

|               |                  |      |
|---------------|------------------|------|
| Centre Number | Candidate Number | Name |
|---------------|------------------|------|

UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS  
General Certificate of Education Ordinary Level

**COMBINED SCIENCE**

**5129/02**

Paper 2

May/June 2006

**2 hours 15 minutes**

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.  
You may use a soft pencil for any diagrams, graphs or rough working.  
Do not use staples, paper clips, highlighters, glue or correction fluid.

Answer **all** questions.

A copy of the Periodic Table is printed on page 24.

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.

**For Examiner's Use**

This document consists of **21** printed pages and **3** blank pages.



1 Fig. 1.1 shows the extraction of iron from iron ore using a blast furnace.

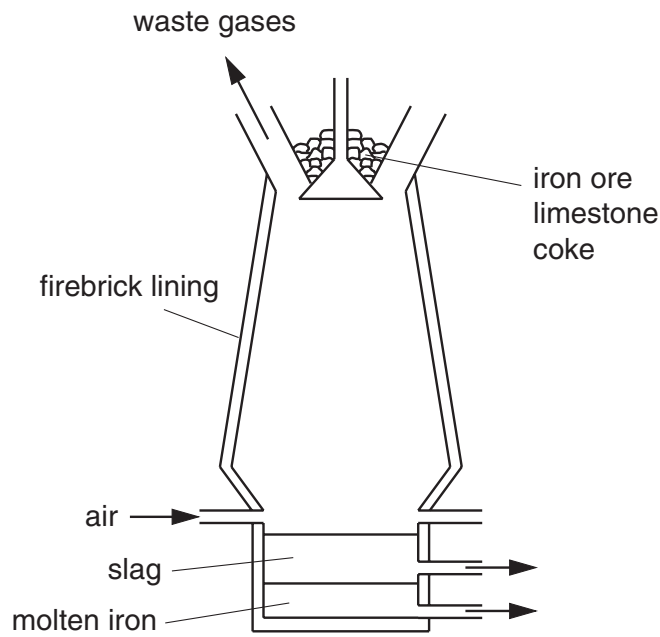


Fig. 1.1

(a) (i) State the name of an iron ore. ....[1]

(ii) Why is limestone added to the blast furnace?

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

(b) In the blast furnace, iron is extracted from its ore by reduction using carbon.  
 Explain why sodium cannot be extracted from its ore by reduction using carbon.

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

(c) The cutlery in Fig. 1.2 is made from stainless steel.

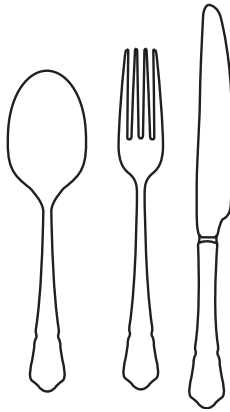


Fig. 1.2

(i) Stainless steel is an alloy.  
What is an *alloy*?

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

(ii) State **one** other use for stainless steel.

.....[1]

(d) Brass is an alloy of two metals.

Name the two metals in brass.

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

- 2 Fig. 2.1 shows a speed-time graph for a car.

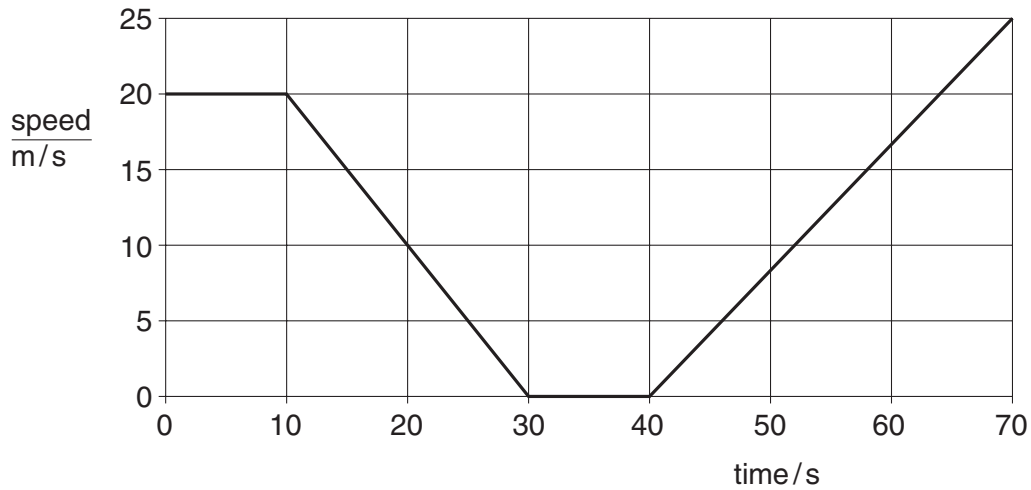


Fig. 2.1

- (a) Complete the following sentence.

The car is at rest from a time of ..... s to a time of ..... s. [1]

- (b) Calculate the distance moved by the car in the first 10 seconds.

[2]

- (c) The acceleration of the car between 40 s and 70 s is constant.

How does Fig. 2.1 show this?

.....[1]

3 Fig. 3.1 shows a satellite in orbit around the Earth.

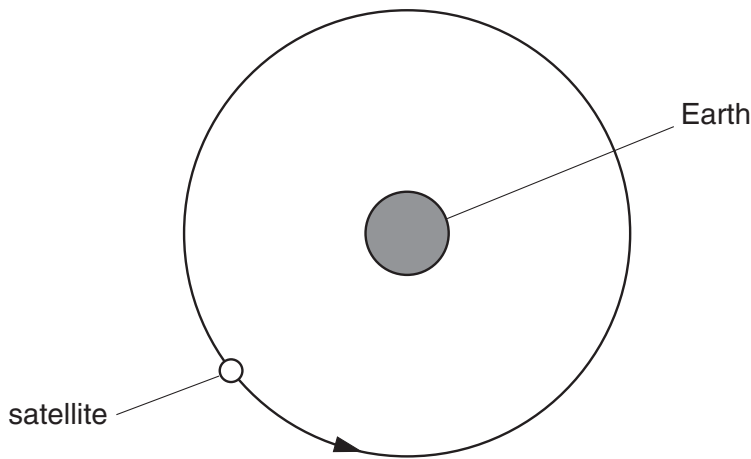


Fig. 3.1

(a) The satellite has constant speed.

Explain why it does not have constant velocity.

.....

.....[1]

(b) The satellite receives infra-red radiation from the Sun.

(i) The satellite must be kept cool.

Suggest a suitable colour for the satellite. .... [1]

(ii) Explain your answer to (b)(i).

.....

.....[1]

(c) Name a region of the electromagnetic spectrum with a longer wavelength than infra-red radiation.

..... [1]

(d) Infra-red radiation is a transverse wave.

State **one** example of a longitudinal wave. .... [1]

4 (a) Fig. 4.1 shows sections cut through two different types of blood vessel.

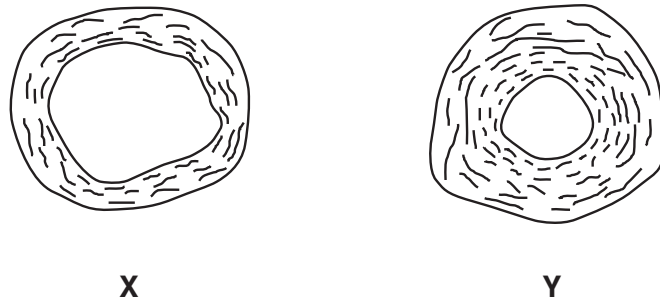


Fig. 4.1

Name the type of blood vessel shown in

X, .....

Y. ....[2]

(b) Fig. 4.2 shows some blood as seen under a microscope.

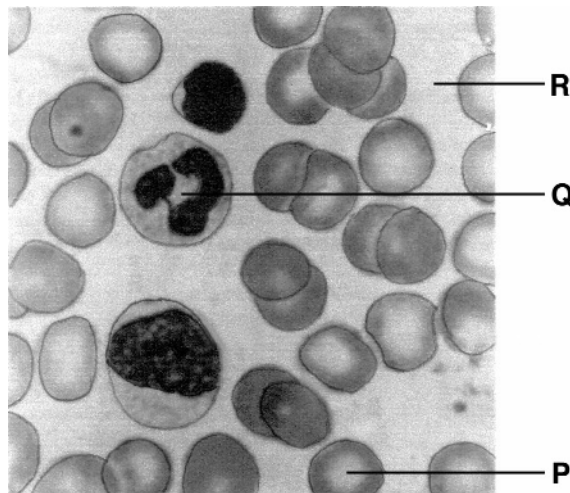


Fig. 4.2

(i) Name the red substance found in cell P.

.....[1]

(ii) State the function of cell P.

.....[1]

(c) Suggest two functions of cell **Q**.

- 1. ....
- 2. ....[2]

(d) State three types of substance that are transported in region **R**.

- 1. ....
- 2. ....
- 3. ....[3]

- 5 Fig. 5.1 shows four test-tubes, each containing a different gas. The four gases are argon, carbon dioxide, hydrogen and oxygen. There are no labels to say which gas is in each test-tube.

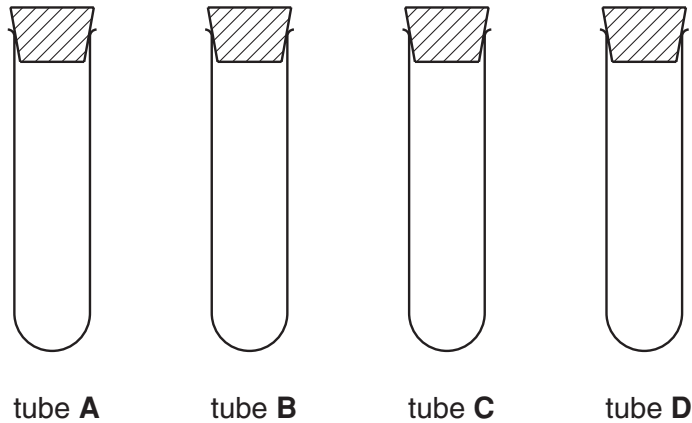


Fig. 5.1

The gases in tubes **A** and **C** extinguish a lighted splint.  
The gas in tube **D** relights a glowing splint.  
The gas in tube **A** turns limewater milky.

- (a) Identify the four gases.

tube **A** .....

tube **B** .....

tube **C** .....

tube **D** .....

[3]

- (b) (i) Hydrogen and oxygen react together to produce water.

State the formula for a molecule of

hydrogen, .....

oxygen, .....

water. ....

[1]

- (ii) Write an equation for the reaction. Include state symbols.

.....[2]



6 Gaseous exchange takes place in the lungs.  
Oxygen moves from air to blood and carbon dioxide moves from blood to air.

(a) State where in the lungs gaseous exchange occurs.

.....[1]

(b) (i) Name the process by which carbon dioxide moves from blood to air.

.....[1]

(ii) Explain how this process takes place.

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

7 Fig. 7.1 shows a swinging pendulum in three different positions. At position **A** and at position **C** the pendulum bob changes the direction in which it is moving.

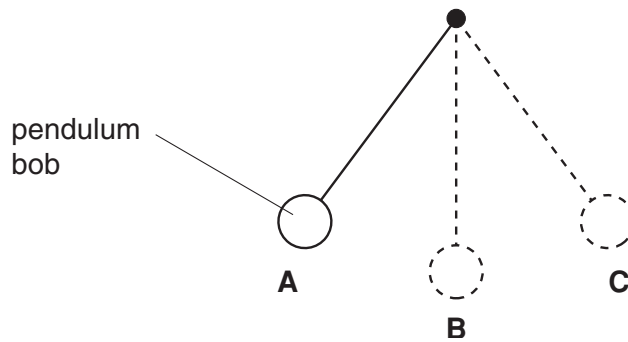


Fig. 7.1

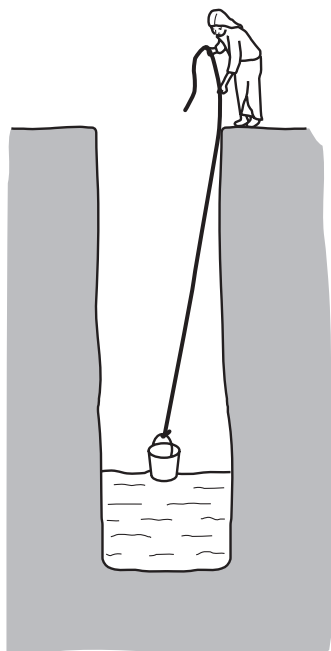
(a) State the position, **A**, **B** or **C** at which the pendulum has the least potential energy.

..... [1]

(b) The pendulum takes 1.6 s to swing from position **A** to position **C**.  
Calculate the period of the pendulum.

.....s [1]

- 8 Fig. 8.1 shows a girl lowering an empty bucket into a well to fill it with water.



**Fig. 8.1**

- (a) The density of water is  $1\,000\text{ kg/m}^3$ . When the bucket is filled it contains  $0.0020\text{ m}^3$  of water.  
Calculate the mass of water in the bucket.

[2]

- (b) When full, the weight of the bucket and the water is  $25\text{ N}$ .

- (i) Calculate the useful work done in lifting the bucket full of water through a vertical distance of  $6.0\text{ m}$ .

[2]

- (ii) State the unit of work done.

..... [1]

9 Ethanol is manufactured by two different processes:

- the fermentation of glucose
- the catalytic addition of steam to ethene

(a) Fermentation is carried out at 40 °C and in the absence of air.  
Explain why these conditions are used.

(i) temperature .....  
.....[2]

(ii) absence of air .....  
.....[1]

(b) The catalytic addition of steam to ethene uses a higher temperature and a catalyst.  
State the temperature used and name the catalyst.

temperature ..... °C

catalyst ..... [2]

(c) Fig. 9.1. shows how ethene is obtained from crude oil.

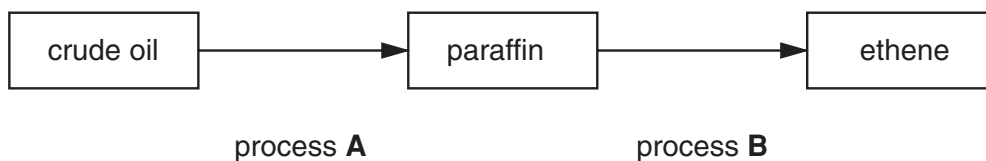


Fig. 9.1

Name the processes **A** and **B**.

**A** .....

**B** .....

[2]

10 Use words from the following list to complete the sentences below.  
The words may be used once, or not at all.

- bacterium**      **carrier**      **contraception**      **condom**  
**fertilisation**      **gonorrhoea**      **intercourse**      **virus**

HIV / AIDS is caused by a .....,  
and is passed on by a person who is a .....  
This infection can be prevented by using a .....  
which is also a form of .....  
Another infection that is passed on during .....  
is .....

[6]

11 Fig. 11.1 gives information about four radioactive sources.

| source   | type of radiation | half-life |
|----------|-------------------|-----------|
| <b>A</b> | gamma             | 5 years   |
| <b>B</b> | beta              | 4 minutes |
| <b>C</b> | alpha             | 12 years  |
| <b>D</b> | beta              | 28 years  |

**Fig. 11.1**

- (a) Use the information in Fig. 11.1 to choose the letter or letters of the sources that
- (i) emit the least penetrating radiation, .....
  - (ii) emit electrons, .....
  - (iii) emit radiation that can pass through several centimetres of lead. .... [3]
- (b) (i) Give the letter of the source that is most suitable for an experiment to measure half-life.  
..... [1]
- (ii) Give a reason for your answer.  
.....  
.....[1]

12 Fig. 12.1 shows a 250 V electric iron. The iron has a power rating of 1500 W.

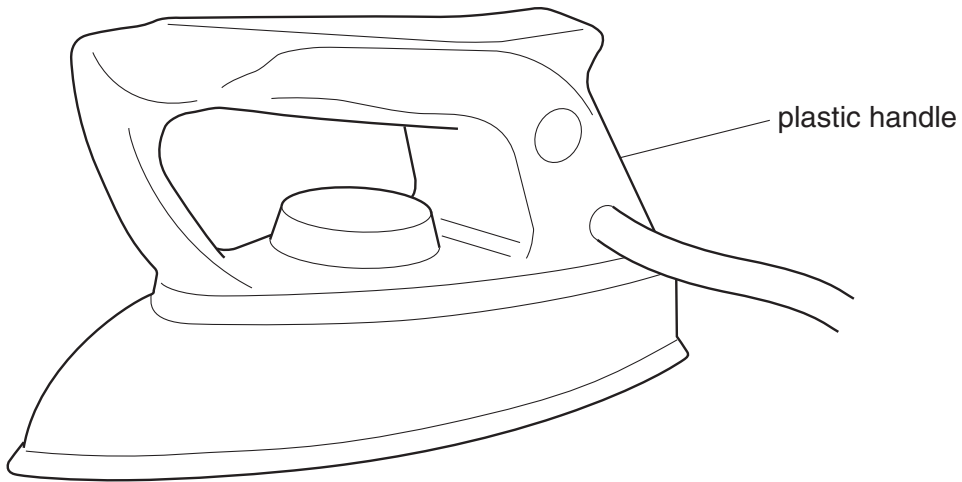


Fig. 12.1

(a) (i) State a formula for calculating electrical power.

.....[1]

(ii) Calculate the current when the iron is working normally.

..... A [2]

(b) Explain why the handle of the iron is made of plastic rather than metal.

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

(c) Complete the following sentence about energy changes.

The iron converts ..... energy into ..... energy. [2]

13 Fig. 13.1 shows part of a flower.

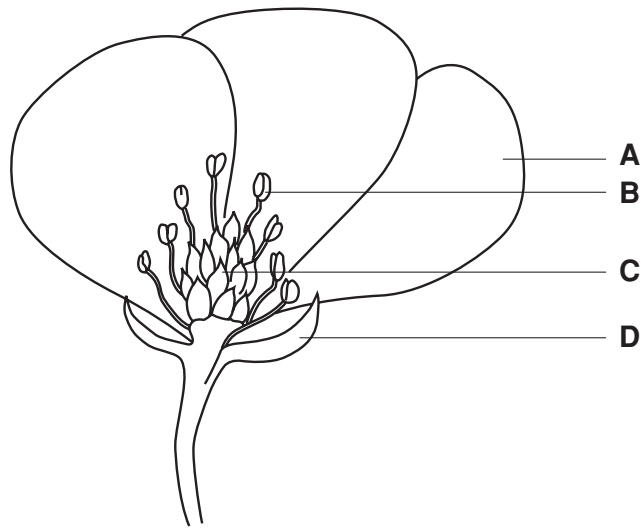


Fig. 13.1

(a) Name the parts labelled

- A, .....
- B, .....
- C, .....
- D. ....

[4]

(b) State the function of the parts labelled

- A, .....
- B, .....
- C, .....
- D. ....

[4]

(c) Fig. 13.2 shows a section cut through a seed.

Fig. 13.3 shows the seed after germination.



**Fig. 13.2**

**Fig.13.3**

State three conditions that are necessary for germination to occur.

- 1. ....
- 2. ....
- 3. .... [3]

14 Fig. 14.1 shows a boy on a diving board. The support holds the diving board in place.

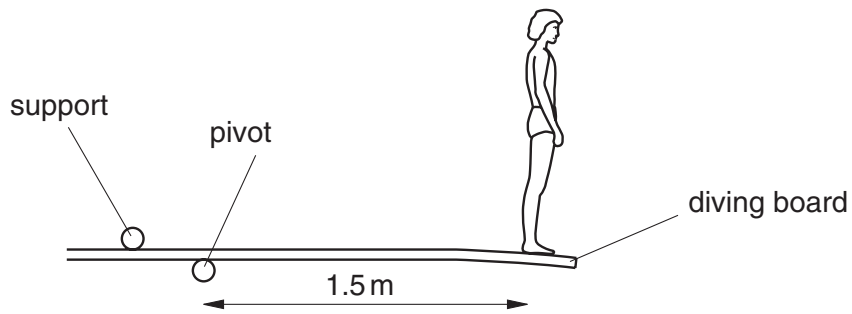


Fig. 14.1

The boy weighs 500 N and is 1.5 m from the pivot.

(a) On Fig. 14.1, draw arrows to represent

(i) the force of gravity on the boy,

[1]

(ii) the force on the diving board at the support.

[1]

(b) Calculate the moment of the weight of the boy about the pivot.

[2]



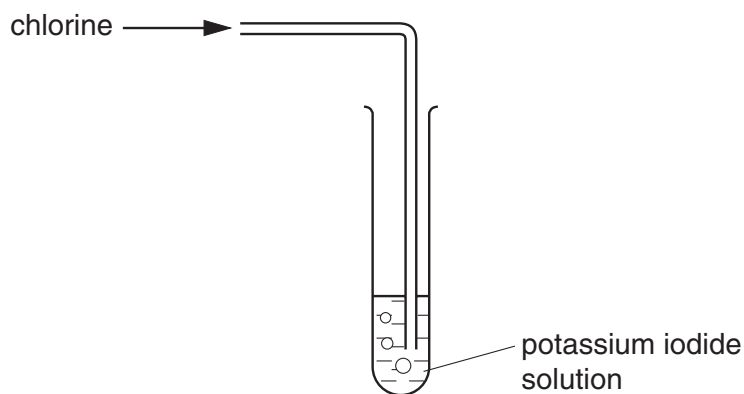
- 15** Chlorine is a green gas in group VII of the Periodic Table.  
Chlorine exists as a diatomic molecule.

**(a) (i)** State the formula of a chlorine molecule. ....[1]

**(ii)** State the number of electrons in the outer shell of a chlorine atom.

.....[1]

- (b)** Fig. 15.1 shows chlorine being bubbled into a solution of potassium iodide.  
The solution turns brown because iodine is produced.



**Fig. 15.1**

**(i)** State the other product of this reaction. ....[1]

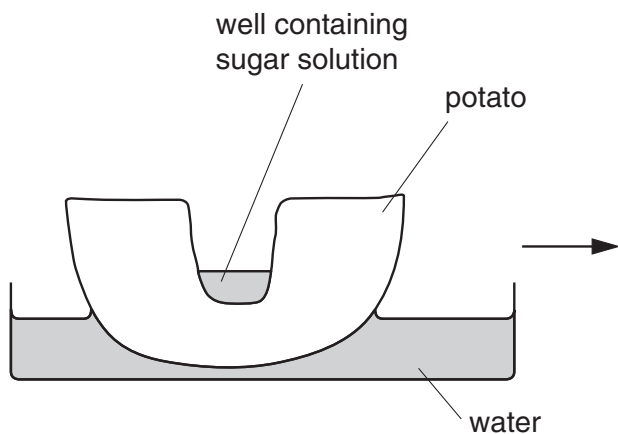
**(ii)** Explain how the experiment shows the relative reactivity of chlorine and iodine.

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

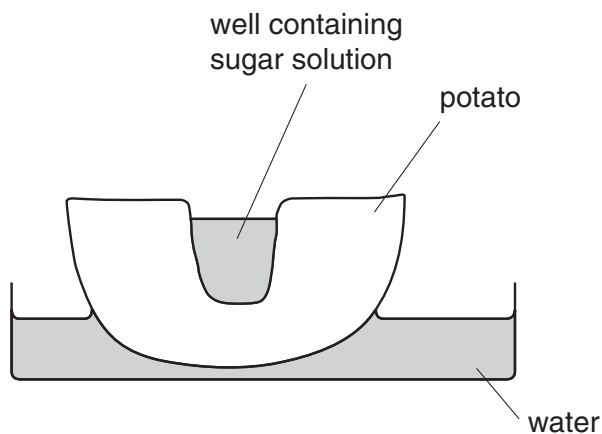
- (c)** Chlorine is used in the purification of water supplies. Explain why.

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

- 16** A potato is cut in half and the skin is removed.  
A well is cut in the flat top of one half of the potato.  
Concentrated sugar solution is poured into the well.  
The potato is now placed in a tray of water as shown in Fig. 16.1.  
It is left for four hours.  
The result is shown in Fig. 16.2.



**Fig. 16.1**



**Fig. 16.2**

During the four-hour period the volume of the sugar solution in the well increases.  
Explain why.

.....

.....

.....

.....[3]

17 Fig. 17.1 shows a liquid-in-glass thermometer.

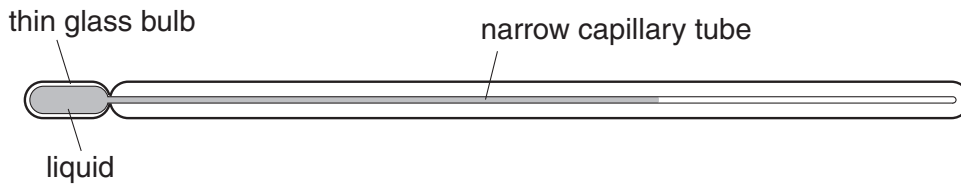


Fig. 17.1

(a) Name the physical property that is used for the measurement of temperature in this thermometer.

..... [1]

(b) State the change that could be made to the capillary tube to make a liquid-in-glass thermometer more sensitive.

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

(c) State **one** difference between a mercury-in-glass laboratory thermometer and a mercury clinical thermometer.

The clinical thermometer.....  
.....[1]

- 18 Fig. 18.1 shows the apparatus used to make ammonium nitrate in the laboratory. Ammonia solution and nitric acid are reacted together so that neither remains in the final solution.

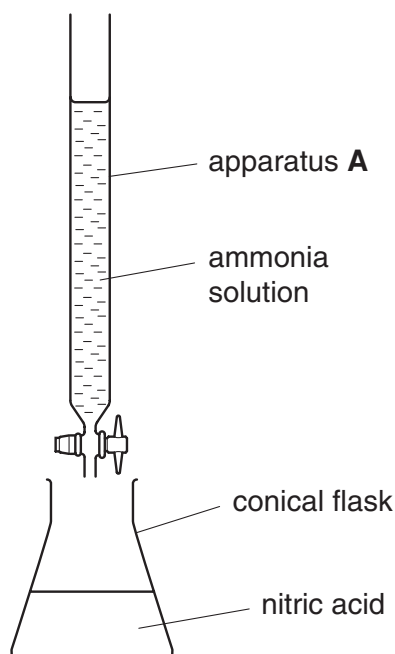


Fig. 18.1

(a) Name the piece of apparatus labelled **A**. .....[1]

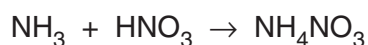
(b) (i) State the type of reaction that occurs when ammonia reacts with nitric acid.

.....[1]

(ii) State the pH of the solution when the reaction is complete.

..... [1]

(c) The equation for the reaction is



The relative molecular mass of ammonia is 17.

[ $A_r$ : N,14;H,1;O,16.]

(i) Calculate the relative molecular mass of ammonium nitrate.

.....[1]

(ii) Calculate the mass of ammonium nitrate produced from 6.8 g of ammonia.

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





**BLANK PAGE**

---

Permission to reproduce items where third-party owned material protected by copyright is included has been sought and cleared where possible. Every reasonable effort has been made by the publisher (UCLES) to trace copyright holders, but if any items requiring clearance have unwittingly been included, the publisher will be pleased to make amends at the earliest possible opportunity.

University of Cambridge International Examinations is part of the University of Cambridge Local Examinations Syndicate (UCLES), which is itself a department of the University of Cambridge.

