

Surname	Centre Number	Candidate Number
Other Names		0



**GCSE**

0240/01

**ADDITIONAL SCIENCE  
FOUNDATION TIER  
CHEMISTRY 2**

A.M. TUESDAY, 29 January 2013

45 minutes

For Examiner's use only		
Question	Maximum Mark	Mark Awarded
1.	6	
2.	4	
3.	7	
4.	7	
5.	6	
6.	5	
7.	8	
8.	7	
<b>Total</b>	<b>50</b>	

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**ADDITIONAL MATERIALS**

In addition to this paper you may require a calculator and a ruler.

**INSTRUCTIONS TO CANDIDATES**

Use black ink or black ball-point pen.

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 in this booklet.

**INFORMATION FOR CANDIDATES**

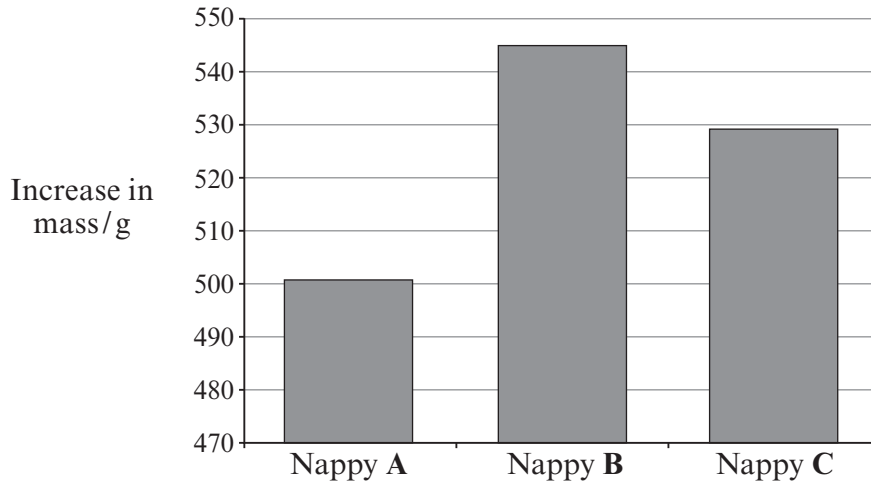
The number of marks is given in brackets at the end of each question or part-question.

You are reminded of the necessity for good English and orderly presentation in your answers.

The Periodic Table is printed on the back cover of the examination paper and the formulae for some common ions on the inside of the back cover.

Answer **all** questions.

1. (a) Three types of disposable nappy were soaked in water for 10 minutes. They were weighed and the increase in mass was recorded. The results are shown in the graph below.



- (i) State which nappy, **A**, **B** or **C**, absorbed **least** water. .... [1]
- (ii) Hydrogels are the type of smart material used in making these nappies. Choose from the box below another use of hydrogels. [1]

artificial snow      gumshields      lenses in sunglasses

.....

- (b) Thermochromic pigments change colour with changing temperature. Choose from the box below **one** use of thermochromic pigments. [1]

bottles      sunglasses      television screens      forehead thermometers

.....

(c) The following box contains some information about carbon nanotubes.

Carbon nanotubes are flat sheets of carbon atoms rolled up to form very thin, cylindrical tubes. One use of nanotubes is in computer chips where they are fixed in place and are not believed to be a health risk.

However, free carbon nanotube particles have a structure similar to that of asbestos fibres. Asbestos fibres can cause lung problems when inhaled in large amounts over long periods.

**Use the information above to help you answer the following questions.**

(i) Name the element from which nanotubes are made. [1]

.....

(ii) State why the use of nanotubes in computer chips is not believed to pose a health risk. [1]

.....  
.....

(iii) State why some people are concerned about the use of nanotubes as free particles. [1]

.....  
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6

2. The following table shows some information about three common metals.

Metal	Properties	Uses
aluminium	strong, low density, good conductor of heat and electricity, resistant to corrosion	overhead power cables, saucepans, cooking foil, drinks cans, aeroplanes, window frames
copper	attractive colour, good conductor of heat and electricity, malleable, ductile	ornaments, jewellery, electrical wires, water pipes, saucepan bases
titanium	hard, strong, high melting point, low density, resistant to corrosion	aircraft industry, medical applications, jewellery, golf clubs

(a) Use the information in the table to give the main reason for the choice of metal in each of the following uses.

(i) Aluminium for overhead power cables. [1]

.....

(ii) Copper for saucepan bases. [1]

.....

(b) Give **one** reason why titanium is used in the aircraft industry. [1]

.....

(c) Give **one** medical application of titanium. [1]

.....

4

3. Many fertilisers are made from ammonia,  $\text{NH}_3$ .

- (a) Complete the following **word** equation by giving the name of the compound formed when ammonia reacts with sulphuric acid. [1]

ammonia + sulphuric acid  $\longrightarrow$  .....

- (b) Complete the following **word** equation by giving the name of the acid used to produce ammonium nitrate. [1]

ammonia + .....  $\longrightarrow$  ammonium nitrate

- (c) Name the type of reaction taking place in (a) and (b). [1]

.....

- (d) The table below shows the nutrient content of three types of fertiliser.

Fertiliser	Percentage of nutrients present / %		
	Nitrogen	Potassium	Sulphur
<b>A</b>	34	0	0
<b>B</b>	21	0	24
<b>C</b>	0	52	12

- (i) State which fertiliser, **A**, **B** or **C**, is not made from ammonia,  $\text{NH}_3$ . Give a reason for your answer. [2]

*Fertiliser* .....

*Reason* .....

- (ii) One of the fertilisers is produced when ammonia reacts with sulphuric acid,  $\text{H}_2\text{SO}_4$ . State which one and give a reason for your answer. [2]

*Fertiliser* .....

*Reason* .....

4. Water can be either hard or soft.

(a) From the metal ions listed in the box below, choose **two** that cause hardness in water.

[2]

calcium	copper	iron	magnesium	sodium
---------	--------	------	-----------	--------

..... and .....

(b) You are provided with some soap solution and two different samples of water. Describe a simple experiment you could carry out to show which sample is the harder. Include details of how you would ensure a fair test.

[5]

.....

.....

.....

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.....

7

5. (a) The following table shows the observations made when some metals were added to solutions containing compounds of other metals.

Metal	Solution	Observations
copper	zinc sulphate	no reaction
magnesium	zinc sulphate	magnesium ribbon coated in dark solid
zinc	copper sulphate	brown deposit on the zinc, solution gradually loses its blue colour
zinc	magnesium sulphate	no reaction

- (i) Use the information in the table to place the metals zinc, copper and magnesium in order of reactivity with the most reactive first. [1]

*Most reactive* .....

.....

*Least reactive* .....

- (ii) Name the products formed when magnesium reacts with zinc sulphate solution. [2]

.....

- (b) Iron is extracted from its ore, iron oxide, by heating with carbon. The process taking place is shown in the equation below.



- (i) State which of iron and carbon is the more reactive. Give a reason for your choice. [1]

*More reactive* .....

*Reason* .....

.....

- (ii) I State why this method could not be used for the extraction of a reactive metal such as aluminium. [1]

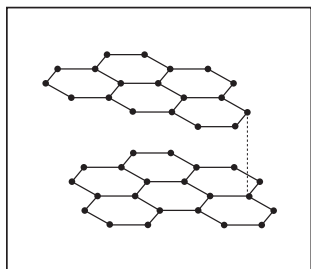
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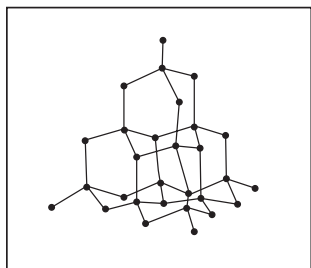
- II Name the process used to extract aluminium. [1]

.....

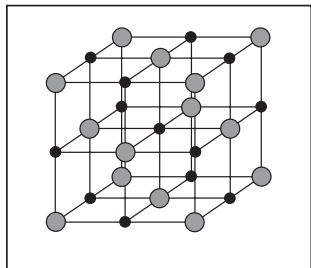
6. (a) The following diagrams show the structures of some substances. Draw a line from each structure to the correct name of the substance. [4]



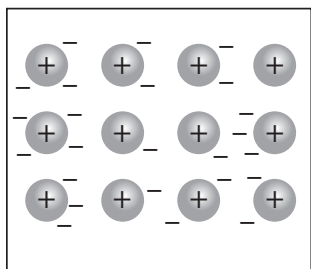
copper



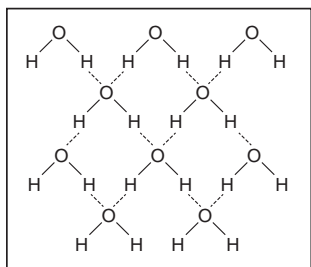
graphite



diamond



ice



sodium chloride

- (b) Name the **two** substances that are good conductors of electricity. [1]

..... and .....



7. (a) Complete the following table of information about the atoms of some elements. [5]

The Periodic Table of Elements shown on the back cover of this examination paper may be helpful in answering this question.

Element	Symbol	Number of protons	Number of neutrons	Number of electrons
sodium	${}_{11}^{23}\text{Na}$	11	12	11
calcium	${}_{20}^{40}\text{Ca}$	20	.....	.....
aluminium	.....	13	14	13
.....	${}_{19}^{39}\text{K}$	19	.....	19

- (b) Atoms of different elements each have a different mass, known as the relative atomic mass ( $A_r$ ). The relative atomic mass compares the masses of different atoms on a scale which gives hydrogen a mass of 1. State why the actual mass of an atom is not used. [1]

.....  
 .....

- (c) Calculate the relative molecular mass ( $M_r$ ) of nitric acid,  $\text{HNO}_3$ . [2]

$$A_r(\text{H}) = 1 \quad A_r(\text{N}) = 14 \quad A_r(\text{O}) = 16$$

$$M_r(\text{HNO}_3) = .....$$

8. (a) Complete the table below by giving the structural formulae for methane and ethane. [2]

Name	methane	ethane	ethene
Formula	CH <sub>4</sub>	C <sub>2</sub> H <sub>6</sub>	C <sub>2</sub> H <sub>4</sub>
Structural formula			$  \begin{array}{c}  \text{H} & & \text{H} \\  & \diagdown & / \\  & \text{C} = \text{C} & \\  & / & \diagdown \\  \text{H} & & \text{H}  \end{array}  $

- (b) Ethene can be produced during a process known as cracking.



State **two** conditions necessary for cracking to take place.

[2]

..... and .....

- (c) Polythene is produced from ethene.

- (i) Name the process taking place when polythene is produced from ethene.

[1]

.....

- (ii) Give **one** use of polythene.

[1]

.....

- (iii) Give **one** reason why the recycling of plastics such as polythene is important for the environment.

[1]

.....

.....

**END OF PAPER**

**FORMULAE FOR SOME COMMON IONS**

<b>POSITIVE IONS</b>		<b>NEGATIVE IONS</b>	
<b>Name</b>	<b>Formula</b>	<b>Name</b>	<b>Formula</b>
<b>Aluminium</b>	<b>Al<sup>3+</sup></b>	<b>Bromide</b>	<b>Br<sup>-</sup></b>
<b>Ammonium</b>	<b>NH<sub>4</sub><sup>+</sup></b>	<b>Carbonate</b>	<b>CO<sub>3</sub><sup>2-</sup></b>
<b>Barium</b>	<b>Ba<sup>2+</sup></b>	<b>Chloride</b>	<b>Cl<sup>-</sup></b>
<b>Calcium</b>	<b>Ca<sup>2+</sup></b>	<b>Fluoride</b>	<b>F<sup>-</sup></b>
<b>Copper(II)</b>	<b>Cu<sup>2+</sup></b>	<b>Hydroxide</b>	<b>OH<sup>-</sup></b>
<b>Hydrogen</b>	<b>H<sup>+</sup></b>	<b>Iodide</b>	<b>I<sup>-</sup></b>
<b>Iron(II)</b>	<b>Fe<sup>2+</sup></b>	<b>Nitrate</b>	<b>NO<sub>3</sub><sup>-</sup></b>
<b>Iron(III)</b>	<b>Fe<sup>3+</sup></b>	<b>Oxide</b>	<b>O<sup>2-</sup></b>
<b>Lithium</b>	<b>Li<sup>+</sup></b>	<b>Sulphate</b>	<b>SO<sub>4</sub><sup>2-</sup></b>
<b>Magnesium</b>	<b>Mg<sup>2+</sup></b>		
<b>Nickel</b>	<b>Ni<sup>2+</sup></b>		
<b>Potassium</b>	<b>K<sup>+</sup></b>		
<b>Silver</b>	<b>Ag<sup>+</sup></b>		
<b>Sodium</b>	<b>Na<sup>+</sup></b>		
<b>Zinc</b>	<b>Zn<sup>2+</sup></b>		

# PERIODIC TABLE OF ELEMENTS

1      2      3      4      5      6      7      0

Group

		<table border="1"> <tr> <td><math>^1_1\text{H}</math> Hydrogen</td> </tr> </table>		$^1_1\text{H}$ Hydrogen											
$^1_1\text{H}$ Hydrogen															
$^3_1\text{Li}$ Lithium	$^4_2\text{Be}$ Beryllium	$^{11}_5\text{B}$ Boron	$^{12}_6\text{C}$ Carbon	$^{14}_7\text{N}$ Nitrogen	$^{16}_8\text{O}$ Oxygen	$^{19}_9\text{F}$ Fluorine	$^{20}_{10}\text{Ne}$ Neon								
$^{23}_{11}\text{Na}$ Sodium	$^{24}_{12}\text{Mg}$ Magnesium	$^{27}_{13}\text{Al}$ Aluminium	$^{28}_{14}\text{Si}$ Silicon	$^{31}_{15}\text{P}$ Phosphorus	$^{32}_{16}\text{S}$ Sulphur	$^{35}_{17}\text{Cl}$ Chlorine	$^{40}_{18}\text{Ar}$ Argon								
$^{39}_{19}\text{K}$ Potassium	$^{40}_{20}\text{Ca}$ Calcium	$^{45}_{21}\text{Sc}$ Scandium	$^{48}_{22}\text{Ti}$ Titanium	$^{51}_{23}\text{V}$ Vanadium	$^{52}_{24}\text{Cr}$ Chromium	$^{56}_{26}\text{Fe}$ Iron	$^{59}_{27}\text{Co}$ Cobalt	$^{64}_{29}\text{Cu}$ Copper	$^{65}_{30}\text{Zn}$ Zinc	$^{70}_{31}\text{Ga}$ Gallium	$^{73}_{32}\text{Ge}$ Germanium	$^{75}_{33}\text{As}$ Arsenic	$^{79}_{34}\text{Se}$ Selenium	$^{80}_{35}\text{Br}$ Bromine	$^{84}_{36}\text{Kr}$ Krypton
$^{86}_{37}\text{Rb}$ Rubidium	$^{88}_{38}\text{Sr}$ Strontium	$^{89}_{39}\text{Y}$ Yttrium	$^{91}_{40}\text{Zr}$ Zirconium	$^{93}_{41}\text{Nb}$ Niobium	$^{96}_{42}\text{Mo}$ Molybdenum	$^{101}_{44}\text{Ru}$ Ruthenium	$^{103}_{45}\text{Rh}$ Rhodium	$^{106}_{46}\text{Pd}$ Palladium	$^{112}_{48}\text{Cd}$ Cadmium	$^{115}_{49}\text{In}$ Indium	$^{119}_{50}\text{Sn}$ Tin	$^{122}_{51}\text{Sb}$ Antimony	$^{128}_{52}\text{Te}$ Tellurium	$^{127}_{53}\text{I}$ Iodine	$^{131}_{54}\text{Xe}$ Xenon
$^{133}_{55}\text{Cs}$ Caesium	$^{137}_{56}\text{Ba}$ Barium	$^{139}_{57}\text{La}$ Lanthanum	$^{179}_{72}\text{Hf}$ Hafnium	$^{181}_{73}\text{Ta}$ Tantalum	$^{184}_{74}\text{W}$ Tungsten	$^{190}_{76}\text{Os}$ Osmium	$^{192}_{77}\text{Ir}$ Iridium	$^{195}_{78}\text{Pt}$ Platinum	$^{201}_{80}\text{Hg}$ Mercury	$^{204}_{81}\text{Tl}$ Thallium	$^{207}_{82}\text{Pb}$ Lead	$^{209}_{83}\text{Bi}$ Bismuth	$^{210}_{84}\text{Po}$ Polonium	$^{210}_{85}\text{At}$ Astatine	$^{222}_{86}\text{Rn}$ Radon
$^{223}_{87}\text{Fr}$ Francium	$^{226}_{88}\text{Ra}$ Radium	$^{227}_{89}\text{Ac}$ Actinium													

Key:

