Cambridge Assessment International Education

# Cambridge IGCSE™

**CO-ORDINATED SCIENCES** **0654/11**

Paper 1 Multiple Choice (Core) **October/November 2024**

**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.



IB24 11_0654_11/2RP


**[Turn over**

**1** Which characteristic of living things is described as the removal of toxic materials and substances in excess of requirements?

**A** excretion

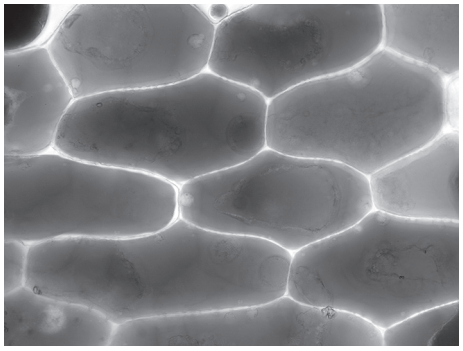
**B** homeostasis

**C** nutrition

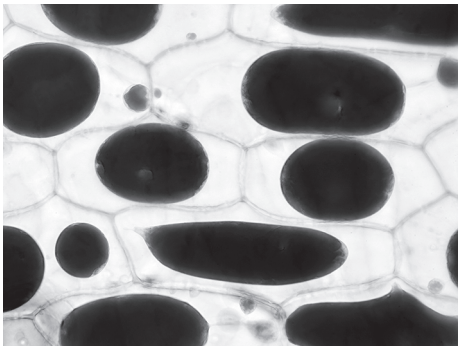
**D** respiration

**2** The photographs show some onion cells before and after being placed in a concentrated solution of glucose.

before



after



What explains the appearance of the onion cells after placing them into the concentrated solution of glucose?

**A** Glucose has entered the cells by osmosis.

**B** Glucose has left the cells by diffusion.

**C** Water has entered the cells by diffusion.

**D** Water has left the cells by osmosis.

**3** Three food tests are carried out on a sample of food. The results are shown.

| food test | final colour |
|---|---|
| Benedict's | blue |
| biuret | blue |
| iodine | blue-black |

From these results, which nutrient is in the food?

**A** reducing sugar

**B** protein

**C** starch

**D** fat

**4** One method of preventing food spoilage is to store it at 4 °C in a refrigerator.

Why does storing food at low temperatures help to prevent food spoilage?

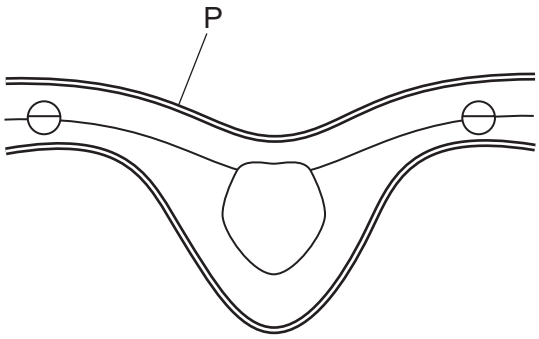
**A** It decreases enzyme activity.

**B** It denatures enzymes.

**C** It increases enzyme production.

**D** It kills cells.

**5** The diagram shows a plan of the cross-section of a dicotyledonous leaf.




What is the name of the part labelled P?

**A** palisade mesophyll

**B** spongy mesophyll

**C** upper epidermis

**D** vascular bundle

**6** What is the dietary importance of fibre?

**A** It builds and repairs tissue.

**B** It builds strong bones and teeth.

**C** It helps to prevent constipation.

**D** It provides a source of iron.

**7** Selexipag is a drug used to treat a condition where the blood pressure going to the lungs is too high. The drug works by widening the blood vessel leading to the lungs to reduce the pressure.

Which blood vessel going to the lungs is selexipag widening?

**A** aorta

**B** pulmonary artery

**C** pulmonary vein

**D** vena cava

**8** The list shows some processes that occur in the body.

1 cell division

2 oxygen diffusion

3 protein synthesis

4 temperature regulation

Which processes use energy released by respiration?

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

**9** In which order does an impulse pass along neurones during a reflex action?

**A** motor → relay → sensory

**B** motor → sensory → relay

**C** sensory → motor → relay

**D** sensory → relay → motor

**10** Before fertilisation in flowering plants, which structure must the pollen nucleus pass through to reach the nucleus in the ovule?

**A** filament

**B** petal

**C** stamen

**D** style

**11** Albinism is a genetic condition which results in an absence of pigment in the skin, hair and eyes.

If two black mice produce an albino offspring, which Punnett square shows the correct cross?

**A**

| | B | b |
|---|---|---|
| B | BB | Bb |
| B | BB | Bb |

**B**

| | B | b |
|---|---|---|
| B | BB | Bb |
| b | Bb | bb |

**C**

| | B | b |
|---|---|---|
| b | Bb | bb |
| b | Bb | bb |

**D**

| | b | b |
|---|---|---|
| b | bb | bb |
| b | bb | bb |

key

B dominant allele for black

b recessive allele for albinism

**12** What is the correct order for the food chain from the information given?

- beetles are herbivores
- mice eat the beetles
- owls are the tertiary consumers
- the leaves of a plant are the producer

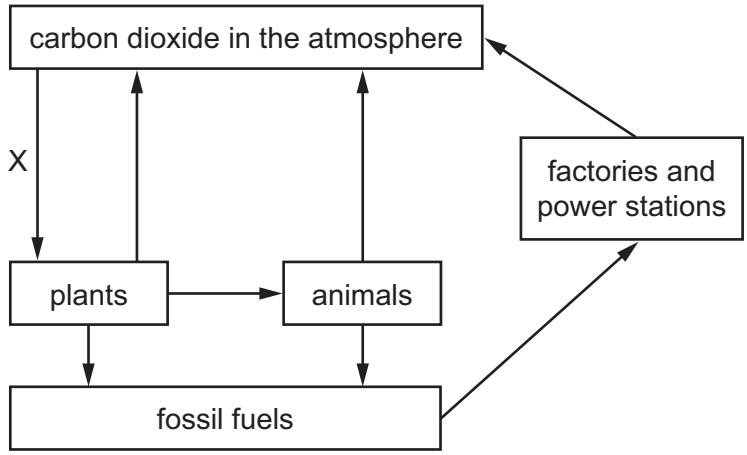
**A** beetles → mice → owl → leaves

**B** leaves → beetles → mice → owl

**C** leaves → beetles → owl → mice

**D** owl → mice → beetles → leaves

**13** The diagram shows part of the carbon cycle.




Which process does X represent?

**A** combustion

**B** decomposition

**C** photosynthesis

**D** respiration

**14** A student adds 5 g of magnesium ribbon to 20 $cm^3$ of dilute hydrochloric acid in a beaker.

The student measures how long it takes for the effervescence to stop.

Which pieces of apparatus does the student use in this experiment?

| | balance | measuring cylinder | stop-clock | thermometer |
|---|---|---|---|---|
| **A** | ✓ | ✓ | ✗ | ✓ |
| **B** | ✓ | ✗ | ✓ | ✓ |
| **C** | ✓ | ✓ | ✓ | ✗ |
| **D** | ✗ | ✓ | ✓ | ✓ |

key

✓ = uses the apparatus

✗ = does not use the apparatus

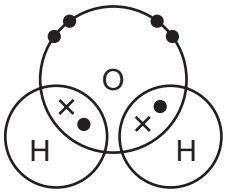
**15** Sea water is a mixture that contains sodium chloride dissolved in water.

Which row describes sea water?

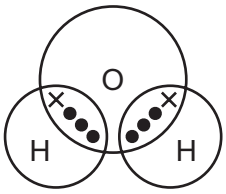
| | solvent | solute | solution |
|---|---|---|---|
| **A** | water | sea water | sodium chloride |
| **B** | sea water | sodium chloride | water |
| **C** | water | sodium chloride | sea water |
| **D** | sodium chloride | water | sea water |

**16** What is the dot-and-cross diagram for a water molecule?

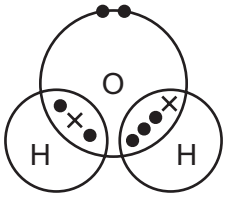
**A**



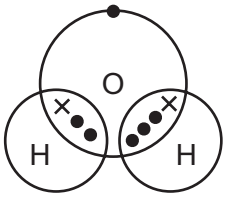

**B**



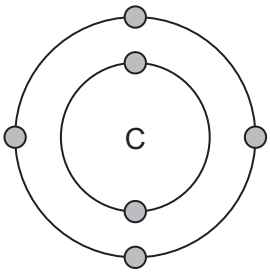

**C**

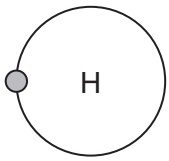



**D**




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




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

**A** $CH_2$ **B** $CH_3$ **C** $C_4H$ **D** $CH_4$

**18** Which elements are formed at the electrodes during the electrolysis of concentrated aqueous sodium chloride?

| | anode | cathode |
|---|---|---|
| **A** | chlorine | sodium |
| **B** | chlorine | hydrogen |
| **C** | hydrogen | chlorine |
| **D** | sodium | chlorine |

**19** Four different substances are added to the same acid of the same concentration in reactions W, X, Y and Z.

The initial temperature of the acid before each reaction is 21 °C.

The final temperatures of the mixtures are measured.

The results are shown.

| reaction | W | X | Y | Z |
|---|---|---|---|---|
| final temperature / °C | 28 | 19 | 26 | 17 |

Which row is correct?

| | most endothermic reaction | most exothermic reaction |
|---|---|---|
| **A** | W | Z |
| **B** | Z | W |
| **C** | X | Y |
| **D** | Y | X |

**20** Dilute hydrochloric acid reacts with solid calcium carbonate.

Which change decreases the rate of the reaction?

**A** decreasing the concentration of the hydrochloric acid

**B** decreasing the size of the calcium carbonate pieces

**C** increasing the surface area of the calcium carbonate

**D** increasing the temperature of the acid

**21** Which statement about oxidation is correct?

**A** It occurs when an element or compound chemically combines with oxygen.

**B** It occurs when an element or compound forms a mixture with oxygen.

**C** It occurs when an element or compound is separated from a mixture with oxygen.

**D** It occurs when a compound loses oxygen.

**22** Which substance is classified as an acidic oxide?

**A** calcium oxide

**B** carbon dioxide

**C** lithium oxide

**D** sodium oxide

**23** The results of two tests on compound P are shown.

| test | observation |
|---|---|
| flame test | red flame |
| addition of acidified silver nitrate | white precipitate |

What is P?

**A** lithium bromide

**B** lithium chloride

**C** sodium bromide

**D** sodium chloride

**24** What is **not** a property of transition elements?

**A** form coloured compounds

**B** good electrical conductivity

**C** high melting point

**D** low density

**25** What is the order of reactivity of metals, from highest to lowest?

**A** aluminium → calcium → copper → iron

**B** calcium → iron → copper → aluminium

**C** calcium → magnesium → iron → copper

**D** aluminium → magnesium → iron → copper



**[Turn over**

**26** A colourless liquid is tested with blue cobalt(II) chloride paper.

The blue paper turns pink.

What does this test prove that the liquid contains?

**A** an acid

**B** an alkali

**C** ethanol

**D** water

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

**A** carbon and hydrogen

**B** carbon dioxide and hydrogen

**C** carbon dioxide and water

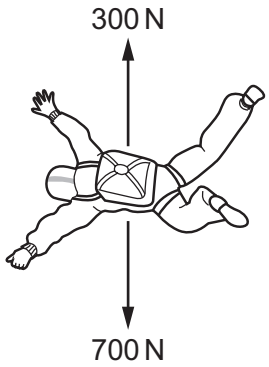
**D** carbon monoxide and water

**28** A person runs 5000 m in 1200 s and then walks a further 3000 m in 1800 s.

What is their average speed for this journey?

**A** 1.7 m/s **B** 2.7 m/s **C** 2.9 m/s **D** 5.8 m/s

**29** The diagram shows the two forces acting on a skydiver.




What is the resultant force on the skydiver?

**A** 400 N downwards

**B** 400 N upwards

**C** 1000 N downwards

**D** 1000 N upwards

**30** When a ball is kicked vertically upwards, its initial kinetic energy is 12 J. When the ball arrives back at its starting point, its kinetic energy is 8.0 J.

Which statement explains the change in the kinetic energy of the ball?

**A** 4.0 J of work is done to increase the gravitational potential energy of the ball.

**B** 4.0 J of work is done to overcome air resistance.

**C** 20 J of work is done to increase the gravitational potential energy of the ball.

**D** 20 J of work is done to overcome air resistance.

**31** A motor lifts a load vertically upwards at constant speed.

The weight of the load is known.

Which of the other quantities in the table must be known to determine the useful power output of the motor?

| | height lifted | time to lift the load |
|---|---|---|
| **A** | ✓ | ✓ |
| **B** | ✓ | ✗ |
| **C** | ✗ | ✓ |
| **D** | ✗ | ✗ |

key

✓ = this quantity is needed

✗ = this quantity is **not** needed

**32** Which material is a poor thermal conductor?

**A** air

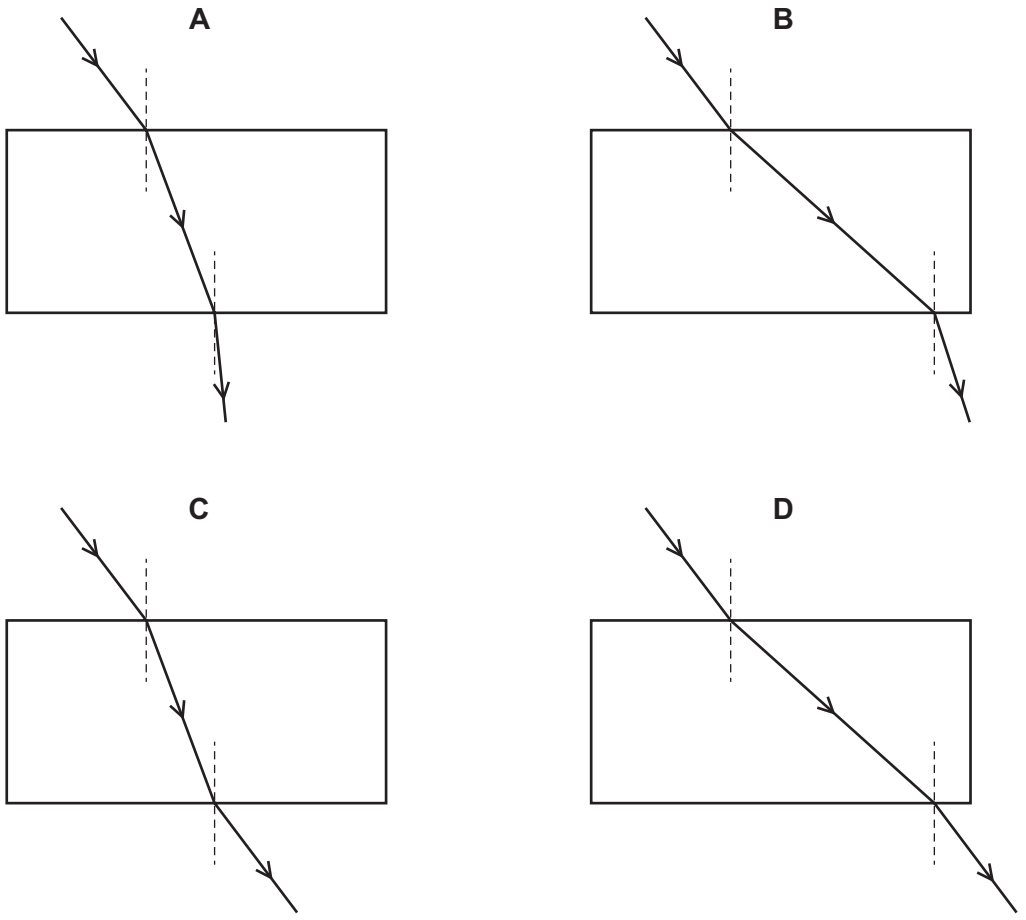
**B** aluminium

**C** copper

**D** iron

**33** A ray of light travels from air into a parallel-sided glass block and then back into air.

Which diagram shows the path of the light?




**34** Which electromagnetic waves have the lowest frequency?

**A** gamma

**B** infrared

**C** ultraviolet

**D** radio

**35** Object P is positively charged and object Q is negatively charged.

Which row describes the force between P and Q and explains how they became charged?

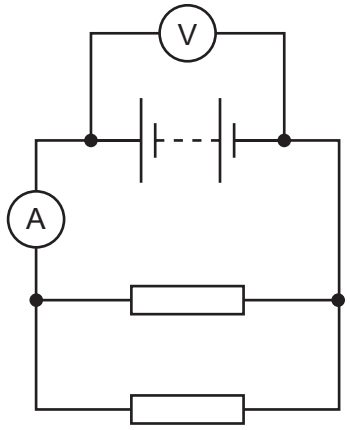
| | force between P and Q | charge on P caused by | charge on Q caused by |
|---|---|---|---|
| **A** | attractive | gaining electrons | losing electrons |
| **B** | attractive | losing electrons | gaining electrons |
| **C** | repulsive | gaining electrons | losing electrons |
| **D** | repulsive | losing electrons | gaining electrons |

**36** A lamp is connected to a 3.0 V battery. The resistance of the lamp is 60 Ω.

What is the current in the lamp?

**A** 0.050 mA **B** 20 mA **C** 50 mA **D** 180 mA

**37** The diagram shows two resistors connected in parallel to a battery. The circuit contains a voltmeter and an ammeter.



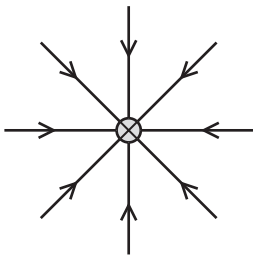

A third resistor is now connected in parallel with these two resistors.

What happens to the voltmeter reading and what happens to the ammeter reading?

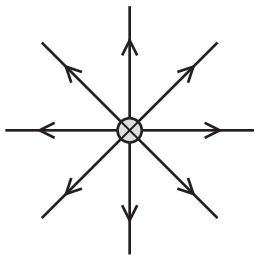
| | ammeter reading | voltmeter reading |
|---|---|---|
| **A** | decreases | increases |
| **B** | decreases | stays the same |
| **C** | increases | increases |
| **D** | increases | stays the same |

**38** Which diagram shows the pattern and the direction of the magnetic field around a straight wire that is carrying a current into the page?

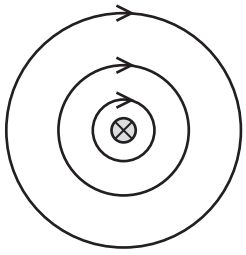
**A**



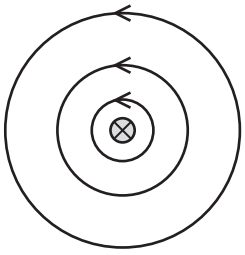
**B**



**C**



**D**



**39** An element has two isotopes.

Which statement about the nuclei of atoms of these isotopes is correct?

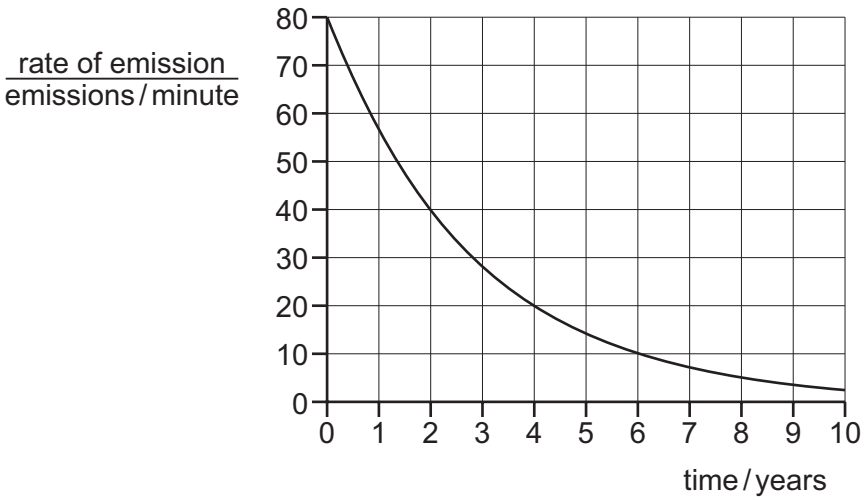
**A** They have equal numbers of neutrons but different numbers of electrons.

**B** They have equal numbers of neutrons but different numbers of protons.

**C** They have equal numbers of protons but different numbers of electrons.

**D** They have equal numbers of protons but different numbers of neutrons.

**40** The graph shows how the rate of emission of radiation from a radioactive sample changes with time.




What is the half-life of this sample?

**A** 40 minutes

**B** 2.0 years

**C** 5.0 years

**D** 10 years

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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 – | 113 Nh nihonium – | 114 Fl flerovium – | 115 Mc moscovium – | 116 Lv livermorium – | 117 Ts tennessine – | 118 Og oganesson – |

**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.).