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| Centre Number | Candidate Number | Name |
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CAMBRIDGE INTERNATIONAL EXAMINATIONS
International General Certificate of Secondary Education

COMBINED SCIENCE

0653/02

Paper 2

May/June 2003

1 hour

Candidates answer on the Question Paper.
No Additional Materials are required.

READ THESE INSTRUCTIONS FIRST

Write your Centre number, candidate number and name on all the work you hand in.
Write in dark blue or black pen in the spaces provided on the Question Paper.
You may use a soft pencil for any diagrams, graphs, tables or rough working.
Do not use staples, paper clips, highlighters, glue or correction fluid.

Answer **all** questions.

At the end of the examination, fasten all your work securely together.

The number of marks is given in brackets [] at the end of each question or part question.

A copy of the Periodic Table is printed on page 16.

| For Examiner's Use | |
|--------------------|--|
| 1 | |
| 2 | |
| 3 | |
| 4 | |
| 5 | |
| 6 | |
| 7 | |
| 8 | |
| 9 | |

If you have been given a label, look at the details. If any details are incorrect or missing, please fill in your correct details in the space given at the top of this page.

Stick your personal label here, if provided.

This document consists of **16** printed pages.

1 Fig. 1.1 shows a fruit containing seeds.

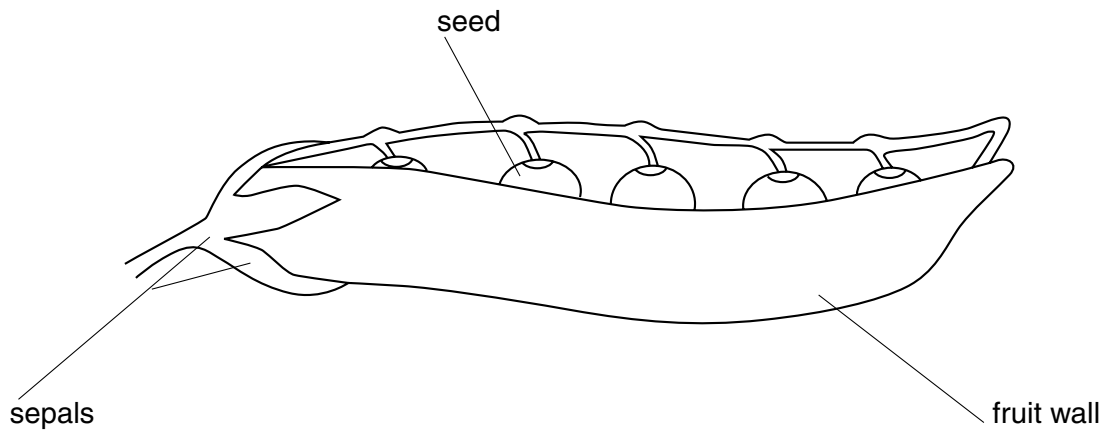


Fig. 1.1

(a) Name the part of the flower from which each of the following parts developed.

the whole fruit

the seeds inside the fruit [2]

(b) A student investigated the conditions needed for the germination of these seeds.

He set up the apparatus shown in Fig. 1.2.

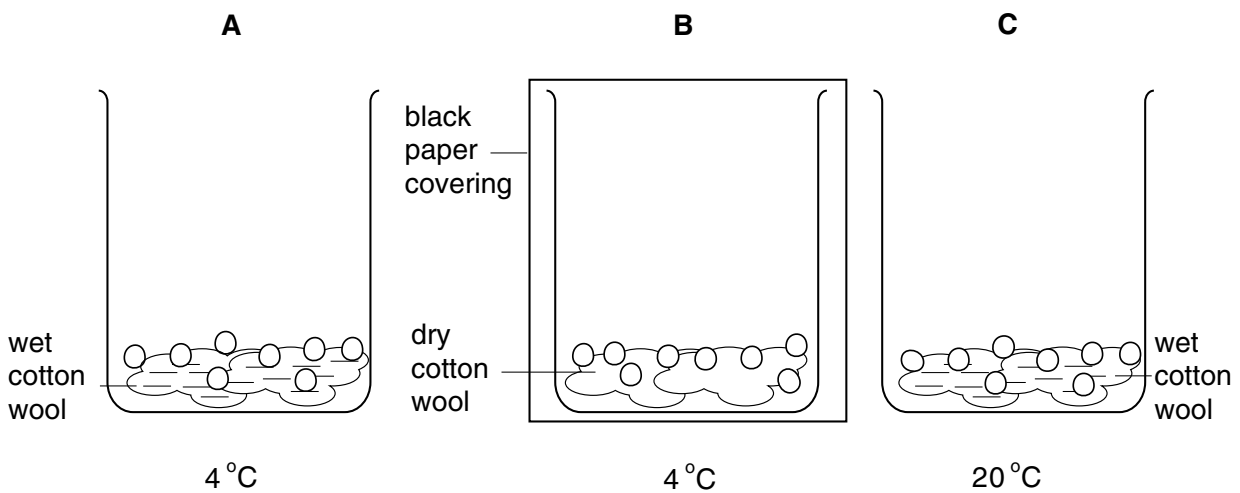


Fig. 1.2

The student found that the seeds in beakers **A** and **B** did not germinate. The seeds in beaker **C** did germinate.

He concluded that the seeds needed water, a warm temperature and light in order to germinate.

(i) Which **two** of these conclusions **cannot** be made from the results of this investigation?

..... [1]

(ii) Explain your answer.

.....
.....
..... [2]

(c) Seeds, such as beans, are a good source of carbohydrate and protein in the human diet.

(i) Describe how you would test a bean seed to see if it contained starch.

..... [1]

(ii) State what you would see if the result of the test was positive.

..... [1]

2 Hydrocarbons are important compounds found in crude oil (petroleum).

(a) Write the names and chemical symbols of the two elements which are combined in hydrocarbon molecules.

1. name symbol

2. name symbol [2]

(b) Propane is a gaseous hydrocarbon fuel.

Fig. 2.1 shows apparatus used to investigate the products of complete combustion of propane.

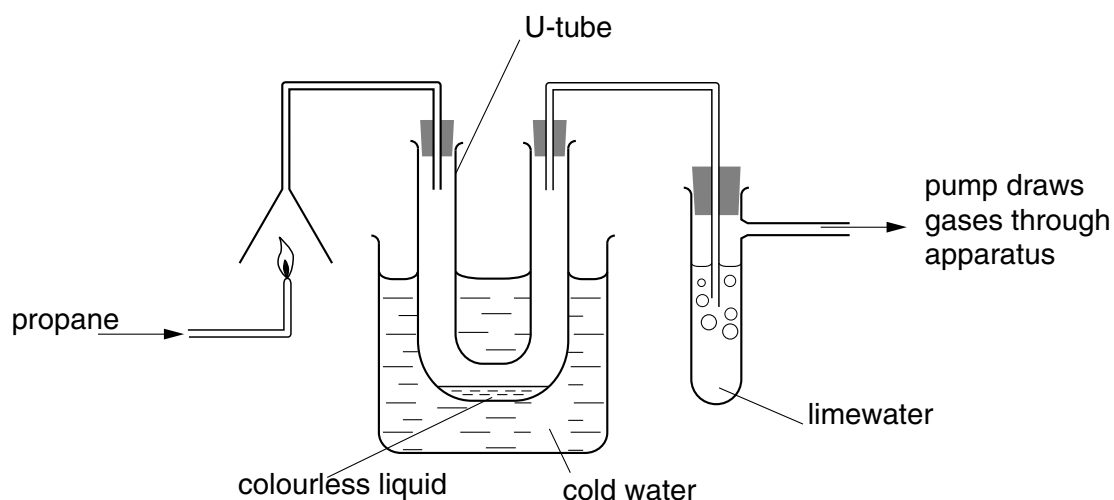


Fig. 2.1

(i) Name the colourless liquid which condenses in the U-tube.

..... [1]

(ii) Predict and explain what is observed in the tube containing limewater.

.....

 [2]

3 This question is about these types of radiation:

- alpha radiation
- beta radiation
- gamma radiation
- infra-red radiation
- ultra-violet radiation

Which of these types of radiation

(a) is a stream of electrons?

..... [1]

(b) can penetrate a thick sheet of lead?

..... [1]

(c) causes the most ionisation?

..... [1]

(d) are forms of electromagnetic radiation?

..... [2]

4 All living things have certain characteristics. These include sensitivity and movement.

(a) List **four** other characteristics of living things.

.....
.....
.....
.....

[2]

(b) In humans, sensitivity and movement are coordinated by the nervous system.

Name the two structures which form the **central** nervous system.

..... and [1]

(c) Alcohol affects the nervous system.

A car was travelling at 12 metres per second along a city street. The driver had not drunk any alcohol. A child ran out in front of the car. The driver saw the child, and reacted by pressing his foot onto the brake. Fig. 4.1 shows the motion of the car during these events.

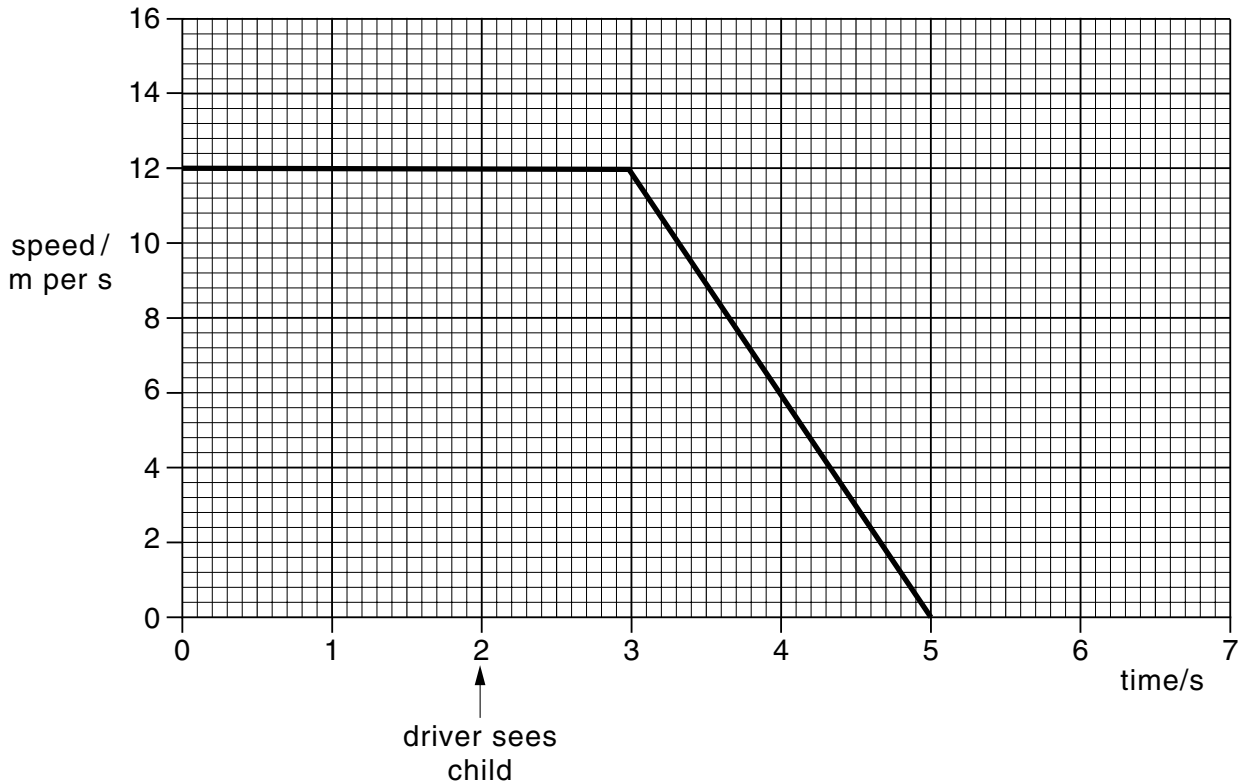


Fig. 4.1

(i) On Fig.4.1, draw a curve to show the motion of the car if the driver had been drinking alcohol before driving the car. [2]

(ii) Using the information in Fig.4.1, and your own knowledge about the effects of alcohol on the nervous system, explain why drivers should not drink alcohol.

.....

.....

..... [2]

5 Two reactions, **A** and **B**, involving metals and non-metals are carried out.

(a) Fig. 5.1 shows reaction **A**.

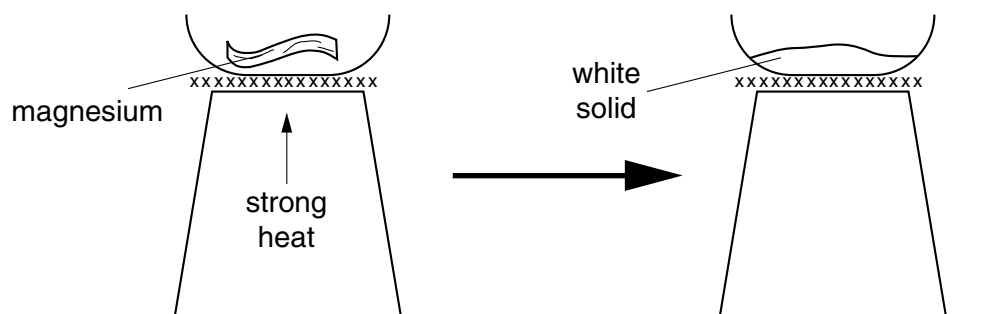


Fig. 5.1

(i) Reaction **A** is an example of oxidation.

Name the substance reacting with magnesium in reaction **A**.

..... [1]

(ii) Name the white solid produced in reaction **A**.

..... [1]

(b) Some of the white solid produced in reaction **A** was shaken with water.

State, with a reason, which of the following could be the pH of the mixture.

5 7 9

pH

reason

..... [3]

(c) Fig. 5.2 shows reaction **B**.

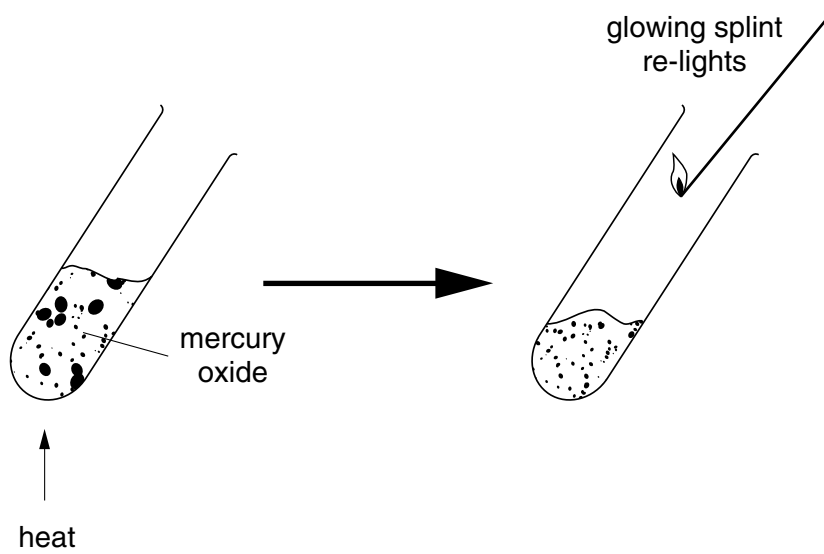


Fig. 5.2

(i) Name the gas produced during reaction **B**.

..... [1]

(ii) Suggest a word equation for reaction **B**.

..... [1]

(iii) Underline the type of chemical reaction which best describes reaction **B**.

combustion **decomposition** **neutralisation** [1]

- 6 Masses were hung on a spring. The length of the spring was measured and the extension was calculated.

Fig. 6.1 shows some of the results.

| mass / g | length of spring / cm | extension of spring / cm |
|----------|-----------------------|--------------------------|
| 0 | 10.0 | 0 |
| 10 | 12.1 | 2.1 |
| 20 | 12.3 | 2.3 |
| 30 | 13.4 | |
| 40 | 14.4 | 4.4 |
| 50 | 15.6 | 5.6 |
| 60 | | 6.7 |

Fig. 6.1

- (a) Complete Fig. 6.1 by filling in the two missing values.

[2]

(b) The graph in Fig. 6.2 has been plotted for some of the values.

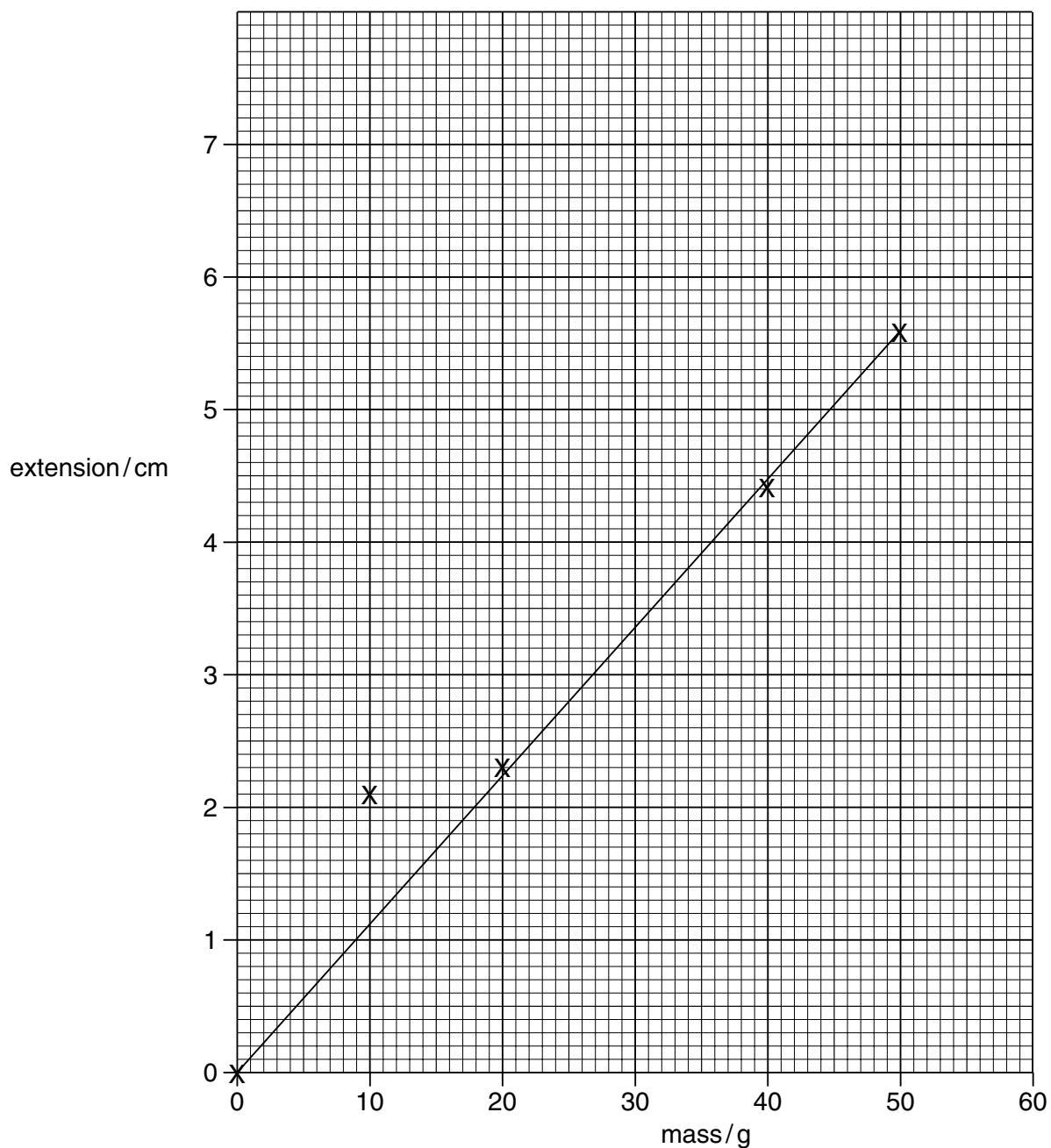


Fig. 6.2

(i) Suggest which result was probably measured inaccurately.

Explain your answer.

.....
 [2]

(ii) Use the graph to find the value of the mass needed to produce an extension of 5.0 cm. Show your working on the graph.

..... [2]

(c) The masses are made of iron.

A 10 g mass has a volume of 1.25 cm³.

Calculate the density of iron.

Show your working and state the formula that you use.

formula used

working

answer g/cm³ [3]

7 (a) Complete the sentences below, using some of the words from the list. You may use each word once, or not at all.

- | | | |
|-----------------------|--------------------------|-----------------------|
| carbon dioxide | conservation | deforestation |
| global warming | oxygen | photosynthesis |
| soil erosion | species diversity | temperature |

Many people are worried about the loss of tropical rain forests. It is important that rain forests should be conserved, because they have a very high Also, when trees have been cut down, is more likely to occur when there is heavy rainfall.

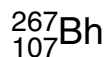
If the trees are burnt, then is released into the atmosphere. An increase in the concentration of this gas in the atmosphere may lead to [4]

(b) Decomposers play an important role in tropical rain forests.

Describe the role of decomposers in the carbon cycle.

.....
.....
..... [2]

8 (a) Bohrium is a recently discovered element. The chemical symbol for bohrium is



(i) State the number of protons and the number of neutrons in the nucleus of this atom.

number of protons

number of neutrons [2]

(ii) A compound of bohrium contains one atom of bohrium, three atoms of oxygen and one atom of chlorine in its molecules.

Write the chemical formula of this compound.

..... [2]

(b) Fig. 8.1 shows part of the Periodic Table. Some elements are represented by letters. These letters are **not** the chemical symbols of the elements.

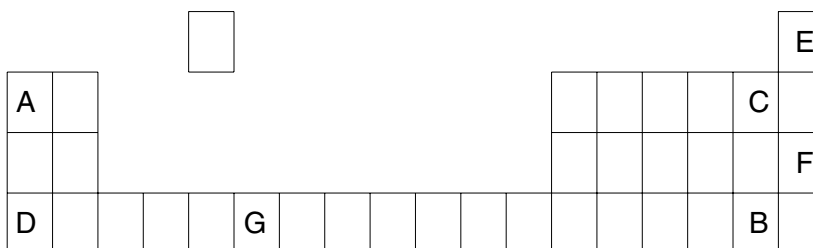


Fig. 8.1

Using only the letters shown in Fig. 8.1, choose the element that is described in each case below. Each letter may be used once or not at all.

a transition metal

an element in Group 7 and the Fourth Period

the more reactive element in Group I [3]

9 Fig. 9.1 shows a simple electrical circuit.

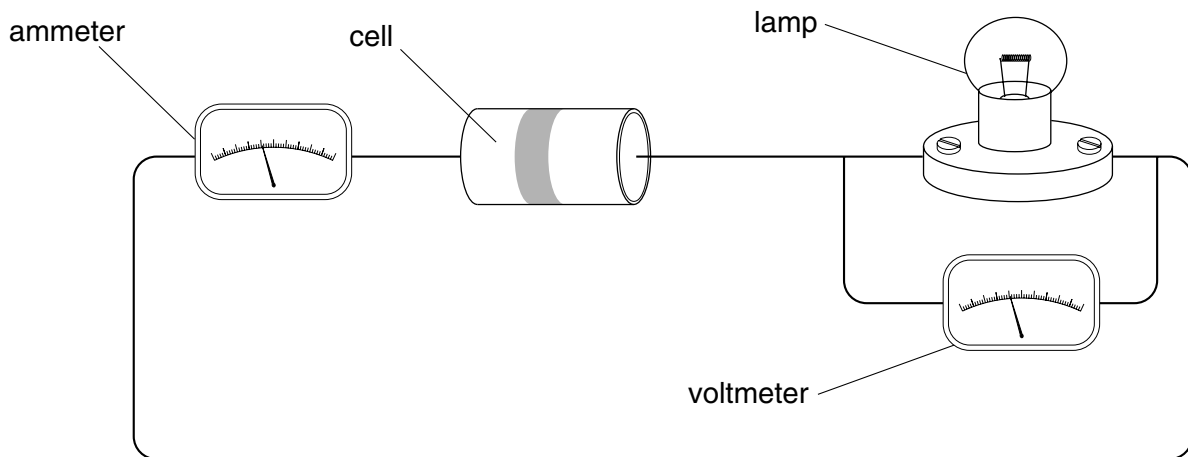


Fig. 9.1

(a) In the space below, draw the circuit diagram for the circuit in Fig. 9.1, using the correct symbols.

[3]

- (b) The current flowing through the ammeter is 0.1 A and the potential difference measured by the voltmeter is 1.5 V.

Calculate the resistance of the lamp. Show your working and state the formula that you use.

..... ohms [2]

- (c) Electrical devices such as an electric fire can be dangerous, especially when they are handled with wet hands.

Explain why you are quite likely to be electrocuted if you handle an electrical device with wet hands rather than dry hands.

.....
..... [1]

DATA SHEET The Periodic Table of the Elements

| Group | | I | II | III | IV | V | VI | VII | 0 | | | | | | | | | | | | | | | | | | | | | | |
|-------|----|--------------------------------|------------------------------|-----|-------------------------------|----------------------------------|------------------------------|-------------------------------|--------------------------------|-------------------------------|--------------------------------|-------------------------------|---------------------------------|---------------------------------|-------------------------------|---------------------------------|------------------------------|--------------------------------|-----------------------------|-------------------------------|-------------------------------|-------------------------------|------------------------------|-------------------------------|---------------------------------|---------------------------------|-----------------------------|---------------------------------|------------------------------|--------------------------------|---------------------------|
| | | 1 H Hydrogen 1 | | | | | | | 4 He Helium 2 | | | | | | | | | | | | | | | | | | | | | | |
| 3 | 4 | 7 Li Lithium | 9 Be Beryllium | | 11 B Boron | 12 C Carbon | 13 Al Aluminium | 14 Si Silicon | 15 P Phosphorus | 16 S Sulphur | 17 Cl Chlorine | 18 Ar Argon | | | | | | | | | | | | | | | | | | | |
| 11 | 12 | 23 Na Sodium | 24 Mg Magnesium | | 27 Fe Iron | 28 Ni Nickel | 29 Cu Copper | 30 Zn Zinc | 31 Ga Gallium | 32 Ge Germanium | 33 As Arsenic | 34 Se Selenium | 35 Br Bromine | 36 Kr Krypton | | | | | | | | | | | | | | | | | |
| 19 | 20 | 39 K Potassium | 40 Ca Calcium | | 44 Ru Ruthenium | 45 Rh Rhodium | 46 Pd Palladium | 47 Ag Silver | 48 Cd Cadmium | 49 In Indium | 50 Sn Tin | 51 Sb Antimony | 52 Te Tellurium | 53 I Iodine | 54 Xe Xenon | | | | | | | | | | | | | | | | |
| 37 | 38 | 85 Rb Rubidium | 88 Sr Strontium | | 91 Ti Titanium | 92 Zr Zirconium | 93 Nb Niobium | 94 Mo Molybdenum | 95 Tc Technetium | 96 Ru Ruthenium | 97 Rh Rhodium | 98 Pd Palladium | 99 Ag Silver | 100 Cd Cadmium | 101 In Indium | 102 Sn Tin | 103 Sb Antimony | 104 Te Tellurium | 105 I Iodine | 106 Xe Xenon | | | | | | | | | | | |
| 55 | 56 | 133 Cs Caesium | 137 Ba Barium | | 144 Nd Neodymium | 145 Pm Promethium | 146 Sm Samarium | 147 Eu Europium | 148 Gd Gadolinium | 149 Tb Terbium | 150 Dy Dysprosium | 151 Ho Holmium | 152 Er Erbium | 153 Tm Thulium | 154 Yb Ytterbium | 155 Lu Lutetium | 156 Hf Hafnium | 157 Ta Tantalum | 158 W Tungsten | 159 Re Rhenium | 160 Os Osmium | 161 Ir Iridium | 162 Pt Platinum | 163 Au Gold | 164 Hg Mercury | 165 Tl Thallium | 166 Pb Lead | 167 Bi Bismuth | 168 Po Polonium | 169 At Astatine | 170 Rn Radon |
| 87 | 88 | 226 Ra Radium | 227 Ac Actinium | | 232 Th Thorium | 233 Pa Protactinium | 234 U Uranium | 235 Np Neptunium | 236 Pu Plutonium | 237 Am Americium | 238 Cm Curium | 239 Bk Berkelium | 240 Cf Californium | 241 Es Einsteinium | 242 Fm Fermium | 243 Md Mendelevium | 244 No Nobelium | 245 Lr Lawrencium | 246 U Uranium | 247 Np Neptunium | 248 Pu Plutonium | 249 Am Americium | 250 Cm Curium | 251 Bk Berkelium | 252 Cf Californium | 253 Es Einsteinium | 254 Fm Fermium | 255 Md Mendelevium | 256 No Nobelium | 257 Lr Lawrencium | |

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

| | |
|---|---|
| a | X |
| b | † |

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

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