
B	ammonia	chlorine
C	chlorine	ammonia
D	chlorine	carbon dioxide

- 22 Which statement about the elements in Group I of the Periodic Table is correct?

- A** They are hard solids.
- B** They change from metallic to non-metallic down the group.
- C** They react with water to form oxygen.
- D** They become more reactive down the group.

- 23 Some information about four metals P, Q, R and S is listed.

P does not react with dilute hydrochloric acid.

Q reacts violently with water.

R reacts slowly with dilute hydrochloric acid.

The oxide of S does not react with carbon.

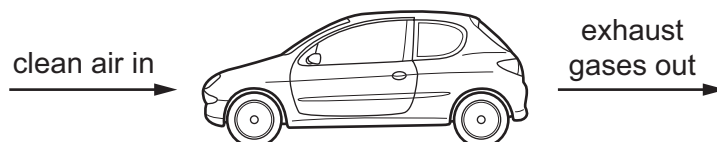
Which row identifies P, Q, R and S?

	P	Q	R	S
A	aluminium	potassium	iron	zinc
B	aluminium	calcium	zinc	potassium
C	copper	potassium	iron	aluminium
D	copper	calcium	zinc	magnesium

24 Which change shows the presence of water?

- A Anhydrous copper(II) sulfate turns white.
- B Anhydrous copper(II) sulfate turns pink.
- C Cobalt(II) chloride paper turns pink.
- D Cobalt(II) chloride paper turns blue.

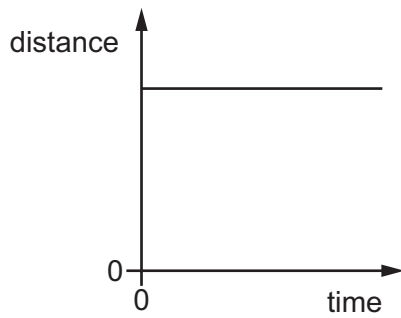
25 A petrol car engine takes in clean air and lets out exhaust gases.



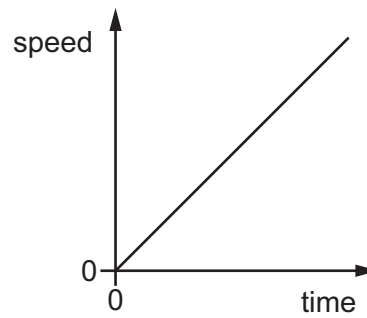
Which gas has a higher concentration in the exhaust gases than in clean air?

- A argon
 - B carbon dioxide
 - C nitrogen
 - D oxygen
- 26 Which petroleum fraction is used to make road surfaces?
- A bitumen
 - B diesel oil
 - C gasoline
 - D naphtha
- 27 Which statement about hydrocarbons is correct?
- A Alkanes are produced by cracking alkenes.
 - B Alkanes decolourise bromine water.
 - C Alkenes are saturated hydrocarbons.
 - D Alkenes contain a double bond.

28 Graph 1 is a distance–time graph. Graph 2 is a speed–time graph.



graph 1



graph 2

Which of these graphs represents a car that is moving at constant speed?

- A graph 1 only
 - B graph 2 only
 - C both graphs
 - D neither graph
- 29 A solid block has a mass of 1.5 kg and a volume of 0.30 m³.
What is its density?
- A 0.20 kg/m³ B 0.45 kg/m³ C 1.8 kg/m³ D 5.0 kg/m³
- 30 A girl holding a heavy load stands with her two feet flat on the ground.
Which change causes the pressure she exerts on the ground to increase?
- A lifting one foot off the ground
 - B lying flat on the ground
 - C removing the load
 - D wearing skis to stand on the ground

31 Diagram 1 shows a load hanging on a spring.

Diagram 2 shows the load pulled down.

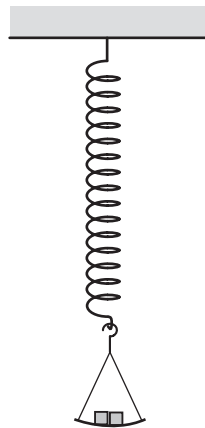


diagram 1

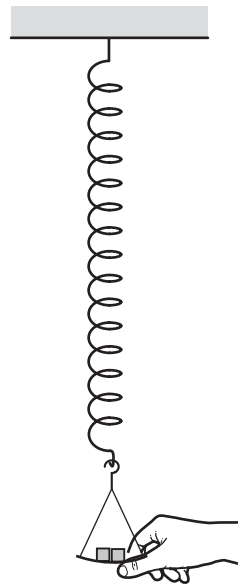


diagram 2

When the load is pulled down, what happens to the gravitational potential energy of the load and the elastic potential (strain) energy of the spring?

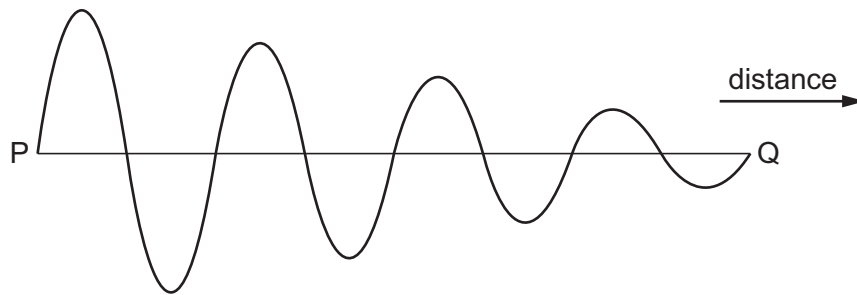
	gravitational potential energy of load	elastic potential energy of spring
A	decreases	decreases
B	decreases	increases
C	increases	decreases
D	increases	increases

32 In which list are all the sources of energy renewable?

- A** geothermal, hydroelectric, nuclear fission
- B** geothermal, tides, hydroelectric
- C** tides, nuclear fission, coal
- D** solar, wind, coal

- 33 How is thermal energy transferred from the Sun to the Earth through the vacuum of space?
- A by conduction, convection and radiation
 - B by conduction only
 - C by convection only
 - D by radiation only

- 34 The diagram represents a wave that travels from P to Q.



The diagram shows that one property of the wave decreases as it travels.

Which property is this?

- A amplitude
 - B frequency
 - C speed
 - D wavelength
- 35 Light in air hits a plane glass surface at an angle of incidence of 45° .
- In which direction does the light continue?
- A along the surface of the glass
 - B in the opposite direction to its original direction
 - C into the glass in a new direction
 - D into the glass in its original direction

- 36 What is the approximate range of frequencies of sound that can be heard by a human, and which property of a sound wave causes echoes?

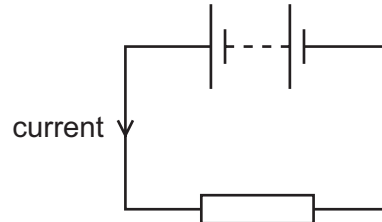
	range of frequencies / Hz	property that causes echoes
A	2.0 to 2000	reflection
B	2.0 to 2000	refraction
C	20 to 20 000	reflection
D	20 to 20 000	refraction

- 37 An uncharged metal ball becomes negatively charged.

Which particles have been transferred to the ball?

- A** atoms
- B** electrons
- C** neutrons
- D** protons

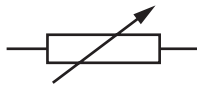
- 38 A battery is connected to a resistor.



Which changes to the resistance of the resistor, and to the potential difference (p.d.) across the resistor, **must** produce a smaller current?

	resistance	p.d.
A	decrease	decrease
B	decrease	increase
C	increase	decrease
D	increase	increase

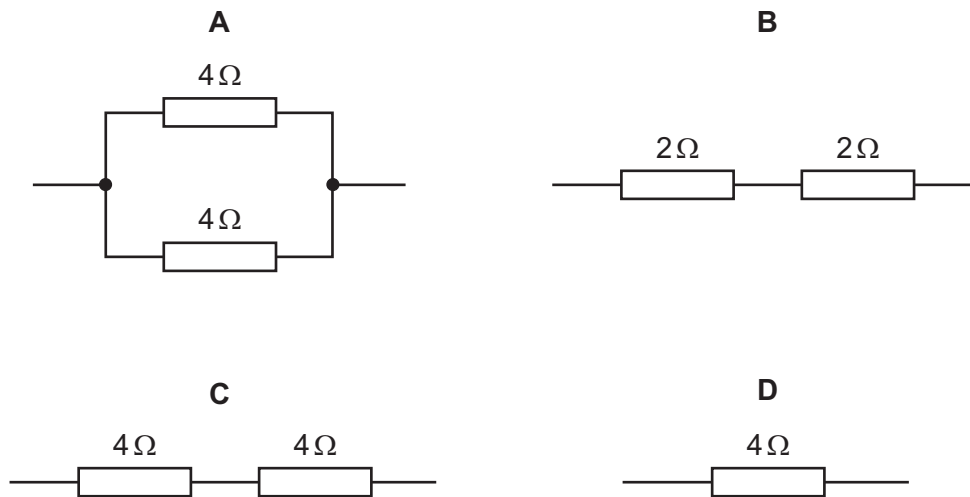
39 Which electrical component is represented by the symbol shown?



- A a fixed resistor
- B a fuse
- C a lamp
- D a variable resistor

40 The diagrams show four arrangements of resistors.

Which arrangement has the **smallest** total resistance?



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The Periodic Table of Elements

Group																																																																																																																																																																																																				
I	II							III	IV	V	VI	VII	VIII																																																																																																																																																																																							
3 Li lithium 7	4 Be beryllium 9	<div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 0 auto;"> <p>Key</p> <p>atomic number</p> <p>atomic symbol</p> <p>name</p> <p>relative atomic mass</p> </div>						1 H hydrogen 1	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 -	118 Og oganeson -	119 Uue unbinilium -	120 Uub unbibium -	121 Uut ununilium -	122 Uuq unununium -	123 Uuq unununium -	124 Uuq unununium -	125 Uuq unununium -	126 Uuq unununium -	127 Uuq unununium -	128 Uuq unununium -	129 Uuq unununium -	130 Uuq unununium -	131 Uuq unununium -	132 Uuq unununium -	133 Uuq unununium -	134 Uuq unununium -	135 Uuq unununium -	136 Uuq unununium -	137 Uuq unununium -	138 Uuq unununium -	139 Uuq unununium -	140 Uuq unununium -	141 Uuq unununium -	142 Uuq unununium -	143 Uuq unununium -	144 Uuq unununium -	145 Uuq unununium -	146 Uuq unununium -	147 Uuq unununium -	148 Uuq unununium -	149 Uuq unununium -	150 Uuq unununium -	151 Uuq unununium -	152 Uuq unununium -	153 Uuq unununium -	154 Uuq unununium -	155 Uuq unununium -	156 Uuq unununium -	157 Uuq unununium -	158 Uuq unununium -	159 Uuq unununium -	160 Uuq unununium -	161 Uuq unununium -	162 Uuq unununium -	163 Uuq unununium -	164 Uuq unununium -	165 Uuq unununium -	166 Uuq unununium -	167 Uuq unununium -	168 Uuq unununium -	169 Uuq unununium -	170 Uuq unununium -	171 Uuq unununium -	172 Uuq unununium -	173 Uuq unununium -	174 Uuq unununium -	175 Uuq unununium -	176 Uuq unununium -	177 Uuq unununium -	178 Uuq unununium -	179 Uuq unununium -	180 Uuq unununium -	181 Uuq unununium -	182 Uuq unununium -	183 Uuq unununium -	184 Uuq unununium -	185 Uuq unununium -	186 Uuq unununium -	187 Uuq unununium -	188 Uuq unununium -	189 Uuq unununium -	190 Uuq unununium -	191 Uuq unununium -	192 Uuq unununium -	193 Uuq unununium -	194 Uuq unununium -	195 Uuq unununium -	196 Uuq unununium -	197 Uuq unununium -	198 Uuq unununium -	199 Uuq unununium -	200 Uuq unununium -	201 Uuq unununium -	202 Uuq unununium -	203 Uuq unununium -	204 Uuq unununium -	205 Uuq unununium -	206 Uuq unununium -	207 Uuq unununium -	208 Uuq unununium -	209 Uuq unununium -	210 Uuq unununium -	211 Uuq unununium -	212 Uuq unununium -	213 Uuq unununium -	214 Uuq unununium -	215 Uuq unununium -	216 Uuq unununium -	217 Uuq unununium -	218 Uuq unununium -	219 Uuq unununium -	220 Uuq unununium -	221 Uuq unununium -	222 Uuq unununium -	223 Uuq unununium -	224 Uuq unununium -	225 Uuq unununium -	226 Uuq unununium -	227 Uuq unununium -	228 Uuq unununium -	229 Uuq unununium -	230 Uuq unununium -	231 Uuq unununium -	232 Uuq unununium -	233 Uuq unununium -	234 Uuq unununium -	235 Uuq unununium -	236 Uuq unununium -	237 Uuq unununium -	238 Uuq unununium -	239 Uuq unununium -	240 Uuq unununium -	241 Uuq unununium -	242 Uuq unununium -	243 Uuq unununium -	244 Uuq unununium -	245 Uuq unununium -	246 Uuq unununium -	247 Uuq unununium -	248 Uuq unununium -	249 Uuq unununium -	250 Uuq unununium -	251 Uuq unununium -	252 Uuq unununium -	253 Uuq unununium -	254 Uuq unununium -	255 Uuq unununium -	256 Uuq unununium -	257 Uuq unununium -	258 Uuq unununium -	259 Uuq unununium -	260 Uuq unununium -	261 Uuq unununium -	262 Uuq unununium -	263 Uuq unununium -	264 Uuq unununium -	265 Uuq unununium -	266 Uuq unununium -	267 Uuq unununium -	268 Uuq unununium -	269 Uuq unununium -	270 Uuq unununium -	271 Uuq unununium -	272 Uuq unununium -	273 Uuq unununium -	274 Uuq unununium -	275 Uuq unununium -	276 Uuq unununium -	277 Uuq unununium -	278 Uuq unununium -	279 Uuq unununium -	280 Uuq unununium -	281 Uuq unununium -	282 Uuq unununium -	283 Uuq unununium -	284 Uuq unununium -	285 Uuq unununium -	286 Uuq unununium -	287 Uuq unununium -	288 Uuq unununium -	289 Uuq unununium -	290 Uuq unununium -	291 Uuq unununium -	292 Uuq unununium -	293 Uuq unununium -	294 Uuq unununium -	295 Uuq unununium -	296 Uuq unununium -	297 Uuq unununium -	298 Uuq unununium -	299 Uuq unununium -	300 Uuq unununium -

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 dm³ at room temperature and pressure (r.t.p.).