

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

PHYSICAL SCIENCE

0652/02

Paper 2

October/November 2005

1 hour 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 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.
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	
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Total	

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 (a) A glider is an aeroplane without an engine. Glider pilots use columns of rising w to lift their gliders to a greater height, as shown in Fig. 1.1.

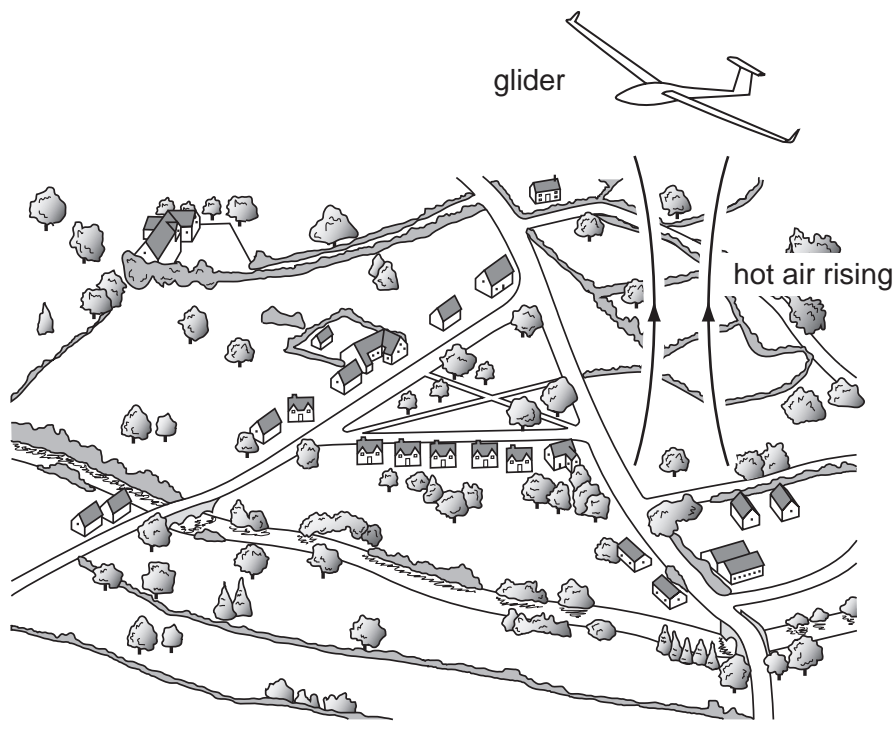


Fig. 1.1

(i) Name the process which causes the warm air to rise.

.....

(ii) Explain why the warm air rises.

.....

.....

..... [3]

(b) The warm air sometimes carries water vapour higher into the atmosphere where it changes to small water drops to form clouds.

Name the process when water vapour turns to liquid.

..... [1]

(c) As the water drops get larger they begin to fall. Fig. 1.2 shows a speed – time graph for the fall of one of the water drops.

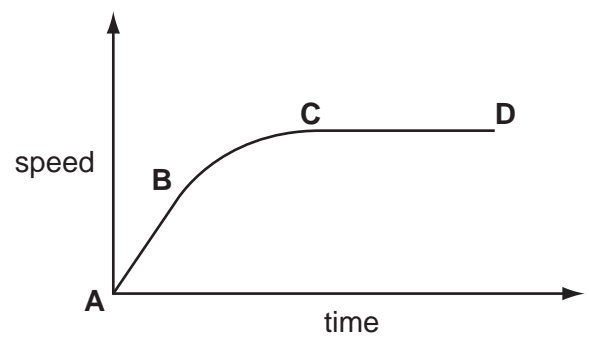


Fig. 1.2

(i) Describe the motion of the water drop between points **A** and **B**.

.....

(ii) Describe the motion of the water drop between points **C** and **D**.

.....

[3]

2 A coloured gas is put into the bottom of a gas-jar of air. The lid is quickly replaced on top. This is shown in Fig. 2.1.

After several minutes the coloured gas can be seen halfway up the jar. This is shown in Fig. 2.2.

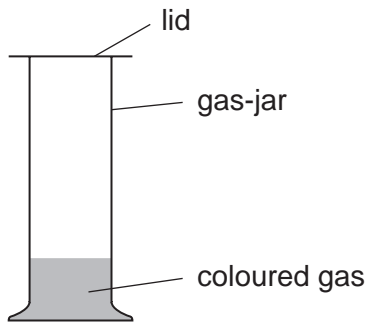


Fig. 2.1

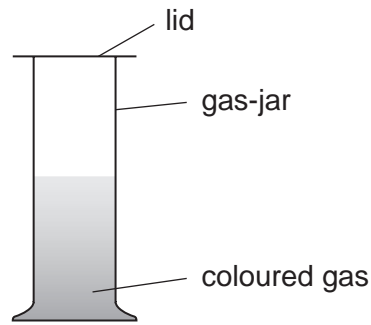


Fig. 2.2

(a) Name this process of one gas mixing slowly with another.

..... [1]

(b) The molecules of the coloured gas move about quickly yet the process of mixing with the air is very slow.

Explain why the mixing is slow.

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

3 The properties of iron can be changed by the controlled use of additives to form steel alloys.

(a) State **one** use of mild steel.

.....

State **one** use of stainless steel.

..... [2]

(b) A piece of mild steel in everyday use is protected with paint. Stainless steel does not need this protection. Explain this difference.

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

4 In a coal-fired power station coal is burnt in a furnace. This heats water to provide steam to drive a generator.

(a) Complete the sentences below to explain the energy changes.

In the furnace energy of the coal is converted to
..... energy in the steam. This is then converted into
energy at the generator. [3]

Another method of obtaining steam to drive a generator is to pump water deep into the ground. The water is heated by hot rocks.

(b) (i) What name is given to this type of power station?

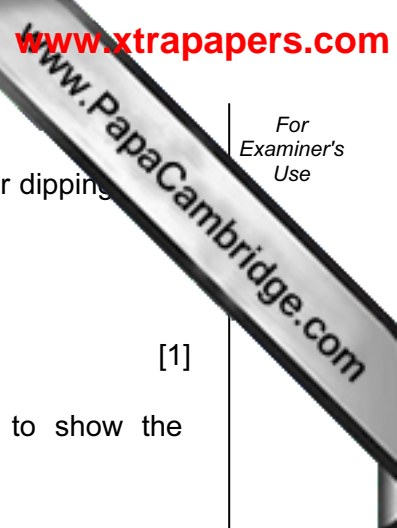
.....

(ii) State **one** advantage of this method over the coal-fired power station.

..... [2]

(c) Explain how the generator is driven in a hydroelectric power station. In your answer refer to relevant energy changes.

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



5 (a) A method to separate and analyse mixtures uses a vertical strip of paper dipping into a solvent.

(i) Name this method of separating mixtures.

..... [1]

(ii) Some experiments using this method require a *locating agent* to show the positions of the components.

Explain why a *locating agent* may be required.

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

(b) Bitumen is used to make roads.

Describe how bitumen is obtained from the mixture of hydrocarbons in crude oil (petroleum).

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

6 Fig. 6.1 shows the electromagnetic spectrum.

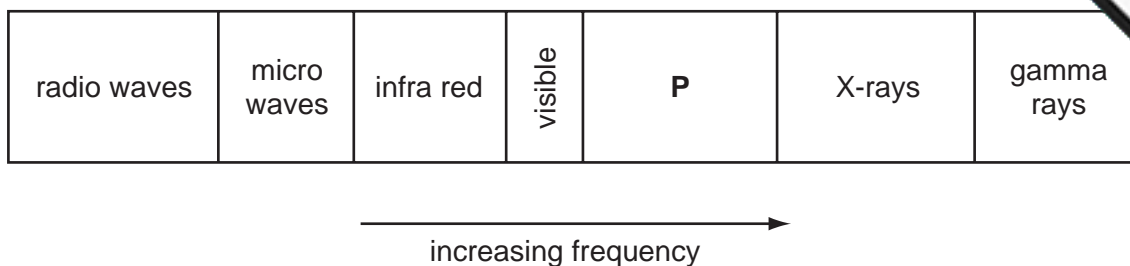


Fig. 6.1

(a) Name the type of radiation found in the section labelled P.

.....

(b) State what happens to the speed of electromagnetic radiation, in a vacuum, as the frequency of the radiation increases.

.....

..... [2]

(c) The photograph in Fig. 6.2 shows a replacement joint in a person's arm.



Fig. 6.2

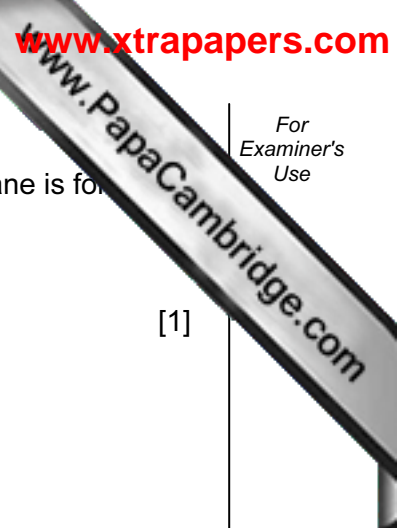
Name the part of the electromagnetic spectrum used to take this photograph.

..... [1]

(d) Another method of obtaining images of internal organs is to use sound waves of frequency above the human threshold of hearing.

State the maximum frequency sound that a human can hear.

..... Hz [1]



7 (a) When ethene, C_2H_4 , reacts with hydrogen in an addition reaction, an alkane is formed.

(i) Name this alkane.

.....

[1]

(ii) Draw a diagram to show the structure of this alkane.

[1]

(b) When ethene, C_2H_4 , reacts with steam in an addition reaction, an alcohol is formed.

(i) Name this alcohol.

.....

[1]

(ii) Draw a diagram to show the structure of this alcohol.

[1]

(c) When ethene, C_2H_4 , reacts with itself in an addition reaction, a polymer is formed.

(i) Name this polymer.

.....

[1]

(ii) Draw a diagram to show the structure of this polymer.

[1]

8 (a) Describe how you would carry out an experiment to find the magnetic field around a bar magnet.

.....

.....

.....

.....

.....

.....

..... [4]

(b) On Fig. 8.1 draw the magnetic field pattern of the bar magnet.

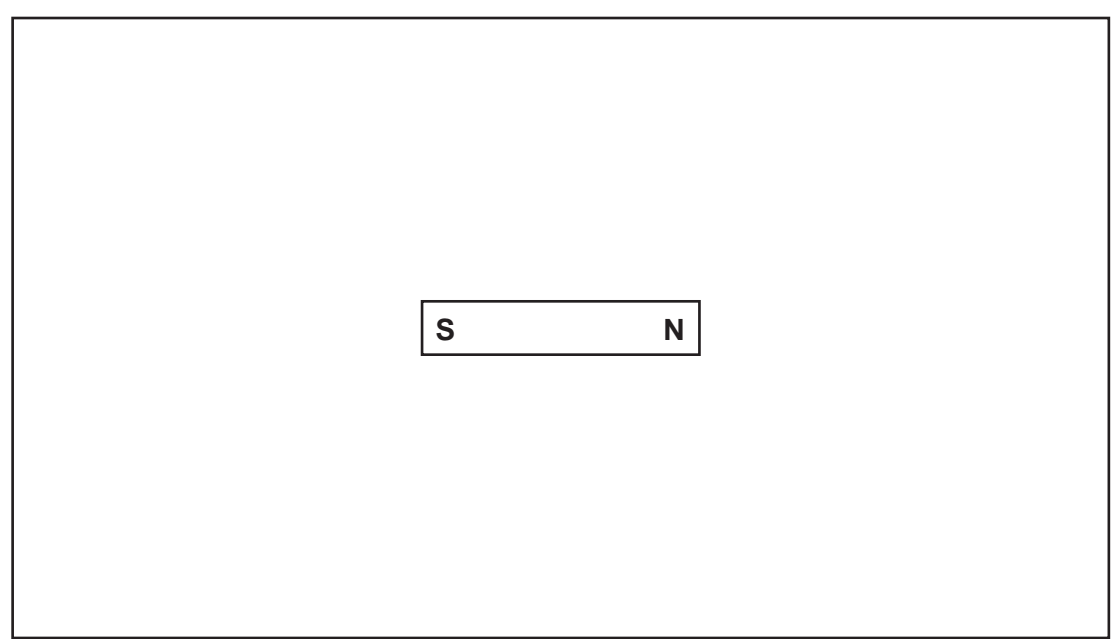


Fig. 8.1

[3]

9 (a) Chlorine has two isotopes, $^{35}_{17}\text{Cl}$ and $^{37}_{17}\text{Cl}$.

Complete Fig. 9.1 for these isotopes.

	$^{35}_{17}\text{Cl}$	$^{37}_{17}\text{Cl}$
number of protons in nucleus	17	
number of neutrons in nucleus		20
arrangement of electrons in shells in the atom		

Fig. 9.1

[3]

(b) Draw a diagram to show the covalent bonding in a molecule of hydrogen chloride, HCl

[2]

(c) (i) Describe the formation of each of the ions in sodium chloride, NaCl , from the elements.

.....

.....

..... [2]

(ii) Explain how these ions are held together in the compound.

.....

..... [1]

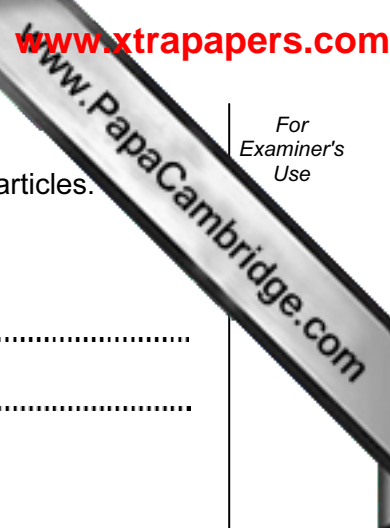
(d) Explain why sodium chloride conducts electricity when liquid but not when solid.

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

(e) Describe a chemical test for the chloride ion in solution.

test

result [2]



10 The noble gas, radon, is radioactive. Radon nuclei decay by emitting alpha-particles.

(a) (i) Explain what is meant by the term *noble gas*.

.....
.....

(ii) Explain what is meant by the term *alpha-particle*.

.....
..... [3]

(b) Complete the equation which shows the decay of a nucleus of radon-220.



[2]

(c) A sample consists of 36.0 µg of radon-220. After a period of 3 minutes only 4.5 µg of radon-220 remained.

Calculate the half-life of radon-220. Show your working.

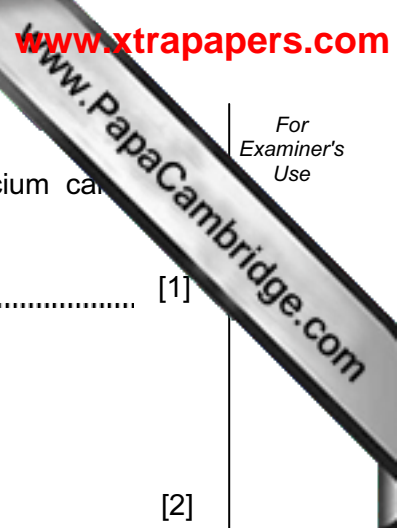
half-life = minute(s) [3]

11 Carbon monoxide and oxides of nitrogen are common pollutants of air.

Describe how each pollutant is formed.

carbon monoxide
.....
.....

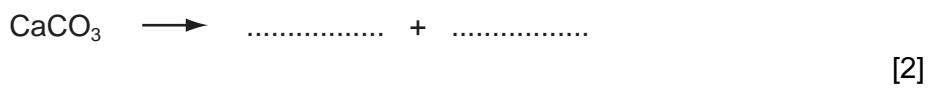
oxides of nitrogen
.....
..... [4]



12 (a) (i) State the main method to obtain calcium oxide (lime) from calcium carbonate (limestone).

..... [1]

(ii) Complete the equation for this process.



(iii) The energy required to break the bonds in calcium carbonate is greater than the energy released when the products are formed.

What does this show about the total energy change in the reaction?
.....
..... [1]

(iv) Describe a test to identify the gas produced in this process.

test

result [2]

(b) Calcium hydroxide (slaked lime) is used to treat acidic industrial waste products.

Name the main chemical process involved in this treatment.
..... [1]

13 Fig. 13.1 shows two types of switch that can be used to control an electric light.

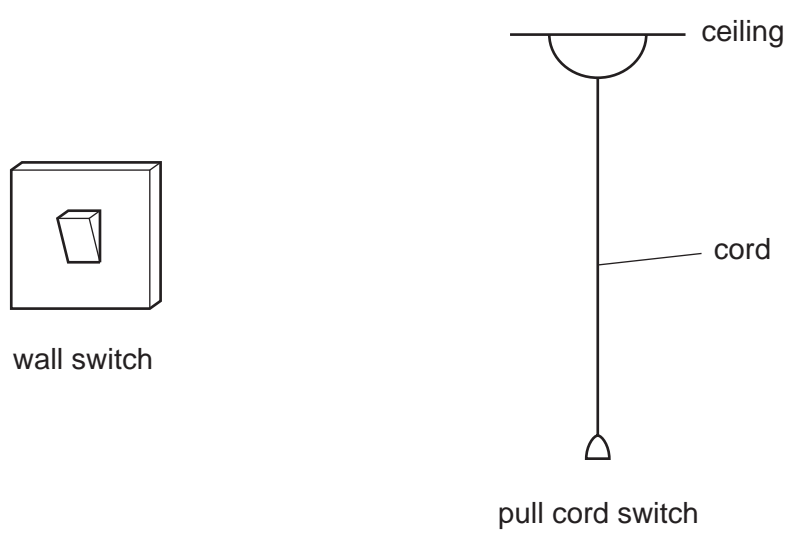


Fig. 13.1

(a) Explain why a pull-cord switch, not a wall switch, should always be used in a bathroom or shower-room.

.....

.....

..... [3]

(b) Fig. 13.2 shows part of a circuit that could be used to operate lights in a room.

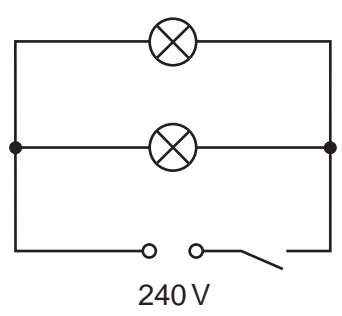


Fig. 13.2

The two lamps are identical and each takes a current of 0.25 A.

(i) Calculate the resistance of each lamp. Show your working and include the unit.

resistance =

(ii) What is the total current taken from the supply when both lamps are switched on?

current A [1]

