UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
General Certificate of Education
Advanced Subsidiary Level

CANDIDATE NAME

CENTRE NUMBER

CANDIDATE NUMBER

PHYSICAL SCIENCE **8780/02**

Paper 2 Short Response **For Examination from 2011**

SPECIMEN PAPER

40 minutes

Candidates answer on the Question Paper.

Additional Materials: Data Booklet

READ THESE INSTRUCTIONS FIRST

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

Answer **all** questions.
You may lose marks if you do not show your working or if you do not use appropriate units.

A Data Booklet is provided.

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	
1	
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Total	

This document consists of **7** printed pages and **1** blank page.

Answer **all** the questions in the spaces provided.
Relevant Data, Formulae and the Periodic Table are provided in the Data Booklet.

For Examiner's Use

1 State the most appropriate instrument, or instruments, for the measurement of the following:

(a) the diameter of a wire of diameter about 1 mm,

..... [1]

(b) the resistance of a filament lamp,

..... [1]

(c) the peak value of an alternating voltage.

..... [1]

2 Derive the SI base unit of force.

SI base unit of force = ... [1]

For Examiner's Use

3 **(a)** Salt, sodium chloride, forms transparent colourless crystals. Describe the bonding in sodium chloride crystals, and sketch part of the crystal structure giving the formula for each particle

bonding.....

sketch

[2]

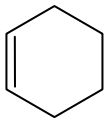
(b) Explain why crystals of sodium chloride do not conduct electricity, but molten sodium chloride does.

.....

.....

..... [1]

4 The formula of the alkene cyclohexene can be written as shown.



(a) State the molecular formula of cyclohexene. ..... [1]

(b) Calculate the percentage by mass of carbon in cyclohexene.

percentage = ... [1]

5 A sky-diver jumps from a high-altitude balloon. Explain briefly why the acceleration of the sky-diver decreases with time.

.....

.....

..... [2]

6 A torque wrench is a type of spanner for tightening a nut and bolt to a particular torque, as illustrated in Fig. 3.1.

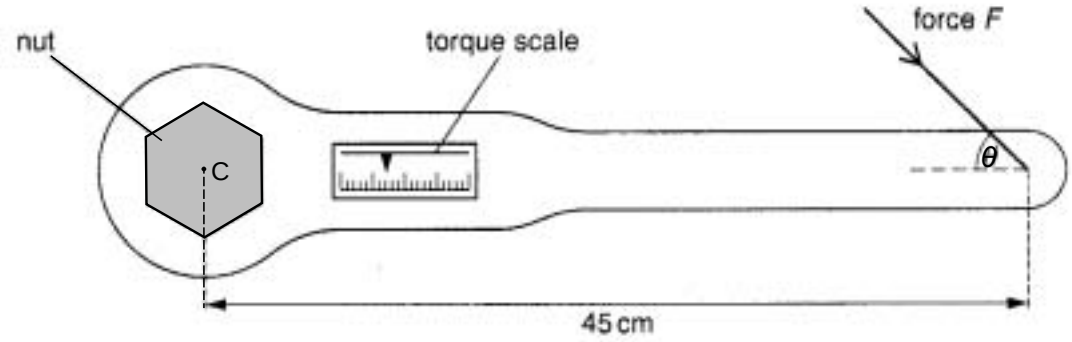


Fig. 3.1

The wrench is put on the nut and a force is applied to the handle. A scale indicates the torque applied.

The wheel nuts on a particular car must be tightened to a torque of 130 N m. This is achieved by applying a force F to the wrench at a distance of 45 cm from its centre of rotation C. This force F may be applied at any angle θ to the axis of the handle, as shown in Fig. 3.1.

For the minimum value of F to achieve this torque,

(a) state the magnitude of the angle θ that should be used,

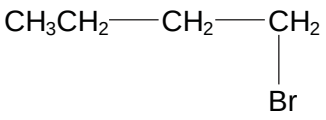
θ = ... ° [1]

(b) calculate the magnitude of F.

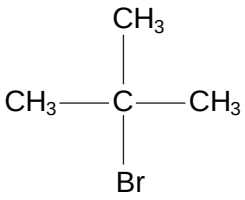
F = ... N [2]

For Examiner's Use

7 1-bromobutane and 2-bromo-2-methylpropane both react with an **ethanolic** (**alcoholic**) solution of sodium hydroxide to form alkenes.



1-bromobutane



2-bromo-2-methylpropane

(a) Name the type of reaction ..... [1]

(b) Identify, by means of the structural formula, the alkene formed from

(i) 1-bromobutane,

(ii) 2-bromo-2-methylpropane.

[2]

8 Explain why the melting point of sulfur is higher than that of chlorine.

.....

.....

.....

..... [2]

For Examiner's Use

9 Explain what is meant by the *diffraction* of a wave.

.....

.....

..... [2]

10 **(a)** Evidence for the nuclear atom was provided by the α-particle scattering experiment. State the results of this experiment.

.....

.....

.....

.....

..... [2]

(b) Give estimates for the diameter of

(i) an atom,

..... [1]

(ii) a nucleus.

..... [1]

11 Describe how you would confirm the presence of aqueous bromide ions using simple test-tube reactions. You should give details of the reagents you would use and the observations you would make.

.....

.....

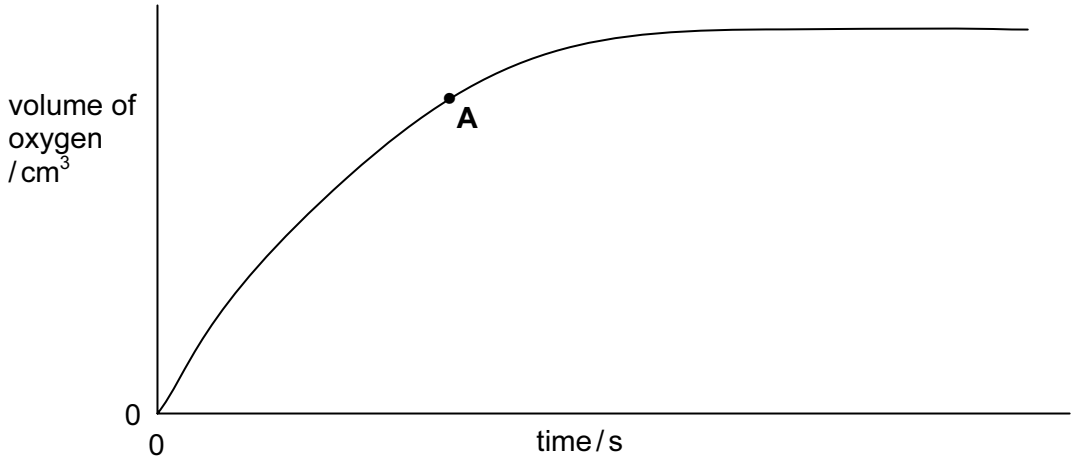
.....

.....

..... [2]

For Examiner's Use

12 Hydrogen peroxide decomposes to form water and oxygen gas. The curve below shows the variation with time of the volume of oxygen evolved when 100 cm^3 of a 2.0 $mol\,dm^{-3}$ hydrogen peroxide solution decomposed at 298 K.



(a) State how you would determine the rate of reaction at point **A**.

.....

.....

..... [1]

(b) On the axes above, sketch a curve to show how the volume of oxygen evolved would change with time if 50 cm^3 of a 2.0 $mol\,dm^{-3}$ hydrogen peroxide solution, in the presence of a catalyst, decomposed at 298 K. [2]

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