

Write your name here	
Surname	Other names
<b>Pearson</b> <b>Edexcel GCSE</b>	Centre Number
	Candidate Number
<b>Chemistry</b>	
<b>Unit C3: Chemistry in Action</b>	
<b>Foundation Tier</b>	
Thursday 19 June 2014 – Afternoon <b>Time: 1 hour</b>	Paper Reference <b>5CH3F/01</b>
<b>You must have:</b> Calculator, ruler	Total Marks

### Instructions

- Use **black** ink or ball-point pen.
- **Fill in the boxes** at the top of this page with your name, centre number and candidate number.
- Answer **all** questions.
- Answer the questions in the spaces provided  
– *there may be more space than you need.*

### Information

- The total mark for this paper is 60.
- The marks for **each** question are shown in brackets  
– *use this as a guide as to how much time to spend on each question.*
- Questions labelled with an **asterisk** (\*) are ones where the quality of your written communication will be assessed  
– *you should take particular care with your spelling, punctuation and grammar, as well as the clarity of expression, on these questions.*

### Advice

- Read each question carefully before you start to answer it.
- Keep an eye on the time.
- Try to answer every question.
- Check your answers if you have time at the end.

Turn over ►

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**PEARSON**

# The Periodic Table of the Elements

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7 <b>Li</b> lithium 3	9 <b>Be</b> beryllium 4	23 <b>Na</b> sodium 11	24 <b>Mg</b> magnesium 12	39 <b>K</b> potassium 19	40 <b>Ca</b> calcium 20	45 <b>Sc</b> scandium 21	48 <b>Ti</b> titanium 22	51 <b>V</b> vanadium 23	52 <b>Cr</b> chromium 24	55 <b>Mn</b> manganese 25	56 <b>Fe</b> iron 26	59 <b>Co</b> cobalt 27	59 <b>Ni</b> nickel 28	63.5 <b>Cu</b> copper 29	65 <b>Zn</b> zinc 30	70 <b>Ga</b> gallium 31	73 <b>Ge</b> germanium 32	75 <b>As</b> arsenic 33	79 <b>Se</b> selenium 34	80 <b>Br</b> bromine 35	84 <b>Kr</b> krypton 36	85 <b>Rb</b> rubidium 37	88 <b>Sr</b> strontium 38	89 <b>Y</b> yttrium 39	91 <b>Zr</b> zirconium 40	93 <b>Nb</b> niobium 41	96 <b>Mo</b> molybdenum 42	98 <b>Tc</b> technetium 43	101 <b>Ru</b> ruthenium 44	103 <b>Rh</b> rhodium 45	106 <b>Pd</b> palladium 46	108 <b>Ag</b> silver 47	112 <b>Cd</b> cadmium 48	115 <b>In</b> indium 49	119 <b>Sn</b> tin 50	122 <b>Sb</b> antimony 51	127 <b>I</b> iodine 53	128 <b>Te</b> tellurium 52	131 <b>Xe</b> xenon 54	133 <b>Cs</b> caesium 55	137 <b>Ba</b> barium 56	139 <b>La*</b> lanthanum 57	140 <b>Pr</b> praseodymium 59	141 <b>Nd</b> neodymium 60	142 <b>Pm</b> promethium 61	143 <b>Sm</b> samarium 62	144 <b>Eu</b> europium 63	145 <b>Gd</b> gadolinium 64	146 <b>Tb</b> terbium 65	147 <b>Dy</b> dysprosium 66	148 <b>Ho</b> holmium 67	149 <b>Er</b> erbium 68	150 <b>Tm</b> thulium 69	151 <b>Yb</b> ytterbium 70	152 <b>Lu*</b> lutetium 71	157 <b>Hf</b> hafnium 72	158 <b>Ta</b> tantalum 73	159 <b>W</b> tungsten 74	162 <b>Re</b> rhenium 75	164 <b>Os</b> osmium 76	166 <b>Ir</b> iridium 77	168 <b>Pt</b> platinum 78	173 <b>Au</b> gold 79	178 <b>Hg</b> mercury 80	181 <b>Tl</b> thallium 81	184 <b>Pb</b> lead 82	186 <b>Bi</b> bismuth 83	188 <b>Po</b> polonium 84	190 <b>At</b> astatine 85	195 <b>Rn</b> radon 86	[223] <b>Fr</b> francium 87	[226] <b>Ra</b> radium 88	[227] <b>Ac*</b> actinium 89	[261] <b>Rf</b> rutherfordium 104	[262] <b>Db</b> dubnium 105	[266] <b>Sg</b> seaborgium 106	[264] <b>Bh</b> bohrium 107	[277] <b>Hs</b> hassium 108	[268] <b>Mt</b> meitnerium 109	[271] <b>Ds</b> darmstadtium 110	[272] <b>Rg</b> roentgenium 111	[209] <b>Po</b> polonium 84	[210] <b>At</b> astatine 85	[222] <b>Rn</b> radon 86																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																											

1  
**H**  
hydrogen  
1

Key  
relative atomic mass  
atomic symbol  
name  
atomic (proton) number

Elements with atomic numbers 112-116 have been reported but not fully authenticated

\* The lanthanoids (atomic numbers 58-71) and the actinoids (atomic numbers 90-103) have been omitted.  
The relative atomic masses of copper and chlorine have not been rounded to the nearest whole number.



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**Questions begin on next page.**



**Answer ALL questions**

Some questions must be answered with a cross in a box ☒. If you change your mind about an answer, put a line through the box ☒ and then mark your new answer with a cross ☒.

**Fertilisers and ammonia**

- 1 (a) State why farmers spread fertilisers on their fields.

(1)

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- (b) Using too much fertiliser can harm the environment.

Describe how the spreading of too much fertiliser on fields can harm the environment.

(2)

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- (c) Ammonium nitrate is a fertiliser.

Ammonium nitrate is formed when nitric acid reacts with ammonia.

- (i) Write the word equation for this reaction.

(2)

..... + ..... → .....



(ii) This hazard symbol appears on a bottle of nitric acid.



Complete the sentence by putting a cross (☒) in the box next to your answer.

This hazard symbol shows that the nitric acid is

(1)

- A** corrosive
- B** explosive
- C** flammable
- D** toxic

(d) In the Haber process, nitrogen and hydrogen react to form ammonia.



(i) The  $\rightleftharpoons$  symbol in the word equation shows that the reaction goes forwards and backwards at the same time.

Give the name of this type of reaction.

(1)

(ii) Complete the sentence by putting a cross (☒) in the box next to your answer.

The formula for a molecule of ammonia is

(1)

- A** Am<sub>3</sub>
- B** HN
- C** NH<sub>3</sub>
- D** N<sub>3</sub>O

**(Total for Question 1 = 8 marks)**



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## Ethanol

2 Ethanol can be made by fermentation.

(a) (i) In a fermentation reaction, yeast is added to sugar solution.

Complete the sentence by putting a cross (☒) in the box next to your answer.

The yeast is added to the sugar solution because it

(1)

- A slows down the reaction
- B heats up the reaction
- C is an alcohol
- D provides enzymes

(ii) A teacher demonstrated the effect of temperature on fermentation.

She made a mixture of water, sugar and yeast.

Half of the mixture was kept in a flask at 40°C and the other half was kept in a flask at 75°C.

Ethanol was formed by fermentation at 40°C.

Explain how the contents of the flask at 75°C would be different from the contents of the flask at 40°C.

(2)

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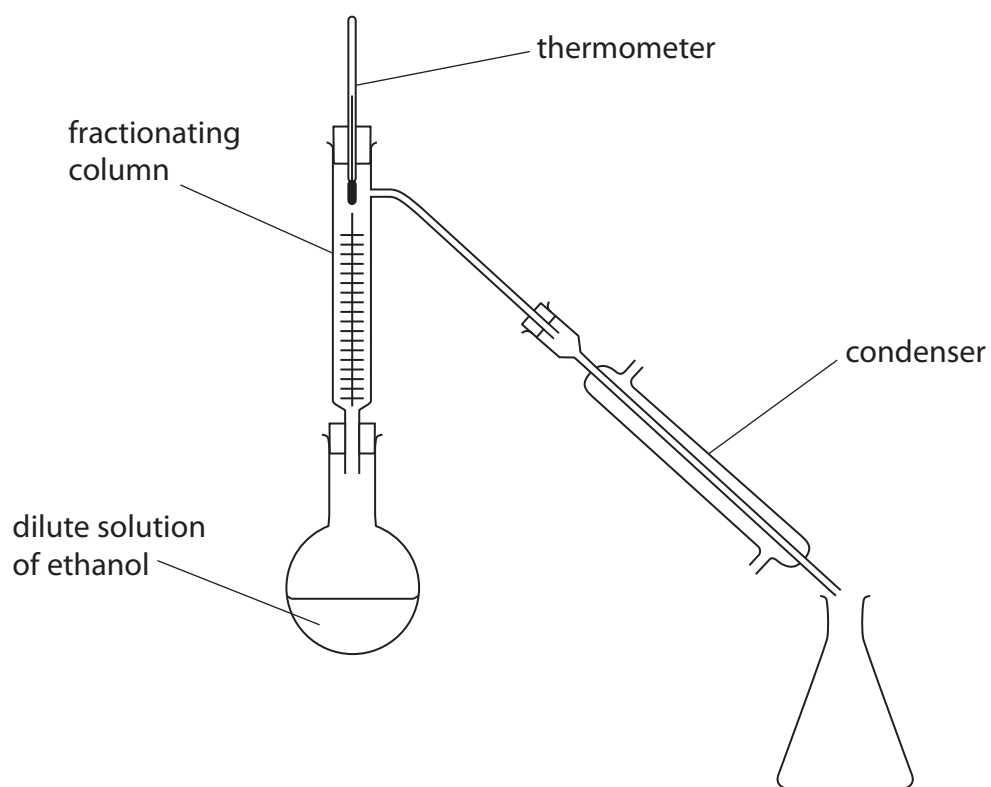
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(b) A dilute solution of ethanol is concentrated by fractional distillation.



Describe how this apparatus is used to obtain a more concentrated solution of ethanol.

(2)

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(c) Alcoholic drinks contain ethanol.

Explain why people should not drink alcoholic drinks before driving.

(2)

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- (d) Ethanol is a member of an homologous series.  
The members of this homologous series are called alcohols.  
Methane and ethane are members of another homologous series.

Give the name of this other homologous series.

(1)

.....  
**(Total for Question 2 = 8 marks)**



P 4 3 4 2 9 A 0 9 2 0

### Tests for ions

- 3 (a) A flame test is used to identify some metal ions in salts.  
A flame test was carried out on a salt.

The flame colour was orange-red.

Complete the sentence by putting a cross (☒) in the box next to your answer.

The metal ion in the salt was

(1)

- A copper
- B sodium
- C potassium
- D calcium

- (b) Some metal ions react with sodium hydroxide solution to produce coloured precipitates.

Draw one straight line from each metal ion to the colour of the precipitate formed when it reacts with sodium hydroxide solution.

(2)

metal ion	colour of precipitate
aluminium ions, $\text{Al}^{3+}$	blue
copper ions, $\text{Cu}^{2+}$	green
iron(III) ions, $\text{Fe}^{3+}$	red-brown
	white



- (c) Bromide ions in solution are detected by adding dilute nitric acid followed by silver nitrate solution.

A precipitate of silver bromide forms.

Complete the sentence by putting a cross (☒) in the box next to your answer.

If bromide ions are present, the colour of the precipitate will be

(1)

A white

B cream

C red

D brown

- (d) A salt contains carbonate ions.

Describe a test using dilute acid that shows the presence of carbonate ions.

(2)

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- (e) Water companies carry out tests on drinking water.

Explain why they need to test the water.

(2)

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- (f) A flame test is an example of qualitative analysis.

Explain the meaning of **qualitative** analysis and the meaning of **quantitative** analysis.

(2)

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(Total for Question 3 = 10 marks)



### Electrolysis

4 (a) When molten sodium chloride is electrolysed, the products are sodium and chlorine.

(i) Give the formula of sodium chloride.

(1)

(ii) State why molten sodium is used in some nuclear reactors.

(1)

(b) Molten lead bromide is electrolysed.

(i) Complete the sentence describing the type of reaction.

(1)

During the electrolysis the lead ions gain electrons at the cathode.

The type of reactions in which metal ions gain electrons is called .....

(ii) Complete the sentence by putting a cross (☒) in the box next to your answer.

Molten lead bromide, rather than solid lead bromide, has to be electrolysed because

(1)

- A** ions can only move freely in molten lead bromide
- B** electrolysis is too fast in solid lead bromide
- C** molten lead bromide contains free electrons
- D** lead bromide has a very low melting point

(iii) When molten lead bromide is electrolysed, a silver-coloured liquid is produced at the cathode and a red-brown gas is produced at the anode.

Complete the word equation by showing the products formed when molten lead bromide is electrolysed.

(2)

lead bromide → ..... + .....



(c) Three colourless liquids, **A**, **B** and **C**, are tested.

Tests 1, 2 and 3 are carried out on each of these liquids.

**Test 1:** the liquid is tested to see if it conducts electricity.

**Test 2:** 20 cm<sup>3</sup> of the liquid is shaken vigorously with a few drops of soap solution.

**Test 3:** 20 cm<sup>3</sup> of the liquid is boiled and then test 2 is carried out on the boiled liquid.

The results are shown in the table.

liquid	observations		
	test 1	test 2	test 3
<b>A</b>	conducts	scum formed, no lather	scum formed, no lather
<b>B</b>	conducts	scum formed, no lather	lather formed
<b>C</b>	does not conduct	lather formed	lather formed

(i) State which of the liquids are electrolytes.

(1)

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(ii) Use the results of the tests to explain whether each of the liquids **A**, **B** and **C** is soft, shows permanent hardness, or shows temporary hardness.

(3)

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(Total for Question 4 = 10 marks)



### Salts

- 5 (a) A mass of magnesium sulfate was taken.

$$\text{mass of watch glass + magnesium sulfate} = 18.50 \text{ g}$$

$$\text{mass of watch glass} = 18.20 \text{ g}$$

The solid was dissolved in water to make  $500 \text{ cm}^3$  solution.

Calculate the concentration of the magnesium sulfate solution in  $\text{g dm}^{-3}$ .

$$(1000 \text{ cm}^3 = 1 \text{ dm}^3)$$

(2)

concentration = .....  $\text{g dm}^{-3}$

- (b) A titration is used to determine the exact volumes of sulfuric acid and sodium hydroxide solution that neutralise each other.

$25.00 \text{ cm}^3$  of sodium hydroxide solution is put into a conical flask and a few drops of indicator solution are added.

The sulfuric acid is added slowly from a burette until the indicator changes colour when all the sodium hydroxide is just neutralised.

- (i) State what is used to measure out  $25.00 \text{ cm}^3$  of sodium hydroxide solution.

(1)

- (ii) State the name of an indicator that could be used and the colour change seen in this titration.

(3)

indicator .....

colour in sodium hydroxide solution .....

colour at end of titration .....



\**(c)* Copper sulfate is a soluble salt.

Copper sulfate can be prepared by reacting copper oxide with dilute sulfuric acid.

Copper oxide is an insoluble solid.

Describe how you would prepare some pure, dry crystals of copper sulfate by reacting excess copper oxide with dilute sulfuric acid.

(6)

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(Total for Question 5 = 12 marks)



### Everyday substances

6 The chemical industry produces many useful products.

(a) Ethanol reacts with ethanoic acid to form ethyl ethanoate.

In general, alcohols react with carboxylic acids.

(i) Give the name of the type of organic substance formed when an alcohol reacts with a carboxylic acid.

(1)

(ii) State why this type of organic substance is used in perfumes.

(1)

(b) Fleece jackets can be made from recycled polyesters.



Explain why polyesters are recycled to make fleece jackets.

(2)







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