

UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS  
International General Certificate of Secondary Education

**COMBINED SCIENCE**

**0653/01**

Paper 1 Multiple Choice

May/June 2004

**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, highlighters, 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.

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.

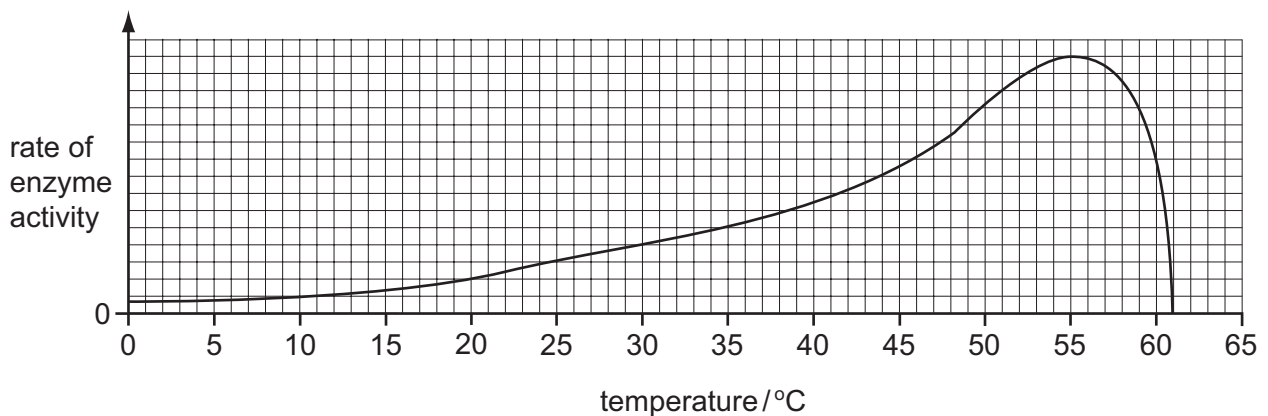
A copy of the Periodic Table is printed on page 20.

This document consists of **19** printed pages and **1** blank page.



- 1 Two characteristics of all living organisms are
- A breathing and reproduction.
  - B photosynthesis and excretion.
  - C reproduction and respiration.
  - D respiration and photosynthesis.
- 2 Which structure provides the best surface for diffusion?
- A alveolus
  - B heart wall
  - C trachea
  - D vagina

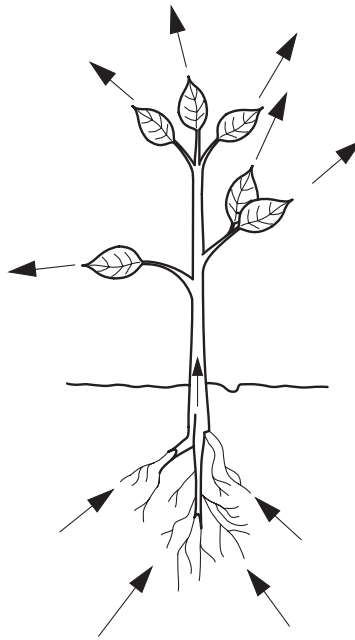
- 3 The graph shows how temperature affects the rate at which an enzyme works.



What does the graph show about this enzyme?

- A The enzyme is denatured by temperatures above 65 °C.
- B The enzyme is denatured by temperatures below 8 °C.
- C The enzyme works fastest at 48 °C.
- D The rate of enzyme activity doubles when the temperature is raised from 10 °C to 20 °C.

- 4 The arrows on the diagram show the path taken by a substance through a plant.



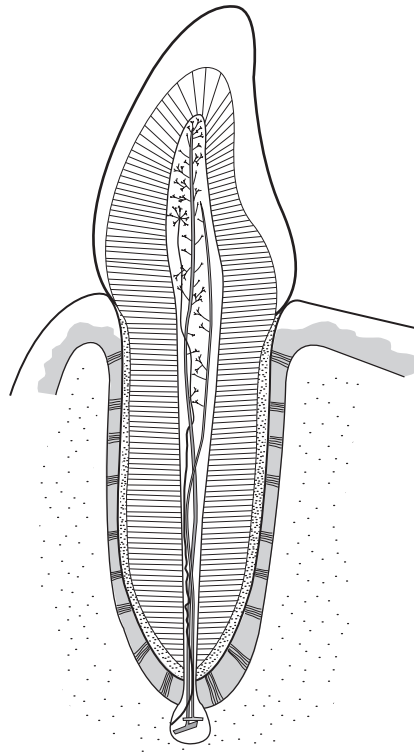
Which substance follows this path?

- A** carbon dioxide  
**B** glucose  
**C** oxygen  
**D** water
- 5 Which symptoms occur when there is a deficiency of vitamin C or of iron in the diet?

|          | symptoms                      |                               |
|----------|-------------------------------|-------------------------------|
|          | vitamin C deficiency          | iron deficiency               |
| <b>A</b> | anaemia (lack of haemoglobin) | bleeding gums                 |
| <b>B</b> | bleeding gums                 | anaemia (lack of haemoglobin) |
| <b>C</b> | poor teeth                    | weak bones                    |
| <b>D</b> | weak bones                    | poor teeth                    |

- 6 What enters a green leaf through its stomata for use during photosynthesis?
- A** carbon dioxide only  
**B** carbon dioxide and oxygen  
**C** carbon dioxide and water  
**D** water only

7 The diagram shows the internal structure of a tooth.

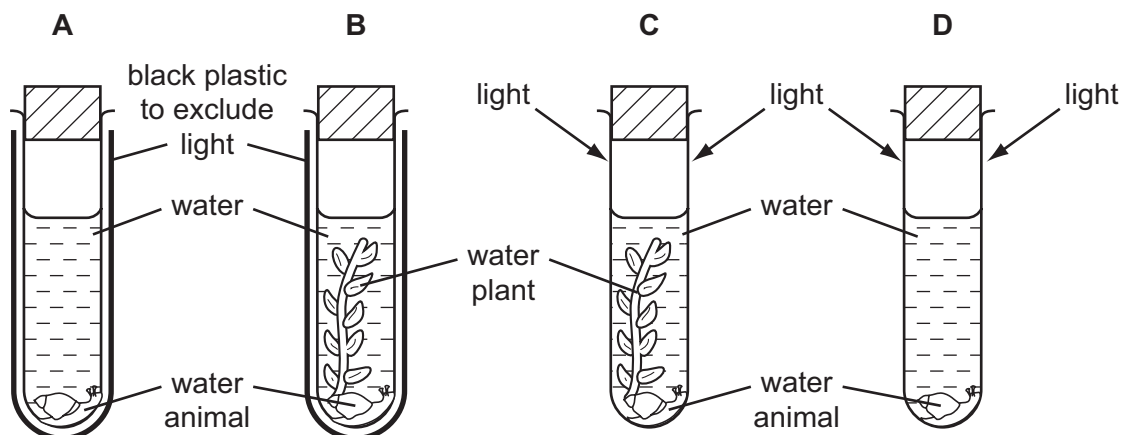


Most of this tooth consists of

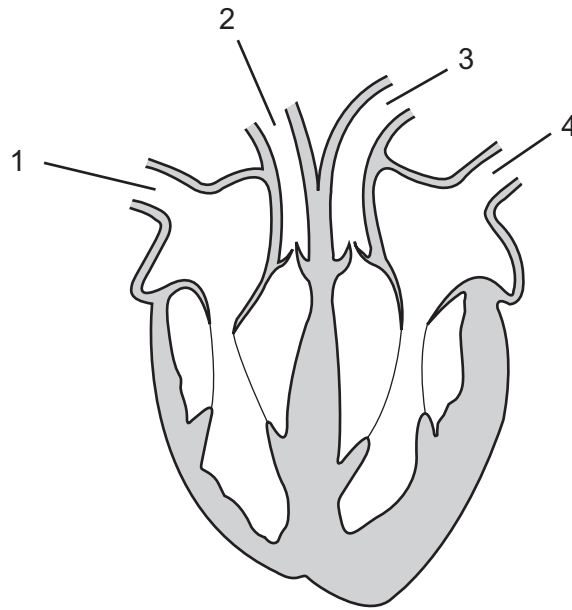
- A cement.
- B dentine.
- C enamel.
- D pulp.

8 Four tubes are set up as shown in the diagram.

In which tube does the water animal survive the longest?



- 9 The diagram shows a vertical section through the heart.



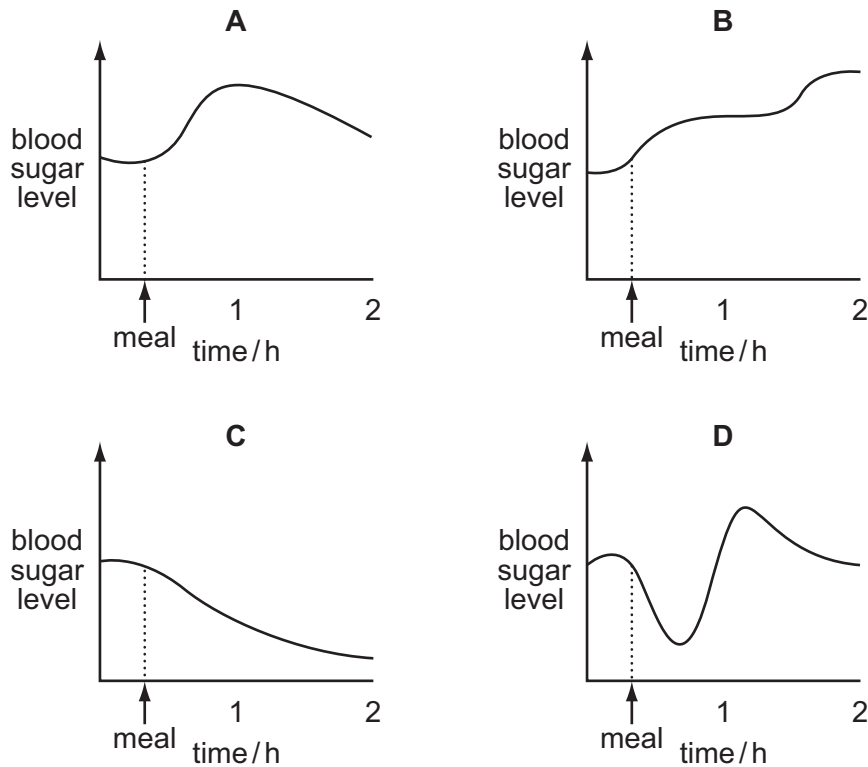
Which blood vessels contain oxygenated blood?

- A** 1 and 2      **B** 2 and 3      **C** 2 and 4      **D** 3 and 4
- 10 What describes the oxygen and carbon dioxide levels in blood as it passes through the lungs?

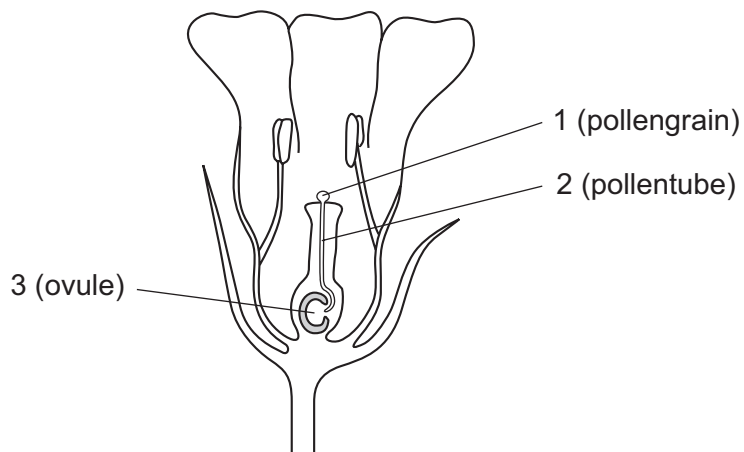
|          | oxygen level | carbon dioxide level |
|----------|--------------|----------------------|
| <b>A</b> | decreased    | decreased            |
| <b>B</b> | decreased    | increased            |
| <b>C</b> | increased    | decreased            |
| <b>D</b> | increased    | increased            |

**11** A person does not eat for several hours but then has a meal rich in carbohydrate.

Which graph shows how the person's blood sugar level changes after the meal?



**12** The diagram shows a flower just before fertilisation.



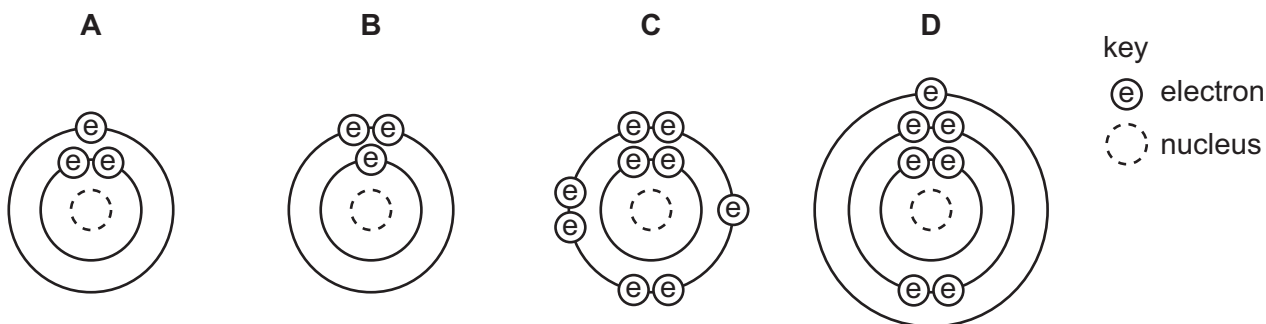
Where are the male and female gametes?

|          | male gamete | female gamete |
|----------|-------------|---------------|
| <b>A</b> | 1           | 2             |
| <b>B</b> | 1           | 3             |
| <b>C</b> | 2           | 3             |
| <b>D</b> | 3           | 2             |

13 What describes the placenta of a pregnant woman?

- A the cord connecting the baby to the mother, through which blood is circulated
- B the protective fluid-filled sac surrounding the embryo
- C the region of the female oviduct into which the egg is passed when it leaves the ovary
- D the structure where materials are exchanged between the mother's and the baby's tissues

14 What is the electronic structure of the atom  ${}^7_3\text{Li}$ ?

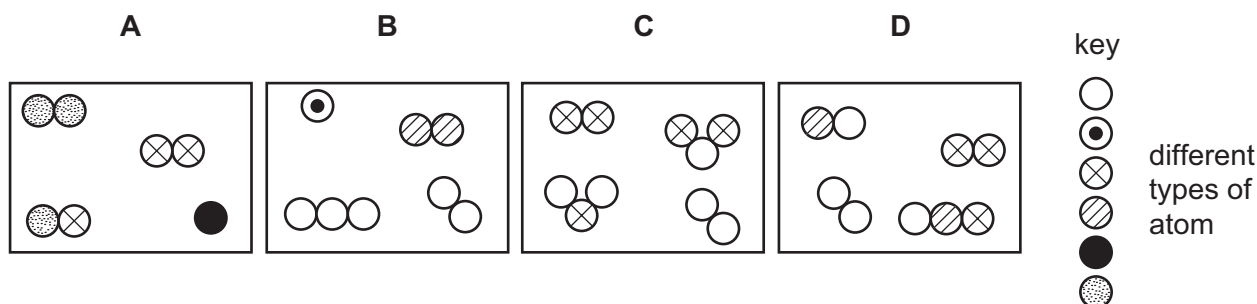


15 Which displayed formula correctly represents a molecule of carbon dioxide?

- A  $\text{O} - \text{C} - \text{O}$
- B  $\text{O} = \text{C} = \text{O}$
- C  $\text{C} - \text{O} - \text{O}$
- D  $\text{C} = \text{O} = \text{O}$

16 Four different mixtures of gases are made.

Which diagram represents a mixture containing only elements and **no** compounds?



**17** The diagram shows an outline of the Periodic Table.

Which two elements have similar chemical properties?

[illegible]

- A** V and W      **B** V and X      **C** W and Y      **D** Y and Z

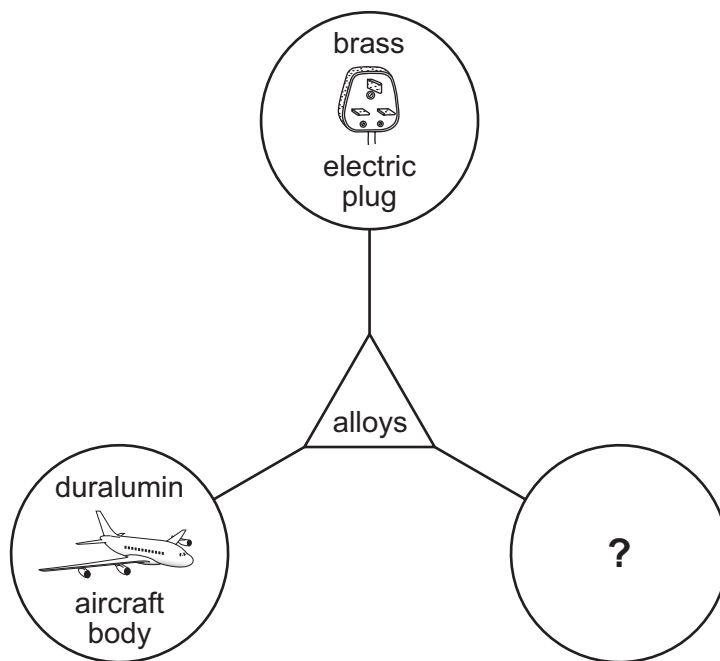
**18** What is the reason for the lack of reactivity of the noble gases?

- A** They have a complete outer shell of electrons.
- B** They have an even number of electrons.
- C** They have an even number of shells of electrons.
- D** They have two electrons in the first shell.

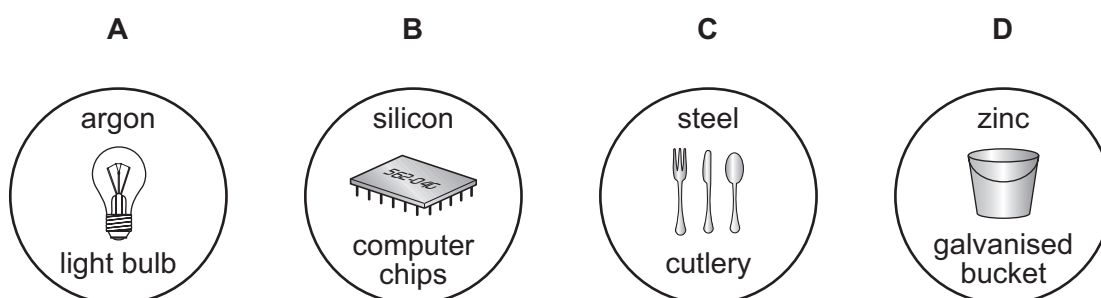
**19** Which two elements react explosively with dilute acids?

- A** Ca and Mg      **B** Ca and K      **C** K and Mg      **D** K and Na

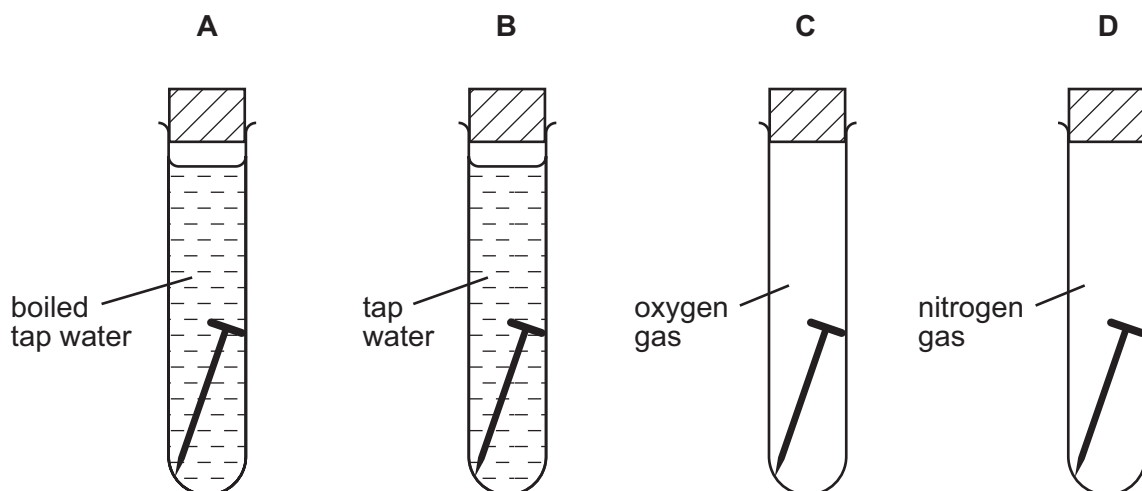
20 The diagram shows uses of alloys.



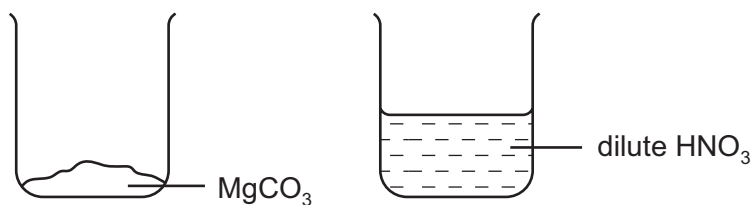
Which picture could be used to complete the diagram?



21 In which tube does the iron nail go rusty in the shortest time?



22 The contents of the labelled beakers shown are mixed.



Which salt is formed?

- A magnesium nitrate
- B magnesium sulphate
- C manganese nitrate
- D manganese sulphate

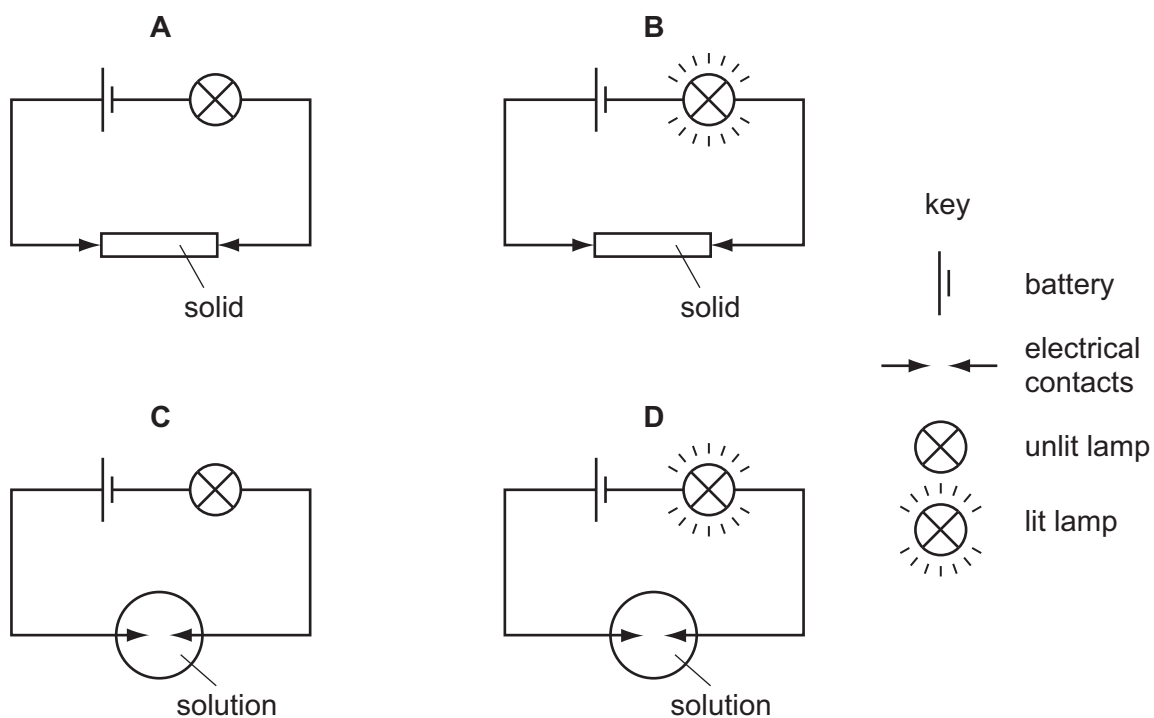
23 The table shows the results of tests on solution X.

| test                   | result            |
|------------------------|-------------------|
| blue litmus paper      | turns red         |
| aqueous silver nitrate | white precipitate |

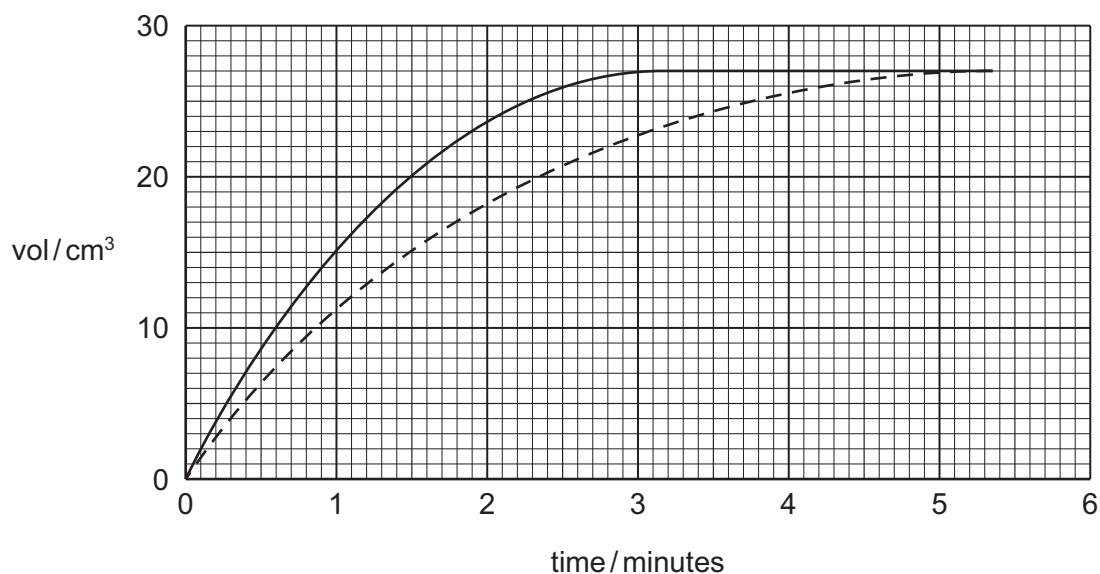
What could solution X contain?

- A HCl
- B HNO<sub>3</sub>
- C NaCl
- D NaOH

24 Which diagram shows that an electrolyte is present?

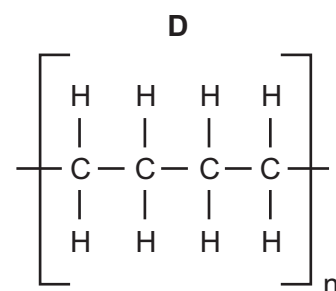
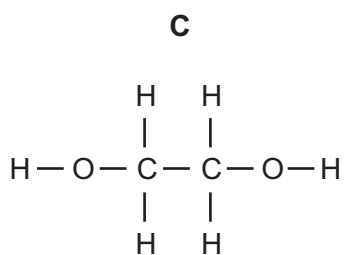
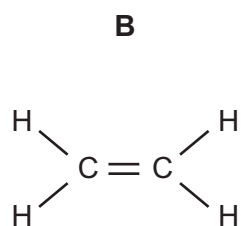
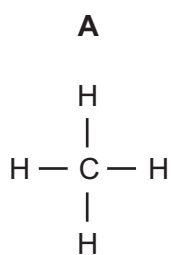


- 25 The solid line on the graph shows the volume of gas given off when calcium carbonate reacts with dilute hydrochloric acid.

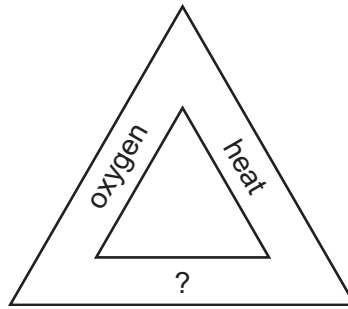


Which change to the conditions gives the results shown by the dotted line?

- A decrease the temperature of the acid
  - B decrease the size of the calcium carbonate pieces
  - C increase the concentration of the acid
  - D increase the mass of the calcium carbonate pieces
- 26 Which structure shows a polymer?



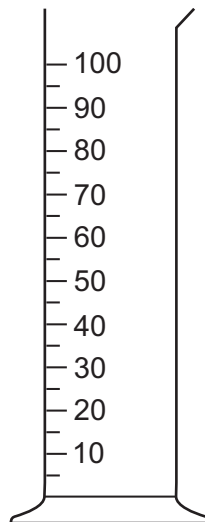
27 The diagram shows part of the fire triangle.



What completes the fire triangle?

- A carbon dioxide
- B flame
- C fuel
- D water

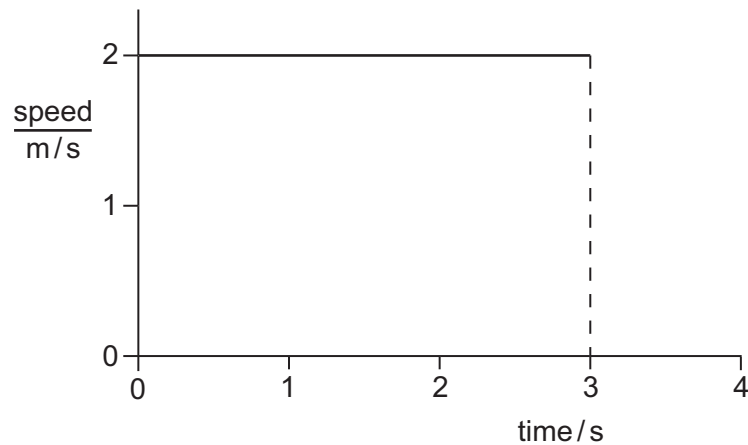
28 The diagram shows a measuring cylinder.



Which unit would be most suitable for its scale?

- A  $\text{mm}^2$
- B  $\text{mm}^3$
- C  $\text{cm}^2$
- D  $\text{cm}^3$

- 29 The diagram shows the speed-time graph for an object moving at constant speed.



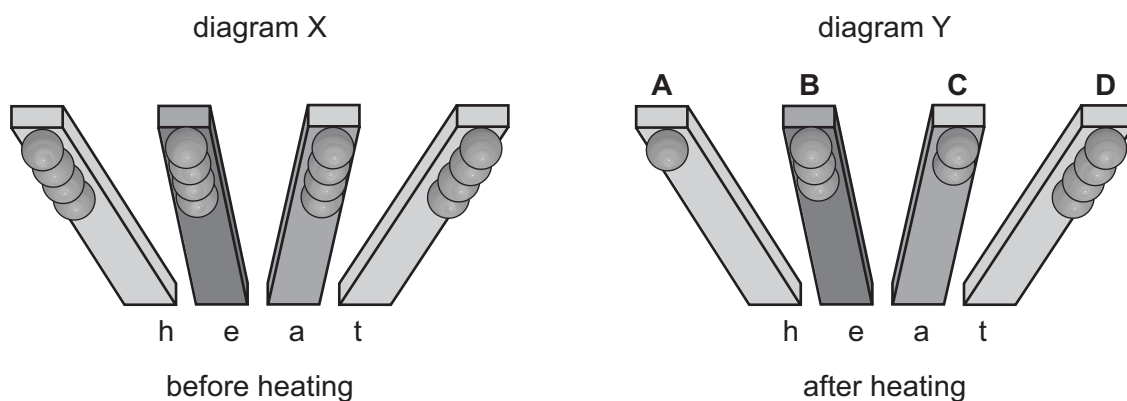
What is the distance travelled by the object in the first 3 s?

- A** 1.5 m      **B** 2.0 m      **C** 3.0 m      **D** 6.0 m
- 30 Which statement about the mass of a falling object is correct?
- A** It decreases as the object falls.  
**B** It is equal to the weight of the object.  
**C** It is measured in newtons.  
**D** It stays the same as the object falls.
- 31 Which of the following is a unit of density?
- A**  $\text{cm}^3/\text{g}$   
**B**  $\text{g}/\text{cm}^2$   
**C**  $\text{g}/\text{cm}^3$   
**D**  $\text{kg}/\text{m}^2$

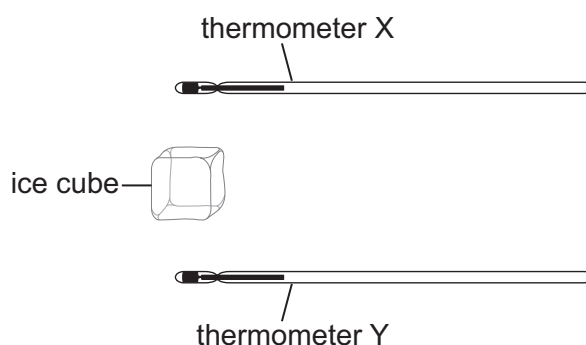
- 32 An experiment is set up to find out which metal is the best conductor of heat. Balls are stuck with wax to rods made from different metals, as shown in diagram X.

The rods are heated at one end. Some of the balls fall off, leaving some as shown in diagram Y.

Which labelled metal is the best conductor of heat?



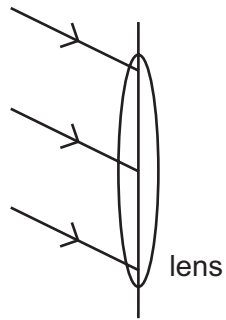
- 33 Thermometer X is held above an ice cube and thermometer Y is held the same distance below the ice cube. After several minutes, the reading on one thermometer changes. The ice cube does not melt.



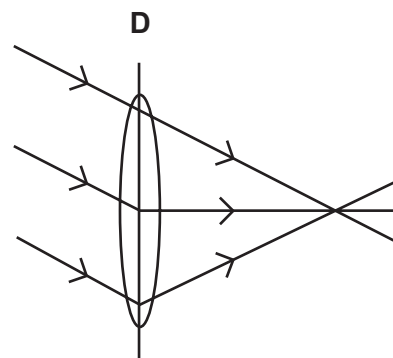
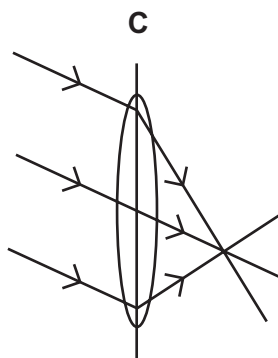
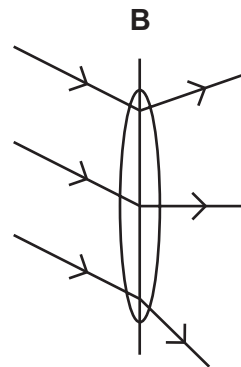
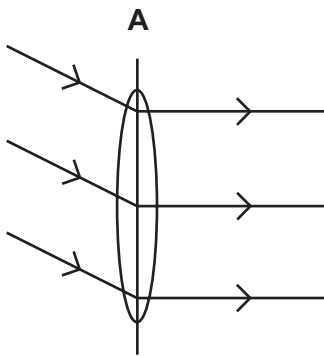
Which thermometer reading changes and why?

|          | thermometer | reason                           |
|----------|-------------|----------------------------------|
| <b>A</b> | X           | cool air rises from the ice cube |
| <b>B</b> | X           | warm air rises from the ice cube |
| <b>C</b> | Y           | cool air falls from the ice cube |
| <b>D</b> | Y           | warm air falls from the ice cube |

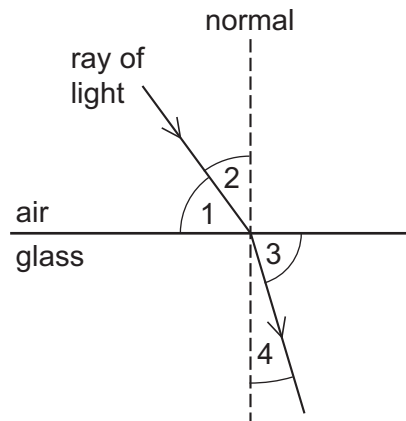
34 Three rays of light fall on a converging lens as shown.



Which diagram shows the path of the rays after passing through the lens?



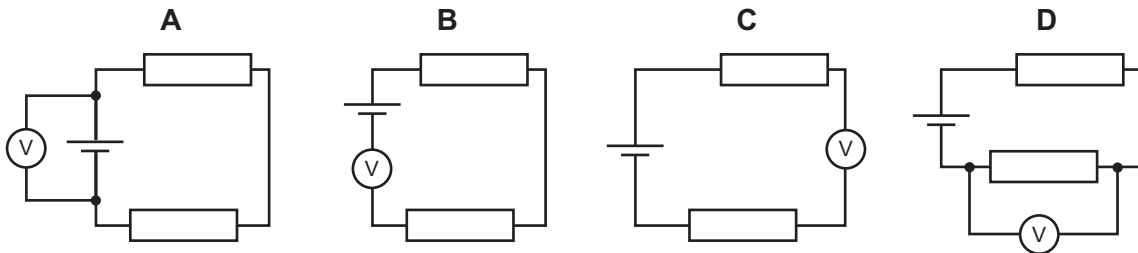
35 The diagram shows a ray of light entering a block of glass.



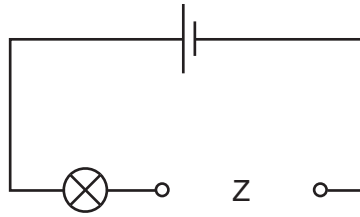
Which numbered angles are the angles of incidence and of refraction?

|          | angle of incidence | angle of refraction |
|----------|--------------------|---------------------|
| <b>A</b> | 1                  | 3                   |
| <b>B</b> | 1                  | 4                   |
| <b>C</b> | 2                  | 3                   |
| <b>D</b> | 2                  | 4                   |

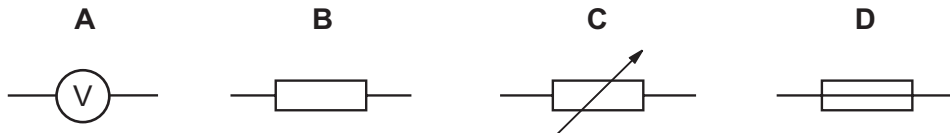
36 Which circuit shows how a voltmeter is connected to measure the potential difference across the cell?



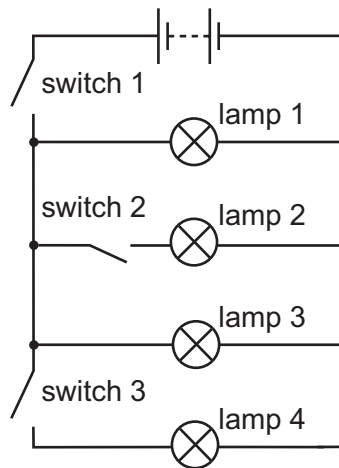
- 37 An electrical component is to be placed in the circuit at Z, to allow the brightness of the lamp to be varied from bright to dim.



What should be connected at Z?



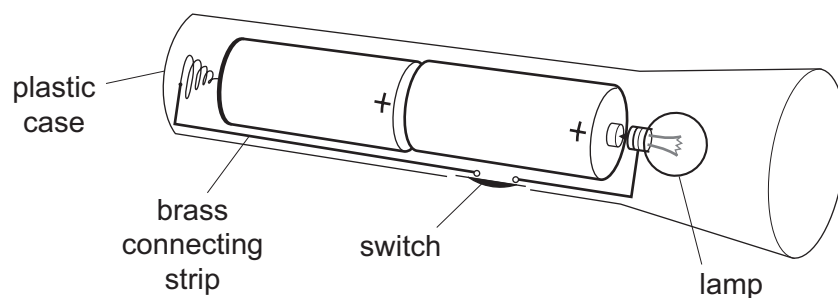
- 38 The circuit shown contains four lamps and three switches.



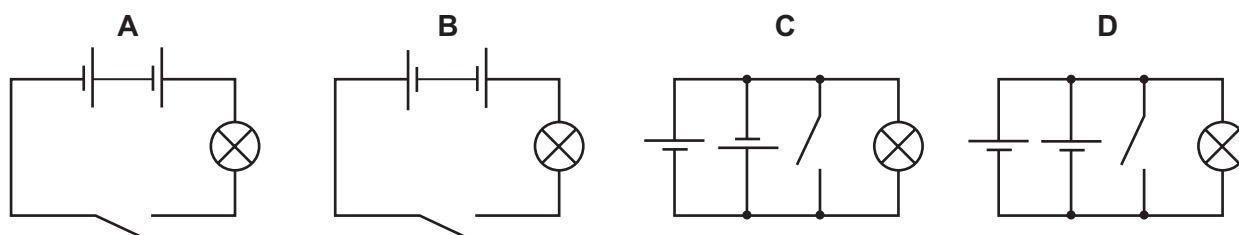
Which switches must be closed to light only lamps 1 and 3?

- A switch 1 only
- B switch 1 and switch 2 only
- C switch 1 and switch 3 only
- D switch 2 and switch 3 only

- 39 The diagram shows a torch containing two 2 V cells, a switch and a lamp.



What is the circuit diagram for the torch?



- 40 Which line correctly describes  $\alpha$ -particles?

|          | electric charge | penetrates 1 cm of aluminium? |
|----------|-----------------|-------------------------------|
| <b>A</b> | negative        | yes                           |
| <b>B</b> | negative        | no                            |
| <b>C</b> | positive        | yes                           |
| <b>D</b> | positive        | no                            |

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# DATA SHEET

## The Periodic Table of the Elements

| Group                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                           |                                            |                                           |                                           |                                            |                                            |                                            |                                          |                                            |                                         |                                          |                                           |                                           |                                           |                                            |                                            |                                         |  |                                      |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------|--------------------------------------------|-------------------------------------------|-------------------------------------------|--------------------------------------------|--------------------------------------------|--------------------------------------------|------------------------------------------|--------------------------------------------|-----------------------------------------|------------------------------------------|-------------------------------------------|-------------------------------------------|-------------------------------------------|--------------------------------------------|--------------------------------------------|-----------------------------------------|--|--------------------------------------|
| I                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | II                                        |                                            |                                           |                                           |                                            |                                            |                                            |                                          |                                            |                                         |                                          | III                                       | IV                                        | V                                         | VI                                         | VII                                        | 0                                       |  |                                      |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                           | <div>1<br/>H<br/>Hydrogen<br/>1</div>      |                                           |                                           |                                            |                                            |                                            |                                          |                                            |                                         |                                          |                                           |                                           |                                           |                                            |                                            |                                         |  | <div>4<br/>He<br/>Helium<br/>2</div> |
| <div>7<br/>Li<br/>Lithium<br/>3</div>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | <div>9<br/>Be<br/>Beryllium<br/>4</div>   |                                            |                                           |                                           |                                            |                                            |                                            |                                          |                                            |                                         |                                          | <div>11<br/>B<br/>Boron<br/>5</div>       | <div>12<br/>C<br/>Carbon<br/>6</div>      | <div>14<br/>N<br/>Nitrogen<br/>7</div>    | <div>16<br/>O<br/>Oxygen<br/>8</div>       | <div>19<br/>F<br/>Fluorine<br/>9</div>     | <div>20<br/>Ne<br/>Neon<br/>10</div>    |  |                                      |
| <div>23<br/>Na<br/>Sodium<br/>11</div>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | <div>24<br/>Mg<br/>Magnesium<br/>12</div> |                                            |                                           |                                           |                                            |                                            |                                            |                                          |                                            |                                         |                                          | <div>27<br/>Al<br/>Aluminium<br/>13</div> | <div>28<br/>Si<br/>Silicon<br/>14</div>   | <div>31<br/>P<br/>Phosphorus<br/>15</div> | <div>32<br/>S<br/>Sulphur<br/>16</div>     | <div>35.5<br/>Cl<br/>Chlorine<br/>17</div> | <div>40<br/>Ar<br/>Argon<br/>18</div>   |  |                                      |
| <div>39<br/>K<br/>Potassium<br/>19</div>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | <div>40<br/>Ca<br/>Calcium<br/>20</div>   | <div>45<br/>Sc<br/>Scandium<br/>21</div>   | <div>48<br/>Ti<br/>Titanium<br/>22</div>  | <div>51<br/>V<br/>Vanadium<br/>23</div>   | <div>52<br/>Cr<br/>Chromium<br/>24</div>   | <div>55<br/>Mn<br/>Manganese<br/>25</div>  | <div>56<br/>Fe<br/>Iron<br/>26</div>       | <div>59<br/>Co<br/>Cobalt<br/>27</div>   | <div>59<br/>Ni<br/>Nickel<br/>28</div>     | <div>64<br/>Cu<br/>Copper<br/>29</div>  | <div>65<br/>Zn<br/>Zinc<br/>30</div>     | <div>70<br/>Ga<br/>Gallium<br/>31</div>   | <div>73<br/>Ge<br/>Germanium<br/>32</div> | <div>75<br/>As<br/>Arsenic<br/>33</div>   | <div>79<br/>Se<br/>Selenium<br/>34</div>   | <div>80<br/>Br<br/>Bromine<br/>35</div>    | <div>84<br/>Kr<br/>Krypton<br/>36</div> |  |                                      |
| <div>85<br/>Rb<br/>Rubidium<br/>37</div>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | <div>88<br/>Sr<br/>Strontium<br/>38</div> | <div>89<br/>Y<br/>Yttrium<br/>39</div>     | <div>91<br/>Zr<br/>Zirconium<br/>40</div> | <div>93<br/>Nb<br/>Niobium<br/>41</div>   | <div>96<br/>Mo<br/>Molybdenum<br/>42</div> | <div>101<br/>Ru<br/>Ruthenium<br/>44</div> | <div>101<br/>Ru<br/>Ruthenium<br/>44</div> | <div>103<br/>Rh<br/>Rhodium<br/>45</div> | <div>106<br/>Pd<br/>Palladium<br/>46</div> | <div>108<br/>Ag<br/>Silver<br/>47</div> | <div>112<br/>Cd<br/>Cadmium<br/>48</div> | <div>115<br/>In<br/>Indium<br/>49</div>   | <div>119<br/>Sn<br/>Tin<br/>50</div>      | <div>122<br/>Sb<br/>Antimony<br/>51</div> | <div>128<br/>Te<br/>Tellurium<br/>52</div> | <div>127<br/>I<br/>Iodine<br/>53</div>     | <div>131<br/>Xe<br/>Xenon<br/>54</div>  |  |                                      |
| <div>133<br/>Cs<br/>Caesium<br/>55</div>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | <div>137<br/>Ba<br/>Barium<br/>56</div>   | <div>139<br/>La<br/>Lanthanum<br/>57</div> | <div>178<br/>Hf<br/>Hafnium<br/>72</div>  | <div>181<br/>Ta<br/>Tantalum<br/>73</div> | <div>184<br/>W<br/>Tungsten<br/>74</div>   | <div>186<br/>Re<br/>Rhenium<br/>75</div>   | <div>190<br/>Os<br/>Osmium<br/>76</div>    | <div>192<br/>Ir<br/>Iridium<br/>77</div> | <div>195<br/>Pt<br/>Platinum<br/>78</div>  | <div>197<br/>Au<br/>Gold<br/>79</div>   | <div>201<br/>Hg<br/>Mercury<br/>80</div> | <div>204<br/>Tl<br/>Thallium<br/>81</div> | <div>207<br/>Pb<br/>Lead<br/>82</div>     | <div>209<br/>Bi<br/>Bismuth<br/>83</div>  | <div>210<br/>Po<br/>Polonium<br/>84</div>  | <div>210<br/>At<br/>Astatine<br/>85</div>  | <div>222<br/>Rn<br/>Radon<br/>86</div>  |  |                                      |
| <div>87<br/>Fr<br/>Francium<br/>87</div>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | <div>226<br/>Ra<br/>Radium<br/>88</div>   | <div>227<br/>Ac<br/>Actinium<br/>89</div>  |                                           |                                           |                                            |                                            |                                            |                                          |                                            |                                         |                                          |                                           |                                           |                                           |                                            |                                            |                                         |  |                                      |
| *58-71 Lanthanoid series<br>90-103 Actinoid series                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                           |                                            |                                           |                                           |                                            |                                            |                                            |                                          |                                            |                                         |                                          |                                           |                                           |                                           |                                            |                                            |                                         |  |                                      |
| <div>a = relative atomic mass<br/>X = atomic symbol<br/>b = proton (atomic) number</div>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                           |                                            |                                           |                                           |                                            |                                            |                                            |                                          |                                            |                                         |                                          |                                           |                                           |                                           |                                            |                                            |                                         |  |                                      |
| Key                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                           |                                            |                                           |                                           |                                            |                                            |                                            |                                          |                                            |                                         |                                          |                                           |                                           |                                           |                                            |                                            |                                         |  |                                      |
| <div><div>a</div><div>X</div><div>b</div></div>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                           |                                            |                                           |                                           |                                            |                                            |                                            |                                          |                                            |                                         |                                          |                                           |                                           |                                           |                                            |                                            |                                         |  |                                      |
| <div><div>140<br/>Ce<br/>Cerium<br/>58</div><div>141<br/>Pr<br/>Praseodymium<br/>59</div><div>144<br/>Nd<br/>Neodymium<br/>60</div><div>150<br/>Sm<br/>Samarium<br/>62</div><div>152<br/>Eu<br/>Europium<br/>63</div><div>157<br/>Gd<br/>Gadolinium<br/>64</div><div>159<br/>Tb<br/>Terbium<br/>65</div><div>162<br/>Dy<br/>Dysprosium<br/>66</div><div>165<br/>Ho<br/>Holmium<br/>67</div><div>167<br/>Er<br/>Erbium<br/>68</div><div>169<br/>Tm<br/>Thulium<br/>69</div><div>173<br/>Yb<br/>Ytterbium<br/>70</div><div>175<br/>Lu<br/>Lutetium<br/>71</div></div>              |                                           |                                            |                                           |                                           |                                            |                                            |                                            |                                          |                                            |                                         |                                          |                                           |                                           |                                           |                                            |                                            |                                         |  |                                      |
| <div><div>232<br/>Th<br/>Thorium<br/>90</div><div>232<br/>Pa<br/>Protactinium<br/>91</div><div>238<br/>U<br/>Uranium<br/>92</div><div>238<br/>Pu<br/>Plutonium<br/>94</div><div>244<br/>Am<br/>Americium<br/>95</div><div>244<br/>Cm<br/>Curium<br/>96</div><div>247<br/>Bk<br/>Berkelium<br/>97</div><div>247<br/>Cf<br/>Californium<br/>98</div><div>251<br/>Es<br/>Einsteinium<br/>99</div><div>253<br/>Fm<br/>Fermium<br/>100</div><div>257<br/>Md<br/>Mendelevium<br/>101</div><div>259<br/>No<br/>Nobelium<br/>102</div><div>261<br/>Lr<br/>Lawrencium<br/>103</div></div> |                                           |                                            |                                           |                                           |                                            |                                            |                                            |                                          |                                            |                                         |                                          |                                           |                                           |                                           |                                            |                                            |                                         |  |                                      |

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