

UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
International General Certificate of Secondary Education

CO-ORDINATED SCIENCES

0654/01

Paper 1 Multiple Choice

October/November 2006

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.

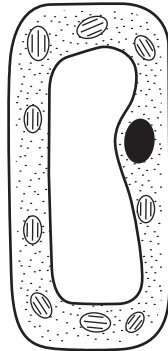
This document consists of **18** printed pages and **2** blank pages.



- 1 A fossil shows evidence of an organism with scaly skin, a tail and four legs.

In which group would the organism be classified?

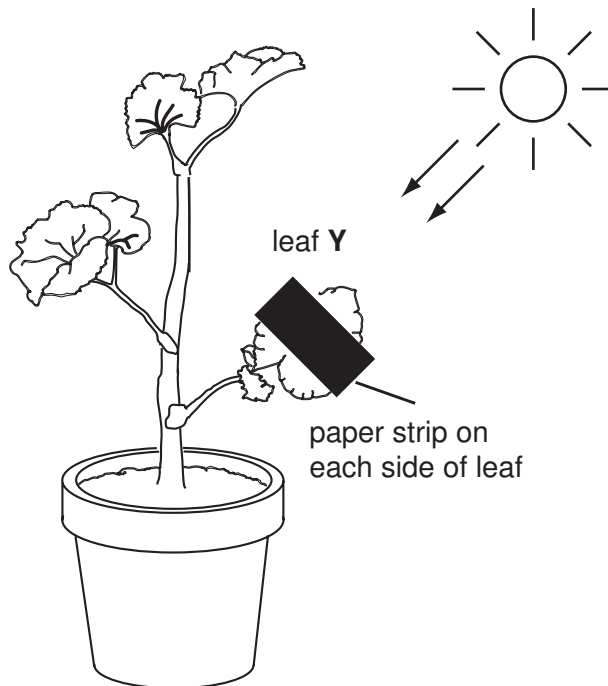
- A amphibians
 - B fish
 - C mammals
 - D reptiles
- 2 The diagram shows an incomplete plant cell.



Which structure is **not** shown?

- A cell membrane
 - B cell wall
 - C chloroplast
 - D vacuole
- 3 Which two parts of the eye help to focus light rays?
- A cornea and iris
 - B cornea and lens
 - C iris and retina
 - D lens and retina

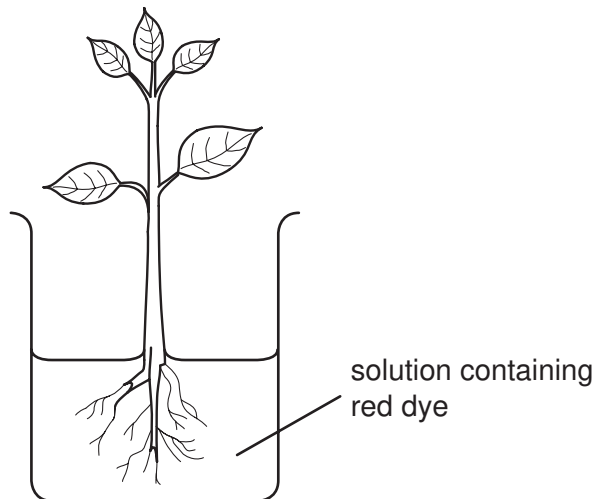
- 4 An experiment is set up as shown to investigate starch production in the leaves of a plant. After six hours in sunlight, leaf **Y** is tested for starch.



There is no starch produced under the paper strip because there was an absence of

- A carbon dioxide.
- B chlorophyll.
- C light.
- D oxygen.

- 5 Roots of a seedling are placed in a solution containing red dye.



What is the path of the red dye after it has entered the roots?

- A phloem in root → phloem in stem
 - B phloem in root → xylem in stem
 - C xylem in root → phloem in stem
 - D xylem in root → xylem in stem
- 6 Which sequence shows the correct order of structures through which air passes when we breathe in?
- A alveolus → bronchiole → trachea → bronchus
 - B bronchus → trachea → alveolus → bronchiole
 - C bronchiole → alveolus → bronchus → trachea
 - D trachea → bronchus → bronchiole → alveolus

- 7 The table shows the amount of protein and fat in 100g samples of different foods.

| foods | protein/g | fat/g |
|--------------|-----------|-------|
| meat | 18.0 | 17.0 |
| bread | 9.0 | 1.5 |
| fish | 18.0 | 0.5 |
| eggs | 13.0 | 11.0 |
| potato chips | 4.0 | 9.0 |

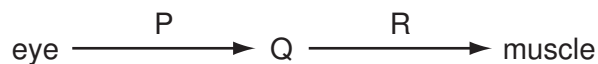
Which foods are best for body-building?

- A** bread and meat
B bread and potato chips
C meat and eggs
D meat and fish
- 8 Calcium and iron are components of the diet.

Which parts of the body need these components?

| | dietary component | |
|----------|-------------------|-------|
| | calcium | iron |
| A | blood | bone |
| B | blood | skin |
| C | bone | blood |
| D | skin | bone |

- 9 The diagram shows how the eye and a muscle of a person are linked when responding to a change in the environment.

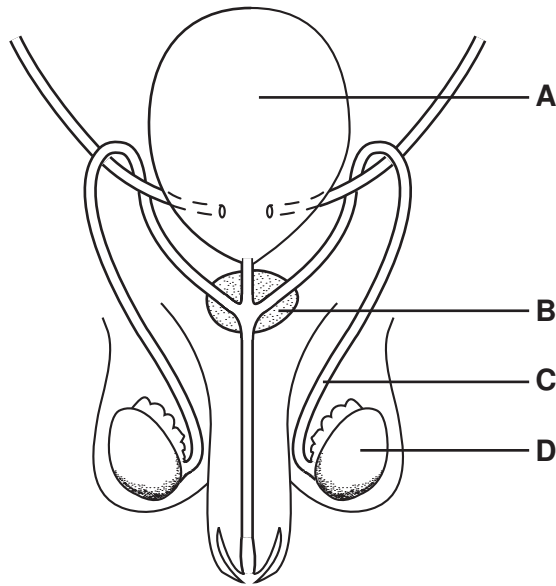


What do P, Q and R represent?

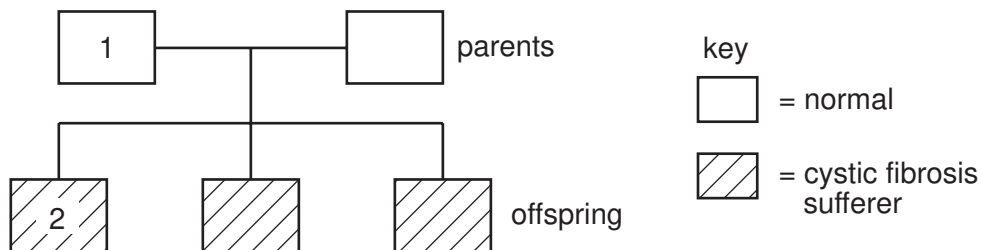
| | P | Q | R |
|----------|----------|------------------------|----------|
| A | effector | stimulus | receptor |
| B | impulses | central nervous system | impulses |
| C | receptor | central nervous system | effector |
| D | stimulus | receptor | effector |

10 The diagram shows the male reproductive system.

In which structure are hormones produced that control adolescence?



11 Cystic fibrosis is an inherited disease. The diagram shows the occurrence of this disease in a family.



If B represents the normal allele and b the allele for cystic fibrosis, what are the genotypes for 1 and 2?

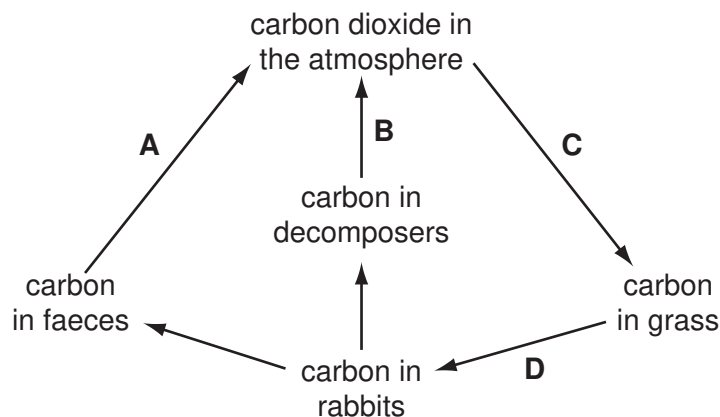
| | individual 1 | individual 2 |
|----------|--------------|--------------|
| A | bb | bb |
| B | Bb | bb |
| C | Bb | Bb |
| D | BB | Bb |

12 Which process converts energy into a form that can be used by all living organisms?

- A** decomposition
- B** denitrification
- C** digestion
- D** photosynthesis

13 The diagram shows a simple carbon cycle.

Which line should have an arrow at both ends?



14 Which row in the table shows the relative charge of an electron and of a neutron?

| | electron | neutron |
|----------|----------|---------|
| A | +1 | 0 |
| B | +1 | -1 |
| C | -1 | 0 |
| D | -1 | +1 |

15 An element is in Group VI of the Periodic Table.

What information does this give about the element?

- A** the number of protons in the nucleus
- B** the number of outer electrons
- C** the reactivity of the element
- D** the relative atomic mass of the element

16 Which process would show that crude oil is a mixture?

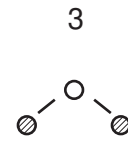
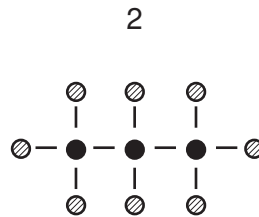
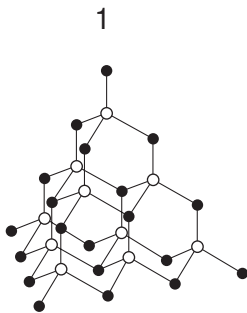
- A** combustion
- B** cracking
- C** fractional distillation
- D** neutralisation

17 Crude oil, salt and wood are important raw materials used in industry.

Which of these raw materials is used to make alkali, paper and plastics?

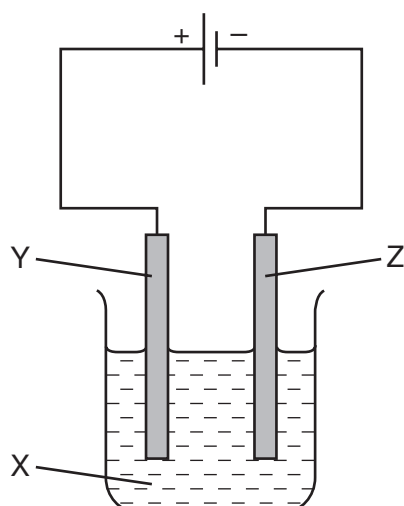
| | alkali | paper | plastics |
|----------|-----------|-----------|-----------|
| A | crude oil | wood | salt |
| B | salt | crude oil | wood |
| C | salt | wood | crude oil |
| D | wood | salt | crude oil |

18 Which diagrams show a giant molecular structure?



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

19 The diagram shows apparatus used for electrolysis.



Which row shows the correct labelling for the apparatus?

| | anode | cathode | electrolyte |
|----------|-------|---------|-------------|
| A | X | Y | Z |
| B | X | Z | Y |
| C | Y | X | Z |
| D | Y | Z | X |

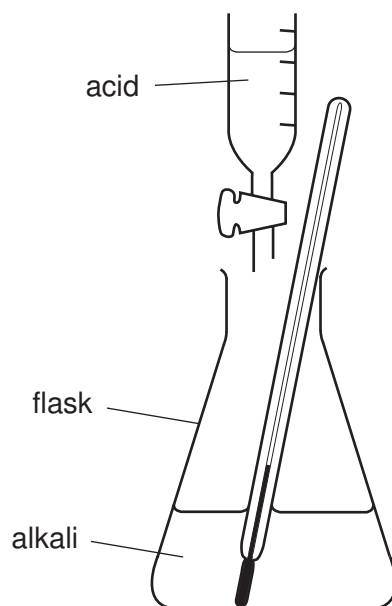
20 When some hard water is boiled in a kettle, a white scale forms inside the kettle.

Which two of the following statements are correct?

- 1 The hard water contains dissolved calcium carbonate.
- 2 The hard water contains dissolved calcium hydrogencarbonate.
- 3 The white scale contains calcium carbonate.
- 4 The white scale contains calcium hydrogencarbonate.

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

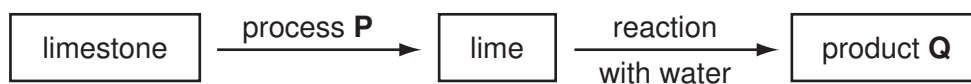
21 The diagram shows acid being added to an alkali until it is neutralised.



What happens in the flask?

| | temperature | type of reaction |
|----------|-------------|------------------|
| A | decreases | endothermic |
| B | decreases | exothermic |
| C | increases | endothermic |
| D | increases | exothermic |

22 The diagram shows how limestone can be converted into useful products for industry.



What are process **P** and product **Q**?

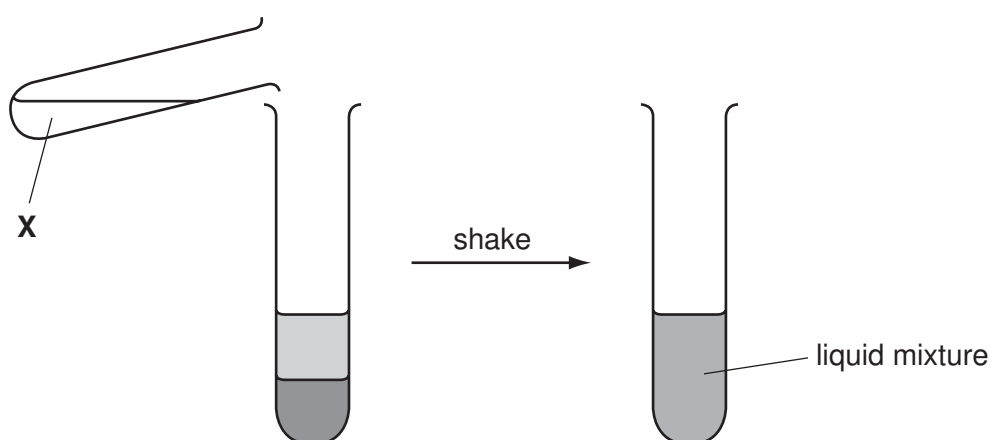
| | P | Q |
|----------|---------------|-----------|
| A | combustion | an acid |
| B | combustion | an alkali |
| C | decomposition | an acid |
| D | decomposition | an alkali |

23 A small amount of ammonia is present in a sample of hydrogen.

What would be the results of tests on the mixture?

| | damp blue litmus | lighted splint |
|----------|------------------|----------------|
| A | stays blue | no effect |
| B | stays blue | pops |
| C | turns red | no effect |
| D | turns red | pops |

24 A medicine contains two liquids that do not normally mix. Adding a small amount of liquid **X** helps to make the liquids mix.



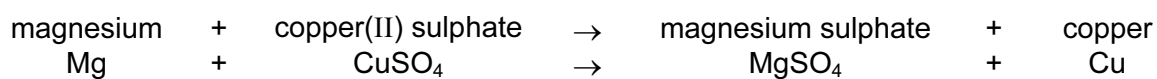
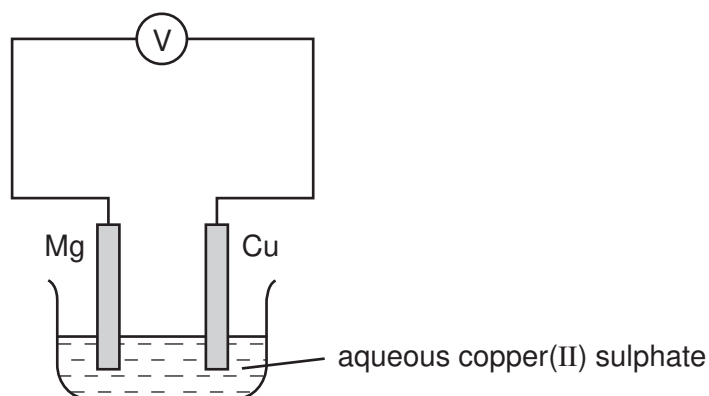
Which word best describes liquid **X**?

- A** analgesic
 - B** antacid
 - C** catalyst
 - D** emulsifier
- 25 Water is used to put out forest fires by spraying it on to the fire from aeroplanes.

Why is water used for this purpose?

- A** Water boils at 100 °C.
- B** Water cools the fire.
- C** Water is a good solvent.
- D** Water is a reducing agent.

- 26 In the simple cell shown, magnesium dissolves from the magnesium electrode and copper is deposited on the copper electrode.



It can be deduced that magnesium is1.... reactive than copper and that the mass of the deposited copper is2.... the mass of the dissolved magnesium.

Which words correctly complete gaps 1 and 2?

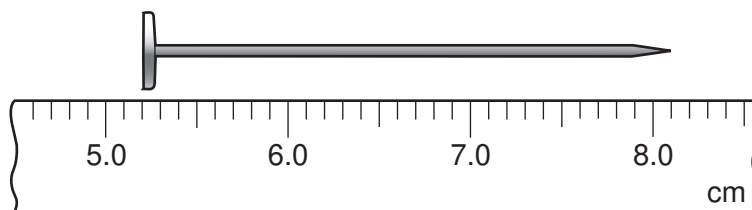
| | gap 1 | gap 2 |
|----------|-------|-------------|
| A | less | more than |
| B | less | the same as |
| C | more | more than |
| D | more | the same as |

- 27 Substance **R** has a high melting point and reacts with an acid to produce hydrogen.

What does this show about substance **R**?

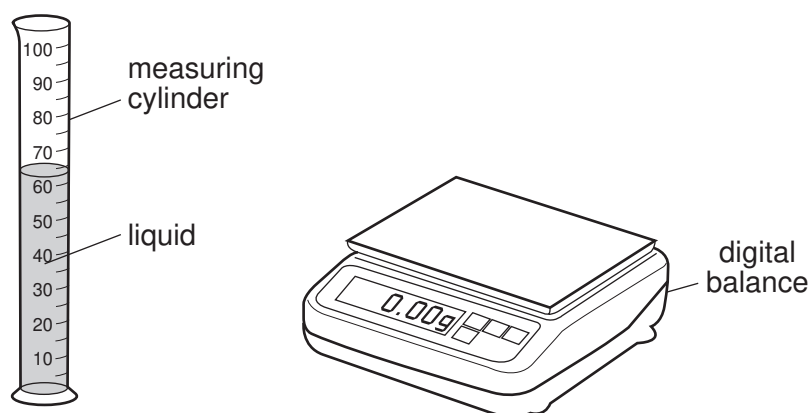
| | metal or non-metal | structure |
|----------|--------------------|-----------|
| A | metal | giant |
| B | metal | molecular |
| C | non-metal | giant |
| D | non-metal | molecular |

- 28 A ruler is used to measure the length of a nail.



What is the length of the nail?

- A 1.3 cm B 2.9 cm C 5.2 cm D 8.1 cm
- 29 A newton is a unit of force.
- Which quantity is measured in newtons?
- A acceleration
B density
C mass
D weight
- 30 A student pours liquid into a measuring cylinder.



The student records the volume of the liquid from the scale on the measuring cylinder. He then puts the measuring cylinder containing the liquid on a balance and records the mass.

What else needs to be measured before the density of the liquid can be calculated?

- A the depth of the liquid in the measuring cylinder
B the mass of the empty measuring cylinder
C the temperature of the liquid in the measuring cylinder
D the volume of the empty measuring cylinder

31 Which source of energy uses the production of steam to generate electricity?

- A hydroelectric
- B nuclear
- C tides
- D waves

32 A cyclist travels down a hill from rest at point X without pedalling.

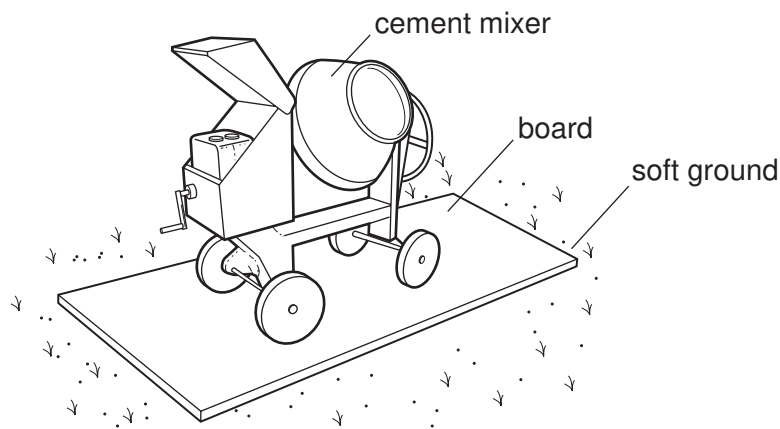
The cyclist applies his brakes and the cycle stops at point Y.



Which energy changes have taken place between X and Y?

- A kinetic \rightarrow internal (heat) \rightarrow gravitational potential
- B kinetic \rightarrow gravitational potential \rightarrow internal (heat)
- C gravitational potential \rightarrow internal (heat) \rightarrow kinetic
- D gravitational potential \rightarrow kinetic \rightarrow internal (heat)

33 To prevent a cement mixer sinking into soft ground, the mixer is placed on a large flat board.



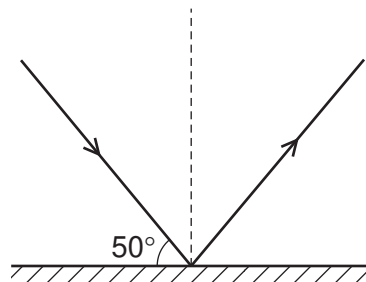
Why does this prevent the mixer sinking?

- A The large area decreases the pressure on the ground.
- B The large area increases the pressure on the ground.
- C The large area decreases the weight on the ground.
- D The large area increases the weight on the ground.

34 Which line in the table is correct about conduction and convection?

| | conduction | convection |
|----------|------------------------|------------------------|
| A | can happen in a solid | can happen in a solid |
| B | can happen in a solid | only happens in fluids |
| C | only happens in fluids | can happen in a solid |
| D | only happens in fluids | only happens in fluids |

35 The diagram shows a ray of light striking a plane mirror.



What is the angle of reflection?

- A** 40° **B** 50° **C** 80° **D** 130°

36 A student wishes to measure the electromotive force (e.m.f.) of a battery and the potential difference (p.d.) across a resistor.

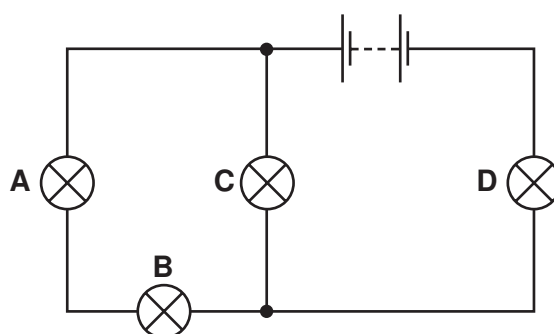
She has the resistor, the battery and some connecting wires.

What else does she need?

- A** a voltmeter only
B an ammeter only
C an ammeter and a voltmeter
D a force meter (newton meter) and a voltmeter

37 In the circuit below, one of the lamps breaks, causing all the other lamps to go out.

Which lamp breaks?

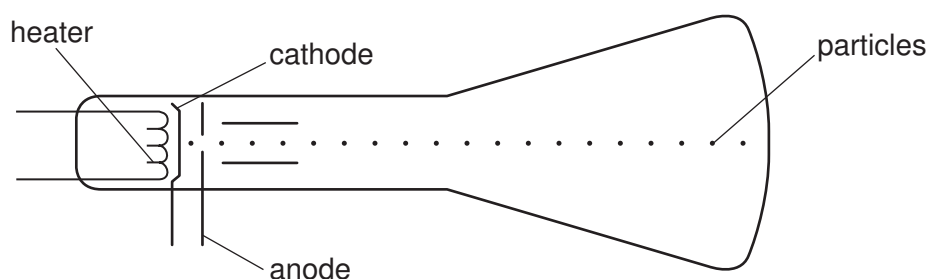


38 An electric heater is connected to the mains, using insulated copper wires. The wires become very warm.

What can be done to prevent so much heat being produced in the connecting wires?

- A Use thicker copper wires.
- B Use thinner copper wires.
- C Use thicker insulation.
- D Use thinner insulation.

39 Particles are emitted by a heated cathode in a cathode-ray tube.



What are these particles?

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

40 Which line in the table describes the nature of alpha radiation and of gamma radiation?

| | alpha radiation | gamma radiation |
|----------|-----------------|-----------------------|
| A | helium nuclei | electromagnetic waves |
| B | helium nuclei | electrons |
| C | protons | electromagnetic waves |
| D | protons | electrons |

DATA SHEET The Periodic Table of the Elements

| Group | | | | | | | | | | | | | | | | | |
|-----------------------------------|------------------------------------|---------------------------------------|------------------------------------|------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|-----------------------------------|-------------------------------------|----------------------------------|-----------------------------------|------------------------------------|------------------------------------|------------------------------------|-------------------------------------|-------------------------------------|----------------------------------|
| I | II | | | | | | | | | | | III | IV | V | VI | VII | 0 |
| | | | | | | | | | | | 1 H Hydrogen 1 | | | | | | 2 He Helium 2 |
| 7 Li Lithium 3 | 9 Be Beryllium 4 | | | | | | | | | | | 11 B Boron 5 | 12 C Carbon 6 | 14 N Nitrogen 7 | 16 O Oxygen 8 | 19 F Fluorine 9 | 20 Ne Neon 10 |
| 23 Na Sodium 11 | 24 Mg Magnesium 12 | | | | | | | | | | | 27 Al Aluminium 13 | 28 Si Silicon 14 | 31 P Phosphorus 15 | 32 S Sulphur 16 | 35.5 Cl Chlorine 17 | 40 Ar Argon 18 |
| 39 K Potassium 19 | 40 Ca Calcium 20 | 45 Sc Scandium 21 | 48 Ti Titanium 22 | 51 V Vanadium 23 | 52 Cr Chromium 24 | 55 Mn Manganese 25 | 56 Fe Iron 26 | 59 Co Cobalt 27 | 59 Ni Nickel 28 | 64 Cu Copper 29 | 65 Zn Zinc 30 | 70 Ga Gallium 31 | 73 Ge Germanium 32 | 75 As Arsenic 33 | 79 Se Selenium 34 | 80 Br Bromine 35 | 84 Kr Krypton 36 |
| 85 Rb Rubidium 37 | 88 Sr Strontium 38 | 89 Y Yttrium 39 | 91 Zr Zirconium 40 | 93 Nb Niobium 41 | 96 Mo Molybdenum 42 | 98 Tc Technetium 43 | 101 Ru Ruthenium 44 | 103 Rh Rhodium 45 | 106 Pd Palladium 46 | 108 Ag Silver 47 | 112 Cd Cadmium 48 | 115 In Indium 49 | 119 Sn Tin 50 | 122 Sb Antimony 51 | 128 Te Tellurium 52 | 127 I Iodine 53 | 131 Xe Xenon 54 |
| 133 Cs Caesium 55 | 137 Ba Barium 56 | 139 La Lanthanum 57 * | 178 Hf Hafnium 72 | 181 Ta Tantalum 73 | 184 W Tungsten 74 | 186 Re Rhenium 75 | 190 Os Osmium 76 | 192 Ir Iridium 77 | 195 Pt Platinum 78 | 197 Au Gold 79 | 201 Hg Mercury 80 | 204 Tl Thallium 81 | 207 Pb Lead 82 | 209 Bi Bismuth 83 | 210 Po Polonium 84 | 210 At Astatine 85 | 210 Rn Radon 86 |
| 87 Fr Francium | 88 Ra Radium | 89 Ac Actinium † | | | | | | | | | | | | | | | |

*58-71 Lanthanoid series
†90-103 Actinoid series

Key

| | |
|----------|----------------------------|
| a | a = relative atomic mass |
| X | X = atomic symbol |
| b | b = proton (atomic) number |

| | | | | | | | | | | | | | |
|-----------------------------------|--|-------------------------------------|--------------------------------------|-------------------------------------|-------------------------------------|--------------------------------------|-------------------------------------|---------------------------------------|---------------------------------------|------------------------------------|--|-------------------------------------|---------------------------------------|
| 140 Ce Cerium 58 | 141 Pr Praseodymium 59 | 144 Nd Neodymium 60 | 147 Pm Promethium 61 | 150 Sm Samarium 62 | 152 Eu Europium 63 | 157 Gd Gadolinium 64 | 159 Tb Terbium 65 | 162 Dy Dysprosium 66 | 165 Ho Holmium 67 | 167 Er Erbium 68 | 169 Tm Thulium 69 | 173 Yb Ytterbium 70 | 175 Lu Lutetium 71 |
| 232 Th Thorium 90 | 234 Pa Protactinium 91 | 238 U Uranium 92 | 237 Np Neptunium 93 | 244 Pu Plutonium 94 | 247 Am Americium 95 | 251 Cm Curium 96 | 259 Bk Berkelium 97 | 261 Cf Californium 98 | 265 Es Einsteinium 99 | 267 Fm Fermium 100 | 268 Md Mendelevium 101 | 269 No Nobelium 102 | 277 Lr Lawrencium 103 |

The volume of one mole of any gas is 24 dm³ at room temperature and pressure (r.t.p.).