



**Cambridge International Examinations**  
Cambridge International General Certificate of Secondary Education

**CO-ORDINATED SCIENCES**

**0654/11**

Paper 1 Multiple Choice (Core)

**October/November 2017**

**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 **16** printed pages.

1 A child blows into a rubber balloon.

What is the percentage of oxygen inside the balloon?

- A** 0%                      **B** 4%                      **C** 16%                      **D** 21%

2 A seedling is placed with its root horizontal to the ground. Three days later, the root is longer and curves towards the earth.

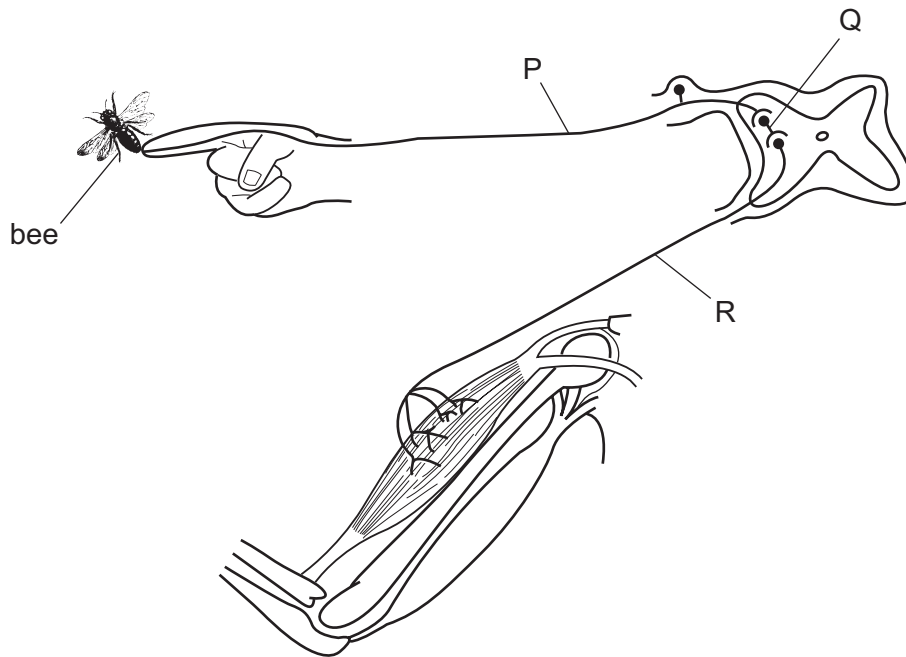
Which characteristics of living things does this show?

- A** growth, nutrition and movement  
**B** growth, sensitivity and movement  
**C** movement, nutrition and respiration  
**D** nutrition, sensitivity and respiration

3 What is homeostasis?

- A** the maintenance of the body's external environment  
**B** the maintenance of the body's internal environment  
**C** the processes that produce heat in the body  
**D** the removal of wastes from the body

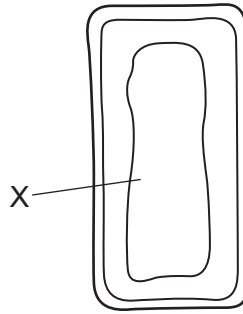
4 The diagram shows a reflex arc.



If the neurone at R is stimulated, what effect does this have on the neurones at P and Q?

	effect on P	effect on Q
<b>A</b>	no effect	no effect
<b>B</b>	no effect	stimulated
<b>C</b>	stimulated	no effect
<b>D</b>	stimulated	stimulated

- 5 The diagram shows parts of a mesophyll cell.



What is found in the part labelled X?

- A chloroplasts and nucleus
  - B chloroplasts only
  - C nucleus only
  - D watery solution
- 6 A human baby develops inside its mother attached to the wall of her uterus by the placenta and umbilical cord.

Which structure becomes embedded in the uterus wall to establish this connection?

- A a ball of cells grown from the zygote
  - B a sperm
  - C the unfertilised egg
  - D the zygote
- 7 Water enters root hair cells from the soil.

What happens to most of this water after it has entered the cells?

- A It is used in photosynthesis in the root cells.
- B It moves out again when the soil is dry.
- C It moves to the leaves and is lost by transpiration.
- D The cell uses it in respiration.

8 Food tests are performed on four substances.

Which substance contains fat and protein?

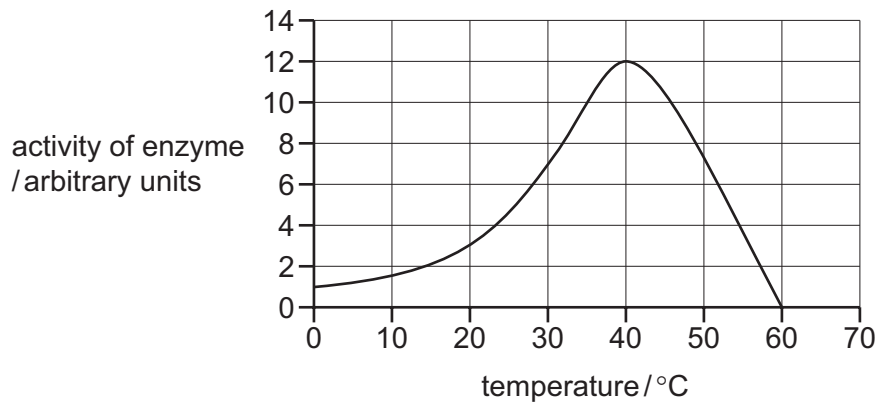
	test reagent			
	Benedict's	biuret	ethanol	iodine
<b>A</b>	✓	✓	x	x
<b>B</b>	✓	x	x	✓
<b>C</b>	x	✓	✓	x
<b>D</b>	x	x	✓	✓

key

✓ = positive test result

x = negative test result

9 The graph shows the effect of temperature on the activity of a mammalian enzyme.



Which conclusion can be drawn from the graph?

- A** The activity increases in a linear manner up to 35 °C.
- B** The activity is four times greater at 40 °C than at 20 °C.
- C** The enzyme has a higher activity at 60 °C than at 0 °C.
- D** The optimum temperature for this enzyme is 37 °C.

10 What is the main result of natural selection?

- A** fewer genes being passed on to offspring
- B** higher-yielding food crops
- C** organisms better adapted to the environment
- D** sheep that produce better quality wool

11 In a food chain, which organism does **not** rely on another organism to supply it with energy?

- A carnivore
- B consumer
- C herbivore
- D producer

12 Which statements about X chromosomes in humans are correct?

	present in body cells in males	present in body cells of females	carry genes
<b>A</b>	✓	✓	✓
<b>B</b>	✓	x	✓
<b>C</b>	✓	x	x
<b>D</b>	x	✓	x

13 What could deforestation cause?

- A a decrease in carbon dioxide levels and a decrease in flooding
- B a decrease in carbon dioxide levels and an increase in flooding
- C an increase in carbon dioxide levels and a decrease in flooding
- D an increase in carbon dioxide levels and an increase in flooding

14 Which statement describes an oxygen molecule?

- A It consists of two oxide ions.
- B It consists of two oxygen atoms.
- C It consists of two oxygen compounds.
- D It consists of two oxygen ions.

15 An excess of a soluble salt is mixed with water.

The mixture is filtered and the filtrate is distilled.

Which row describes the filtrate and the distilled liquid?

	filtrate	distilled liquid
<b>A</b>	solution	solution
<b>B</b>	solution	solvent
<b>C</b>	solvent	solution
<b>D</b>	solvent	solvent

16 A student completes four experiments.

Experiment 1 The student heats some ice and it melts.

Experiment 2 The student heats some blue copper sulfate crystals and a white solid is formed. Steam is given off.

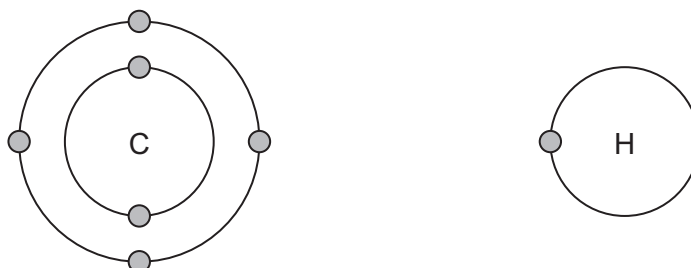
Experiment 3 The student grinds up a lump of chalk to a powder.

Experiment 4 The student heats green copper carbonate crystals and a black solid is formed. A gas is produced that turns limewater milky.

Which row describes the changes in the experiments?

	physical changes	chemical changes
<b>A</b>	1 and 3	2 and 4
<b>B</b>	1 and 4	2 and 3
<b>C</b>	2 and 3	1 and 4
<b>D</b>	2 and 4	1 and 3

17 The electronic structures of carbon and of hydrogen are shown.



What is the formula of a compound formed between carbon and hydrogen?

**A** CH<sub>2</sub>

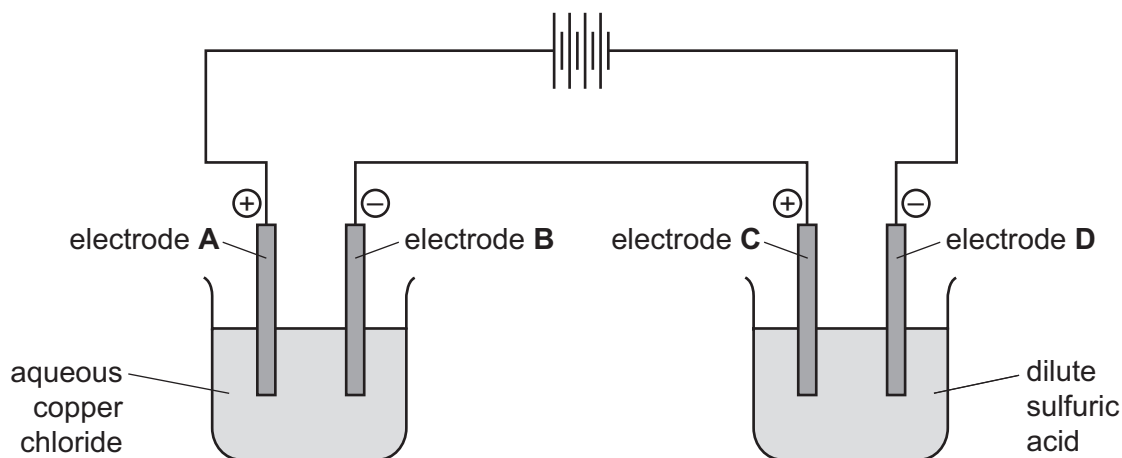
**B** CH<sub>3</sub>

**C** CH<sub>4</sub>

**D** C<sub>4</sub>H

- 18 Electrolysis of two solutions, aqueous copper chloride and dilute sulfuric acid, is carried out using the apparatus shown.

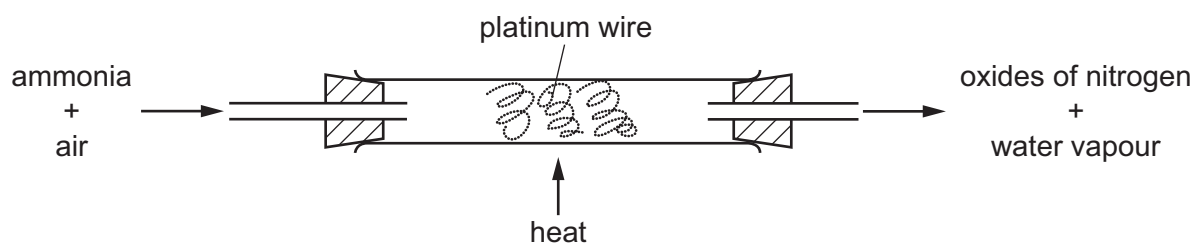
Which electrode produces a colourless gas that 'pops' with a lighted splint?



- 19 Some white anhydrous copper(II) sulfate powder is put into a beaker of water and stirred.

Which observation shows that the process is exothermic?

- A A blue solution forms.
  - B A colourless solution forms.
  - C The beaker becomes cooler.
  - D The beaker becomes warmer.
- 20 Ammonia is oxidised as shown.



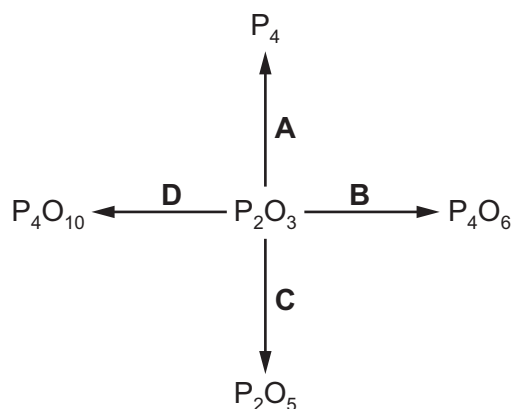
The platinum is chemically unchanged at the end of the reaction.

What is the reason for using platinum?

- A to absorb the heat from the reaction
- B to filter out oxygen from the air
- C to increase the rate of the reaction
- D to neutralise the ammonia



21 In which change is the oxide of phosphorus,  $P_2O_3$ , reduced?



22 Which substances react with dilute sulfuric acid to form a salt?

	magnesium	magnesium oxide	magnesium carbonate	magnesium chloride
<b>A</b>	✓	✓	✓	x
<b>B</b>	✓	✓	x	✓
<b>C</b>	✓	x	✓	✓
<b>D</b>	x	✓	✓	✓

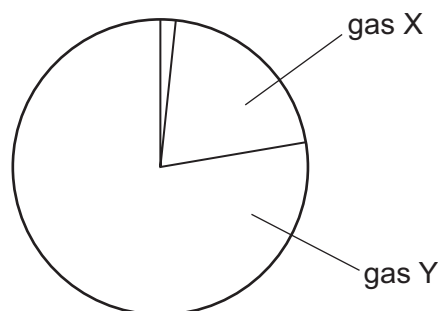
23 Compound X is heated with a mixture of aqueous sodium hydroxide and aluminium powder.

A gas is made which turns damp red litmus blue.

Which compound **cannot** be X?

- A** ammonium hydroxide
- B** ammonium nitrate
- C** potassium hydroxide
- D** potassium nitrate

- 24 Which trend is observed as the Periodic Table is crossed from left to right?
- A** The elements change from metallic to non-metallic and the oxides of the elements change from acidic to basic.
- B** The elements change from metallic to non-metallic and the oxides of the elements change from basic to acidic.
- C** The elements change from non-metallic to metallic and the oxides of the elements change from acidic to basic.
- D** The elements change from non-metallic to metallic and the oxides of the elements change from basic to acidic.
- 25 The diagram represents the composition of clean air.



Which row identifies gas X and gas Y?

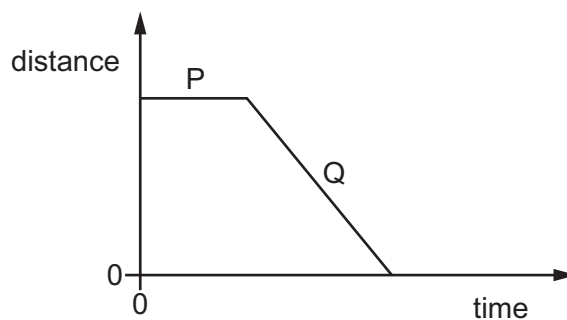
	gas X	gas Y
<b>A</b>	carbon dioxide	nitrogen
<b>B</b>	nitrogen	oxygen
<b>C</b>	oxygen	carbon dioxide
<b>D</b>	oxygen	nitrogen

- 26 Which word equation describes the manufacture of lime from limestone?
- A** calcium carbonate  $\rightarrow$  calcium hydroxide + carbon dioxide
- B** calcium carbonate  $\rightarrow$  calcium oxide + carbon dioxide
- C** calcium hydroxide  $\rightarrow$  calcium oxide + water
- D** calcium oxide + carbon dioxide  $\rightarrow$  calcium carbonate

27 What are the products of the **complete** combustion of ethanol?

- A carbon dioxide + carbon monoxide + water
- B carbon dioxide + hydrogen
- C carbon dioxide + water
- D carbon monoxide + water

28 The diagram shows a distance-time graph for a vehicle.



Which row describes the motion of the vehicle in region P and in region Q of the graph?

	P	Q
<b>A</b>	at rest	changing speed
<b>B</b>	at rest	constant speed
<b>C</b>	constant speed	changing speed
<b>D</b>	constant speed	constant speed

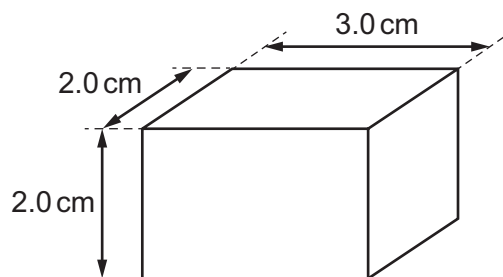
29 A metal block is heated until it is completely melted. None of the melted metal evaporates.

The metal now solidifies.

What happens to the mass of the metal during the changes of state?

	mass during melting	mass during solidification
<b>A</b>	decreases	increases
<b>B</b>	increases	decreases
<b>C</b>	increases	stays constant
<b>D</b>	stays constant	stays constant

30 The diagram shows a solid rectangular block made of material of density  $2.0 \text{ g/cm}^3$ .



What is the mass of the block?

- A** 2.0g            **B** 6.0g            **C** 14g            **D** 24g

31 A worker carries bricks up a ladder.

The following quantities are known.

- the height the bricks are lifted up
- the time taken for the worker to lift the bricks
- the volume of the bricks
- the weight of the bricks

Which quantities are needed to calculate the useful power produced by the worker as he carries the bricks up the ladder?

- A** height, time and volume  
**B** height, time and weight  
**C** height, volume and weight  
**D** time, volume and weight

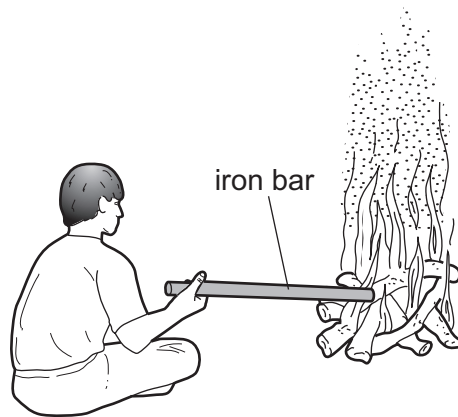
32 A gas is contained in a cylinder of constant volume.

The gas is cooled and this causes its pressure to change.

What happens to the speed of the molecules of the gas, and what happens to the pressure of the gas?

	speed of molecules	pressure of gas
<b>A</b>	decreases	decreases
<b>B</b>	decreases	increases
<b>C</b>	increases	decreases
<b>D</b>	increases	increases

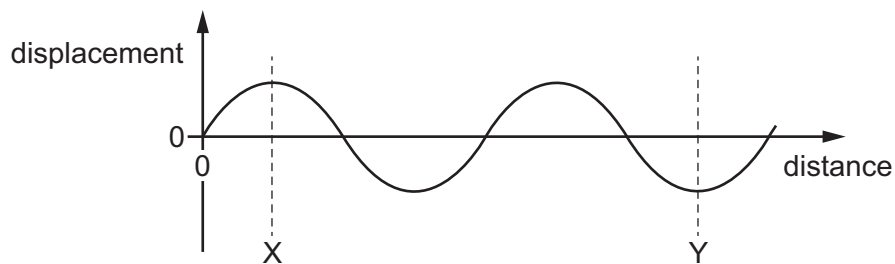
33 A boy sits near a campfire. He holds an iron bar with one end in the fire. His hand becomes hot.



In which ways does thermal energy (heat) from the fire reach his hand?

- A conduction and convection only
- B conduction and radiation only
- C convection and radiation only
- D conduction, convection and radiation

34 The diagram represents a wave.

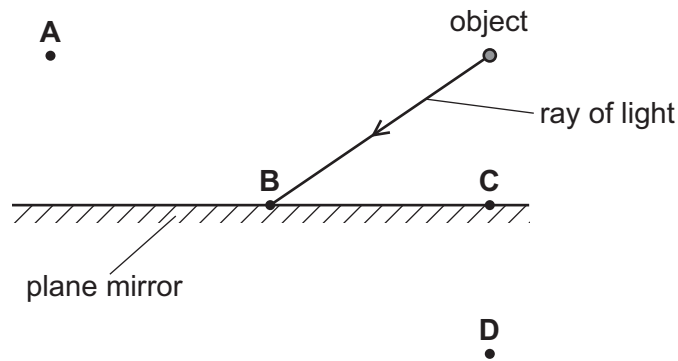


How many wavelengths are there between X and Y?

- A  $\frac{2}{3}$
- B 1
- C  $1\frac{1}{2}$
- D 3

35 A plane mirror is used to form an image of an object.

At which labelled point is the image formed?



36 Which group of electromagnetic radiations is arranged in order of increasing frequency?

- A infra-red, visible light, ultraviolet
- B ultra-violet, visible light, radio waves
- C X-rays, radio waves,  $\gamma$ -rays
- D  $\gamma$ -rays, X-rays, infra-red

37 Four loudspeakers each vibrate at the frequencies shown.

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

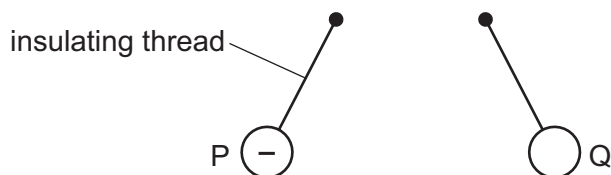
- A  $5.0 \times 10^3 \text{ Hz}$
- B  $15 \times 10^3 \text{ Hz}$
- C  $25 \times 10^3 \text{ Hz}$
- D  $35 \times 10^3 \text{ Hz}$

38 Which row gives the unit for energy and the unit for electromotive force (e.m.f.)?

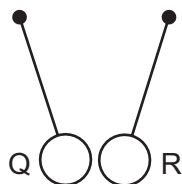
	energy	e.m.f.
A	J	N
B	J	V
C	W	N
D	W	V

- 39 Three charged balls P, Q and R are suspended by insulating threads. Ball P is negatively charged.

Ball Q is brought close to ball P. The balls move away from each other.



Ball Q is now brought close to ball R. The balls move closer to each other.



What are the signs of the charges on ball Q and ball R?

	ball Q	ball R
<b>A</b>	negative	negative
<b>B</b>	negative	positive
<b>C</b>	positive	negative
<b>D</b>	positive	positive

- 40 The diagrams represent pairs of nuclei of some atoms.

Which pair shows nuclei of different isotopes of the same element?

**A** **B**

**C** **D**

key  
 ○ neutron  
 ● proton

## The Periodic Table of Elements

Group																										
I	II											III	IV	V	VI	VII	VIII									
<div style="border: 1px solid black; padding: 5px; width: fit-content; margin: auto;"> <b>Key</b>            atomic number            atomic symbol            name            relative atomic mass         </div>										1 <b>H</b> hydrogen 1																2 <b>He</b> helium 4
										3 <b>Li</b> lithium 7	4 <b>Be</b> beryllium 9											5 <b>B</b> boron 11	6 <b>C</b> carbon 12	7 <b>N</b> nitrogen 14	8 <b>O</b> oxygen 16	9 <b>F</b> fluorine 19
11 <b>Na</b> sodium 23	12 <b>Mg</b> magnesium 24											13 <b>Al</b> aluminium 27	14 <b>Si</b> silicon 28	15 <b>P</b> phosphorus 31	16 <b>S</b> sulfur 32	17 <b>Cl</b> chlorine 35.5	18 <b>Ar</b> argon 40									
19 <b>K</b> potassium 39	20 <b>Ca</b> calcium 40	21 <b>Sc</b> scandium 45	22 <b>Ti</b> titanium 48	23 <b>V</b> vanadium 51	24 <b>Cr</b> chromium 52	25 <b>Mn</b> manganese 55	26 <b>Fe</b> iron 56	27 <b>Co</b> cobalt 59	28 <b>Ni</b> nickel 59	29 <b>Cu</b> copper 64	30 <b>Zn</b> zinc 65	31 <b>Ga</b> gallium 70	32 <b>Ge</b> germanium 73	33 <b>As</b> arsenic 75	34 <b>Se</b> selenium 79	35 <b>Br</b> bromine 80	36 <b>Kr</b> krypton 84									
37 <b>Rb</b> rubidium 85	38 <b>Sr</b> strontium 88	39 <b>Y</b> yttrium 89	40 <b>Zr</b> zirconium 91	41 <b>Nb</b> niobium 93	42 <b>Mo</b> molybdenum 96	43 <b>Tc</b> technetium –	44 <b>Ru</b> ruthenium 101	45 <b>Rh</b> rhodium 103	46 <b>Pd</b> palladium 106	47 <b>Ag</b> silver 108	48 <b>Cd</b> cadmium 112	49 <b>In</b> indium 115	50 <b>Sn</b> tin 119	51 <b>Sb</b> antimony 122	52 <b>Te</b> tellurium 128	53 <b>I</b> iodine 127	54 <b>Xe</b> xenon 131									
55 <b>Cs</b> caesium 133	56 <b>Ba</b> barium 137	57–71 lanthanoids	72 <b>Hf</b> hafnium 178	73 <b>Ta</b> tantalum 181	74 <b>W</b> tungsten 184	75 <b>Re</b> rhenium 186	76 <b>Os</b> osmium 190	77 <b>Ir</b> iridium 192	78 <b>Pt</b> platinum 195	79 <b>Au</b> gold 197	80 <b>Hg</b> mercury 201	81 <b>Tl</b> thallium 204	82 <b>Pb</b> lead 207	83 <b>Bi</b> bismuth 209	84 <b>Po</b> polonium –	85 <b>At</b> astatine –	86 <b>Rn</b> radon –									
87 <b>Fr</b> francium –	88 <b>Ra</b> radium –	89–103 actinoids	104 <b>Rf</b> rutherfordium –	105 <b>Db</b> dubnium –	106 <b>Sg</b> seaborgium –	107 <b>Bh</b> bohrium –	108 <b>Hs</b> hassium –	109 <b>Mt</b> meitnerium –	110 <b>Ds</b> darmstadtium –	111 <b>Rg</b> roentgenium –	112 <b>Cn</b> copernicium –		114 <b>Fl</b> flerovium –		116 <b>Lv</b> livermorium –											

lanthanoids	57 <b>La</b> lanthanum 139	58 <b>Ce</b> cerium 140	59 <b>Pr</b> praseodymium 141	60 <b>Nd</b> neodymium 144	61 <b>Pm</b> promethium –	62 <b>Sm</b> samarium 150	63 <b>Eu</b> europium 152	64 <b>Gd</b> gadolinium 157	65 <b>Tb</b> terbium 159	66 <b>Dy</b> dysprosium 163	67 <b>Ho</b> holmium 165	68 <b>Er</b> erbium 167	69 <b>Tm</b> thulium 169	70 <b>Yb</b> ytterbium 173	71 <b>Lu</b> lutetium 175
actinoids	89 <b>Ac</b> actinium –	90 <b>Th</b> thorium 232	91 <b>Pa</b> protactinium 231	92 <b>U</b> uranium 238	93 <b>Np</b> neptunium –	94 <b>Pu</b> plutonium –	95 <b>Am</b> americium –	96 <b>Cm</b> curium –	97 <b>Bk</b> berkelium –	98 <b>Cf</b> californium –	99 <b>Es</b> einsteinium –	100 <b>Fm</b> fermium –	101 <b>Md</b> mendelevium –	102 <b>No</b> nobelium –	103 <b>Lr</b> lawrencium –

The volume of one mole of any gas is 24 dm<sup>3</sup> at room temperature and pressure (r.t.p.).