

**ADVANCED SUBSIDIARY GCE  
CHEMISTRY**

Foundation Chemistry

**THURSDAY 11 JANUARY 2007**

**2811/01**

Morning

Time: 1 hour

Additional materials: Scientific calculator  
Data Sheet for Chemistry (Inserted)



Candidate  
Name

Centre  
Number

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Candidate  
Number

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**INSTRUCTIONS TO CANDIDATES**

- Write your name, Centre number and Candidate number in the boxes above.
- Answer **all** the questions.
- Use blue or black ink. Pencil may be used for graphs and diagrams only.
- Read each question carefully and make sure you know what you have to do before starting your answer.
- Do not write in the bar code.
- Do not write outside the box bordering each page.
- **WRITE YOUR ANSWER TO EACH QUESTION IN THE SPACE PROVIDED. ANSWERS WRITTEN ELSEWHERE WILL NOT BE MARKED.**

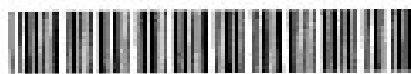
**INFORMATION FOR CANDIDATES**

- The number of marks for each question is given in brackets [ ] at the end of each question or part question.
- You will be awarded marks for the quality of written communication where this is indicated in the question.
- You may use a scientific calculator.
- A copy of the *Data Sheet for Chemistry* is provided as an insert with this question paper.
- You are advised to show all the steps in any calculations.

**FOR EXAMINER'S USE**

Qu.	Max.	Mark
1	13	
2	15	
3	9	
4	7	
5	16	
<b>TOTAL</b>	<b>60</b>	

This document consists of **10** printed pages, **2** blank pages and a *Data Sheet for Chemistry*.











3 Although compounds are usually classified as having ionic or covalent bonding, often the bonding is somewhere in between these two extremes.

(a) State what is meant by the terms

(i) *ionic bond*,

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

(ii) *covalent bond*.

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

(b) Compounds with covalent bonding often have polar bonds. Polarity can be explained in terms of electronegativity.

(i) Explain the term *electronegativity*.

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

(ii) Use a suitable example to show how the presence of a polar bond can be explained in terms of electronegativity.

You may find it useful to draw a diagram in your answer.

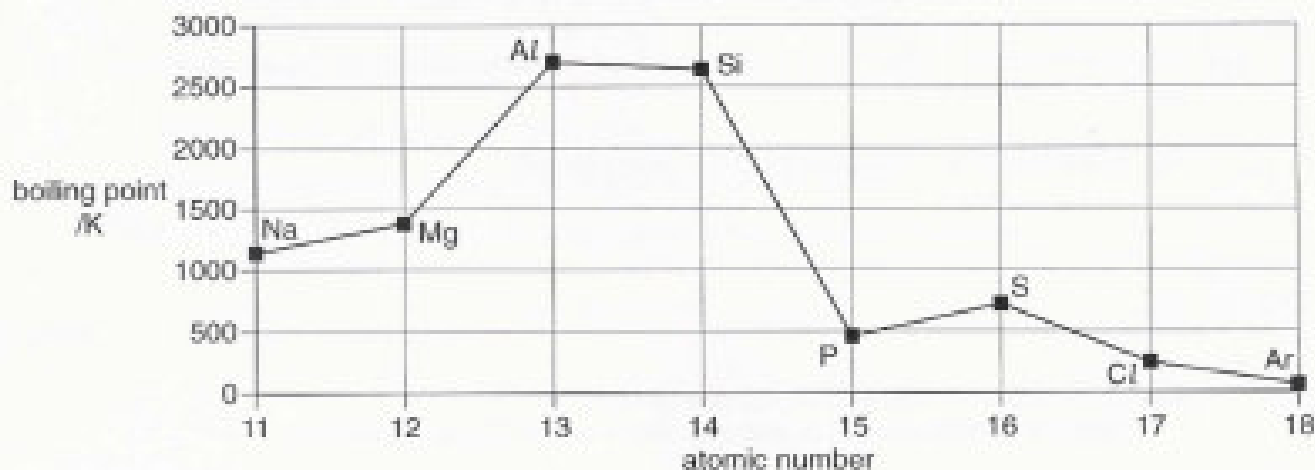
.....  
.....  
.....[2]

(c) Some polar molecules are able to form hydrogen bonds.  
Draw a diagram to show an example of hydrogen bonding.

[2]

[Total: 9]

- 4 The diagram below shows the variation in the boiling points of elements across Period 3 of the Periodic Table.



- (a) In the table below for the elements Mg, Si and S,

- complete the structure column using the word *giant* or *simple*.
- complete the bonding column using the word *metallic*, *ionic* or *covalent*.

element	structure	bonding
Mg		
Si		
S		

[3]

- (b) Explain why silicon has a much **higher** boiling point than phosphorus.

.....

.....

.....

.....

..... [2]

- (c) Explain why the boiling point **increases** from sodium to aluminium.

.....

.....

..... [2]

[Total: 7]

- 5 Chlorine can be prepared by reacting concentrated hydrochloric acid with manganese(IV) oxide.



- (a) A student reacted  $50.0 \text{ cm}^3$  of  $12.0 \text{ mol dm}^{-3}$  hydrochloric acid with an excess of manganese(IV) oxide.

- (i) Calculate how many moles of HCl were reacted.

answer = ..... mol [1]

- (ii) Calculate the volume of  $\text{Cl}_2(\text{g})$  produced, in  $\text{dm}^3$ .  
Under the experimental conditions, one mole of  $\text{Cl}_2(\text{g})$  occupies  $24.0 \text{ dm}^3$ .

answer = .....  $\text{dm}^3$  [2]

- (b) In this reaction, chlorine is oxidised.

Use oxidation numbers to determine what is reduced.

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

- (c) Sodium reacts with chlorine forming the ionic compound sodium chloride, NaCl.

- (i) Write an equation, including state symbols, for this reaction.

..... [2]

- (ii) Describe the structure of sodium chloride in the solid state. You may find it useful to draw a diagram.

..... [2]



