Centre Number	Candidate Number

Candidate Name _____

International General Certificate of Secondary Education
CAMBRIDGE INTERNATIONAL EXAMINATIONS

PHYSICAL SCIENCE 0652/2

PAPER 2

MAY/JUNE SESSION 2002

1 hour

Candidates answer on the question paper.
No additional materials are required.

TIME 1 hour

INSTRUCTIONS TO CANDIDATES

Write your name, Centre number and candidate number in the spaces at the top of this page.
Answer **all** questions.
Write your answers in the spaces provided on the question paper.

INFORMATION FOR CANDIDATES

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	
10	
TOTAL	

This question paper consists of 14 printed pages and 2 blank pages.

UNIVERSITY of CAMBRIDGE
Local Examinations Syndicate

[Turn over

1 A converging lens can be used to form a small spot of light from the sun onto a sheet of paper, as shown in Fig. 1.1.

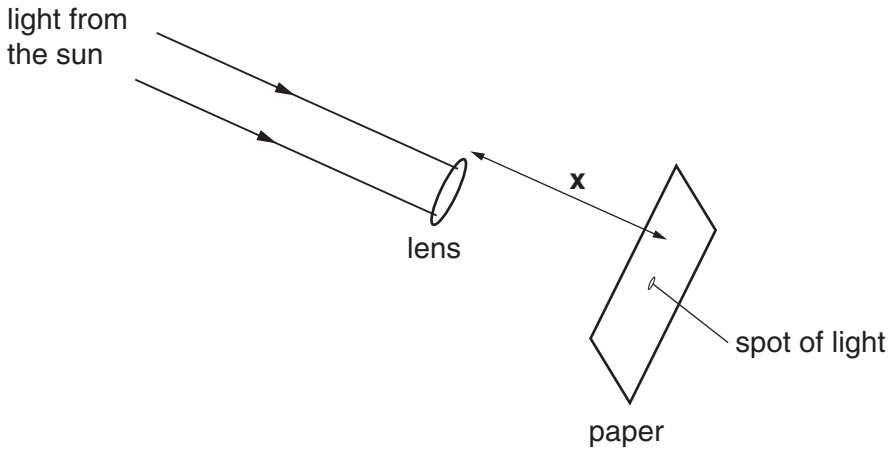


Fig. 1.1

Two parallel rays of light from the sun are drawn on Fig. 1.1.

(a) **(i)** Complete the paths of the rays after they pass through the lens.

(ii) Name the distance labelled **x** on the diagram. .....[2]

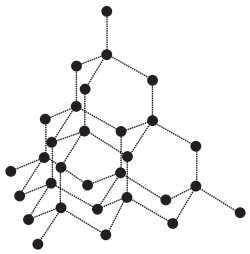
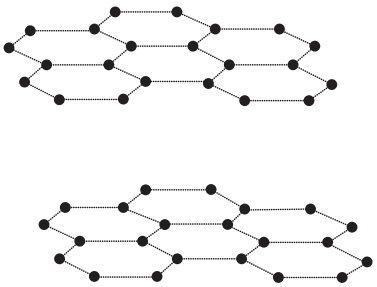
(b) Explain why the paper may catch fire if the lens and paper are held still for about a minute.

.....

.....[2]

2 Diamond and graphite are different crystalline forms of carbon. Both are macromolecules. The diagrams in Fig. 2.1 and Fig. 2.2 represent the structures of these macromolecules.

Write your answers in the spaces provided beneath each diagram.

	 diamond **Fig. 2.1**	 graphite **Fig. 2.2**
number of covalent bonds made by each atom	.....	.....
description of structure of macromolecule	....	....

[4]

3 A child suspends a magnet from a piece of string as in Fig. 3.1.

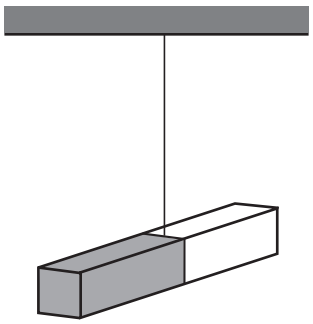


Fig. 3.1

(a) (i) Explain why the magnet comes to rest in a north-south direction.

.....

.....

(ii) What name is given to the end that points north?

.....

(iii) Name an instrument that is based on this behaviour of a magnet.

..... [3]

Fig. 3.2 shows the results of placing different metal bars near the magnet.

metal	result of placing different metal bars near magnet
P	there is no force between metal **P** and the magnet
Q	each end of metal **Q** attracts the magnet
R	one end of metal **R** repels the shaded end of the magnet

Fig. 3.2

(b) (i) Name a possible metal for each of **P**, **Q** and **R**.

P .....

Q .....

R ..... [3]

(ii) State what you would expect to happen if the other end of metal **R** was brought up to the shaded end of the magnet.

.....[1]

4 Sodium chloride can be prepared from dilute hydrochloric acid and aqueous sodium hydroxide.

(a) Describe how a student can test that the solution of sodium chloride produced in this reaction has pH 7.

test .....

result .....[2]

(b) Describe how the student can obtain solid sodium chloride from the solution tested in **(a)**.

.....

.....

.....[2]

5 A settee catches fire in a ground floor room in a hotel. The smoke and fumes spread as shown in Fig. 5.1.

(a) Draw on the diagram labelled lines to show how the smoke would spread around the room. [2]

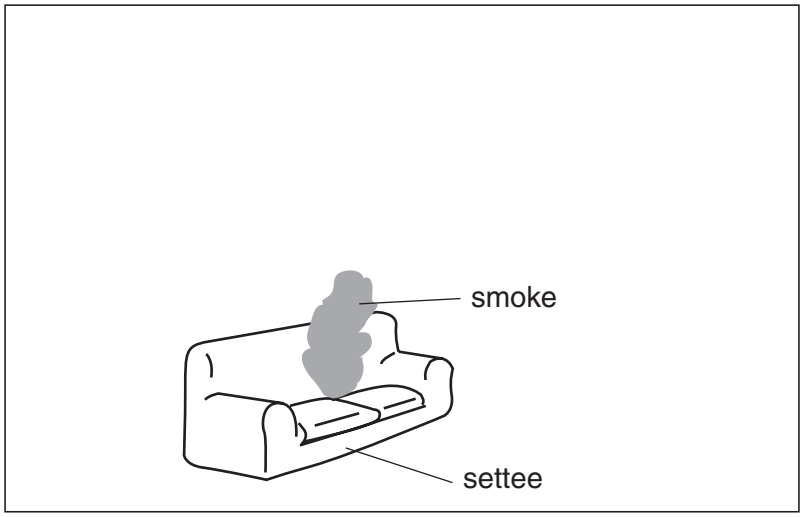


Fig. 5.1

(b) Thermal energy causes the smoke and fumes to spread in this way.

(i) Name this type of energy transfer.

.....

(ii) Name two other methods by which thermal energy can be transferred.

1. .....

2. ..... [3]

(c) When the fire reaches the bottom of the stairs it will advance very rapidly up the stairs.

Explain why this advance is so rapid.

.....

.....

.....[2]

6 **(a)** Chlorine has two isotopes, ^{35}Cl and ^{37}Cl.

State **one** similarity and **one** difference between the nuclei of these two isotopes.

similarity .....

difference .....[2]

(b) **(i)** State what is seen when chlorine is bubbled into a colourless solution of potassium iodide.

.....

.....[1]

(ii) Explain this observation in terms of the reaction between chlorine and iodide ions.

.....

.....

.....[2]

[Turn over

7 Fig. 7.1 shows a balance which is being used to measure the mass of some gold.

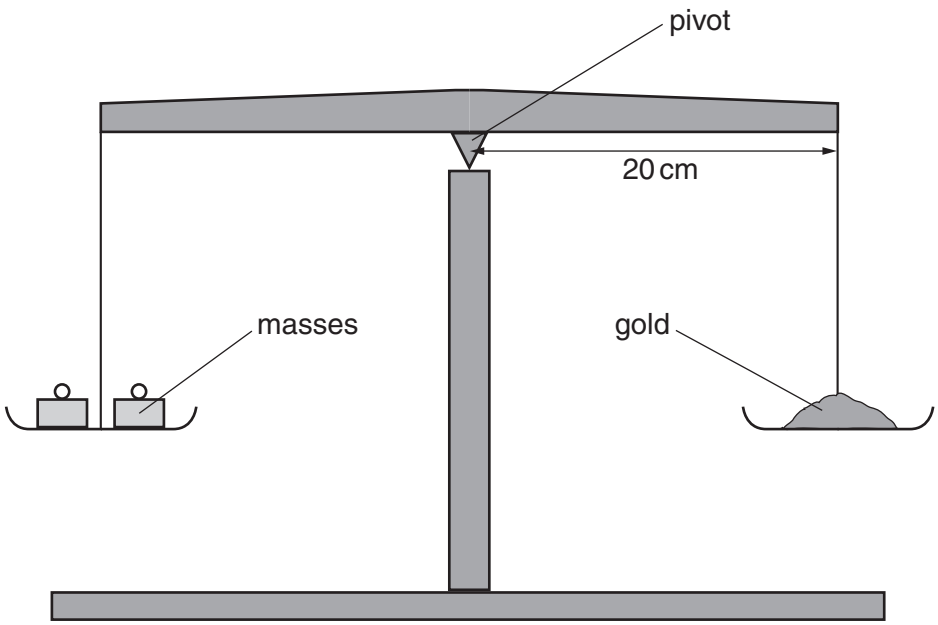


Fig. 7.1

(a) (i) Calculate the weight of the gold. The total mass of the gold is 0.38 kg (380 g). Give the units for your answer.
(*g = 10 N / kg*)

weight = ... [2]

(ii) Calculate the moment the gold produces about the pivot. Show your working.

moment = ... N cm [2]

(b) The density of gold is 19 g / cm^3. Calculate the volume of gold on the balance. Show your working.

volume = ... cm^3 [3]

(c) Gold is found in nature as a pure metal. State what this tells us about its position in the activity series.

.....

.....[1]

8 A student puts some pieces of a solid hydrocarbon wax into a test-tube. She places this test-tube into a beaker of boiling water until all the solid wax has melted to form a liquid.

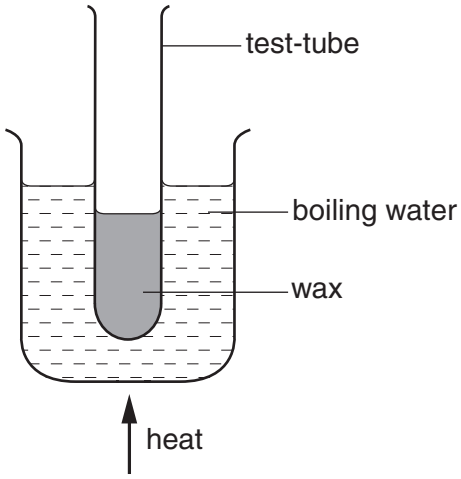


Fig. 8.1

(a) Explain why she heats the wax in this way instead of heating the test-tube directly with a burner.

.....

.....

.....[2]

(b) Another student puts a thermometer in the wax in the test-tube then removes the test-tube from the boiling water. He notes the reading of the thermometer every minute as the wax cools. His results are shown in Fig. 8.2.

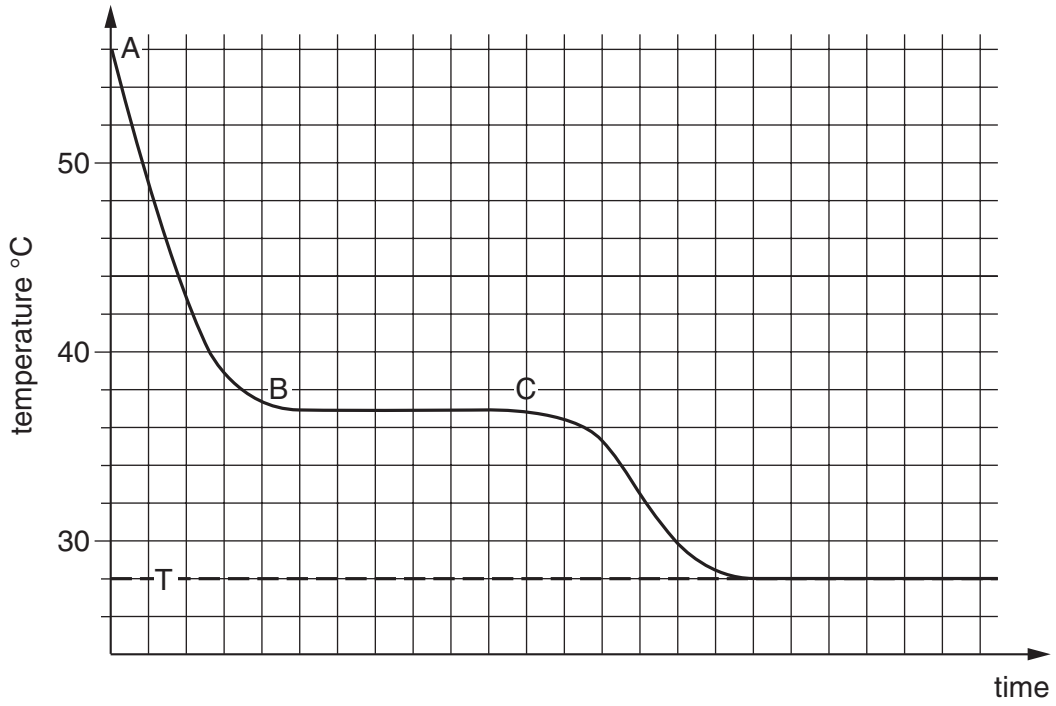


Fig. 8.2

(i) Using words from the list below complete the following sentences about this experiment.

cooling endothermic exothermic melting solidifying warming

Between the points **A** and **B** on the graph, the liquid is ..... . Between the points **B** and **C** on the graph, the hydrocarbon is ..... . This an ..... process. [3]

(ii) Use the graph to find the melting point of this hydrocarbon.

melting point = ... °C [1]

(iii) How does the shape of the graph show that the hydrocarbon is pure?

.....

.....[1]

(iv) What is the significance of the final temperature **T**?

.....

.....[1]

9 A racing car is travelling along a level track at constant speed. The car has kinetic energy due to its motion.

(a) (i) Explain the meaning of the term *energy*.

.....

.....

(ii) State the unit of energy.

..... [2]

The car brakes as it approaches a corner.

(b) (i) Into what form of energy is the kinetic energy changed?

.....

(ii) Name the type of force that work is being done against.

.....[2]

10 A student uses a test-tube held as shown in Fig. 10.1 to collect some of the hydrogen produced in a reaction.

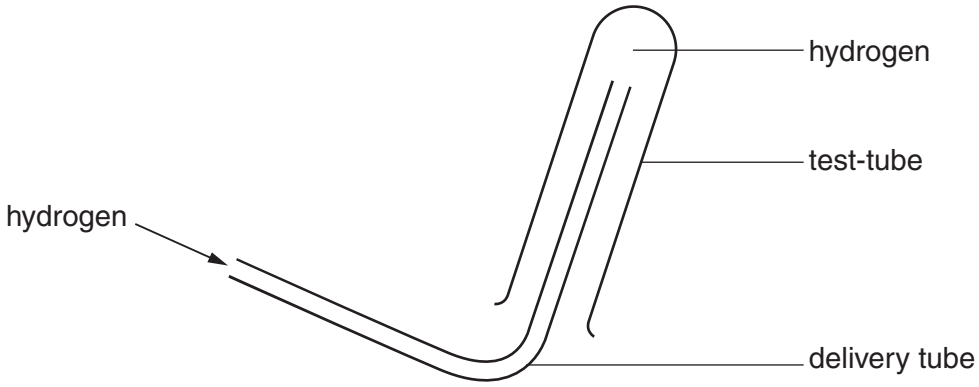


Fig. 10.1

(a) Explain why she keeps the test-tube upside-down until she is ready to test the gas.

.....

.....

.....[2]

(b) **(i)** Describe a chemical test for hydrogen.

test .....

result .....[2]

(ii) The reaction in this test for hydrogen is described by the following word equation.

hydrogen + oxygen → water

Use this word equation to construct the balanced chemical equation for this reaction.

.....[2]

(c) **(i)** Draw a 'dot-cross' diagram to describe the bonding in a molecule of water, H_2O. You need show only the outer electrons of each atom.

[2]

(ii) Name the type of bonding between the atoms in the water molecule.

.....[1]

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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
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	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	Po Polonium 84	At Astatine 85	Rn Radon 86
Fr Francium 87	226 Ra Radium 88	227 Ac Actinium 89 †															

140 Ce Cerium 58	141 Pr Praseodymium 59	144 Nd Neodymium 60	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	Pa Protactinium 91	238 U Uranium 92	Np Neptunium 93	Pu Plutonium 94	Am Americium 95	Cm Curium 96	Bk Berkelium 97	Cf Californium 98	Es Einsteinium 99	Fm Fermium 100	Md Mendelevium 101	No Nobelium 102	Lr Lawrencium 103

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

Key

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

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