Write your name here

Surname	Other names

Pearson Edexcel GCSE

Centre Number | Candidate Number

Chemistry

Unit C3: Chemistry in Action

Foundation Tier

Wednesday 22 June 2016 – Morning
Time: 1 hour

Paper Reference
5CH3F/01

You must have:
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.
- Try to answer every question.
- Check your answers if you have time at the end.

Turn over ▶

P45931A

1/1/1/1/1/1/1/

P 4 5 9 3 1 A 0 1 2 0

PEARSON

The Periodic Table of the Elements

1	2											3	4	5	6	7	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** sulfur 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	63.5 **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	[98] **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	[209] **Po** polonium 84	[210] **At** astatine 85	[222] **Rn** radon 86
[223] **Fr** francium 87	[226] **Ra** radium 88	[227] **Ac*** actinium 89	[261] **Rf** rutherfordium 104	[262] **Db** dubnium 105	[266] **Sg** seaborgium 106	[264] **Bh** bohrium 107	[277] **Hs** hassium 108	[268] **Mt** meitnerium 109	[271] **Ds** darmstadtium 110	[272] **Rg** roentgenium 111	Elements with atomic numbers 112-116 have been reported but not fully authenticated						

Key

relative atomic mass
atomic symbol
name
atomic (proton) number

**** 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 ☒.

Water

1 Water from reservoirs is treated and tested before it is supplied to our homes.

(a) Give a reason why water is tested before it is supplied to our homes.

(1)

.....

.....

.....

(b) Water taken from reservoirs can be hard or soft.

You are given samples of hard water and soft water.

(i) Explain how you could show which sample was hard water and which sample was soft water.

Use the words from the box in your answer.

lather	scum	soap

(3)

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DO NOT WRITE IN THIS AREA DO NOT WRITE IN THIS AREA DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA DO NOT WRITE IN THIS AREA DO NOT WRITE IN THIS AREA

(ii) Which of these ions causes hardness in water?

Put a cross (☒) in the box next to your answer.

(1)

☒ **A** potassium ions

☒ **B** magnesium ions

☒ **C** chloride ions

☒ **D** hydroxide ions

(iii) Hardness in water can be either temporary or permanent.

Describe a test to show whether the hardness in a sample of water is temporary or permanent.

(2)

.....

.....

.....

.....

.....

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

(1)

1000 cm^3 of a solution contained 1.0 g of dissolved solid.
The concentration of the solid in g dm^{-3} is

☒ **A** 0.1

☒ **B** 1.0

☒ **C** 2.0

☒ **D** 10.0

(Total for Question 1 = 8 marks)

Solutions and tests for ions

2 (a) (i) Describe how you would make a solution of sodium chloride from sodium chloride crystals and distilled water.

(2)

.....

.....

.....

.....

(ii) A test for chloride ions is carried out on the sodium chloride solution.

P, **Q**, **R** and **S** are involved in tests for ions.

P add silver nitrate solution to the solution

Q a white precipitate forms

R add sodium hydroxide solution to the solution

S add dilute nitric acid to the solution

Only three of these form part of the test for chloride ions.

Identify the three and place them in the order they occur in the test.

(2)

1 .....

2 .....

3 .....

(b) The test for ammonium ions is

- add sodium hydroxide solution to a solution of the salt
- warm the mixture
- test the ammonia gas given off with damp red litmus paper.

(i) Choose the formula of sodium hydroxide.

Put a cross (☒) in the box next to your answer.

(1)

☒ **A** KOH

☒ **B** NaO

☒ **C** NaOH

☒ **D** SOH

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

(1)

When the ammonia gas is tested with damp red litmus paper, the litmus paper turns blue.

This shows that the ammonia gas is

☒ **A** acidic

☒ **B** alkaline

☒ **C** neutral

☒ **D** an indicator

(c) Two tests are carried out on a solid.

- In a flame test, a yellow flame is seen.
- When some dilute hydrochloric acid is added to the solid, a gas is evolved. The gas turns limewater milky.

Give the name of the solid.

(2)

.....

(Total for Question 2 = 8 marks)

Electrolysis and metal ions

3 (a) Some metals are extracted by the electrolysis of a molten compound.

(i) Complete the sentences about the electrolysis of a molten compound using words from the box.

decomposed	electricity	electrons	ions	molecules	purified

Each word may be used once, more than once or not at all.

(2)

The compound has to be molten so that the ..... can move.

When a molten compound is electrolysed its elements are formed. During electrolysis the compound is ..... .

(ii) Which of the following statements about electrolysis is correct?

Put a cross (☒) in the box next to your answer.

(1)

☒ **A** an anion is positively charged

☒ **B** an anode is negatively charged

☒ **C** a cation is positively charged

☒ **D** a cathode is positively charged

(b) (i) When molten zinc chloride is electrolysed, a solid forms at one electrode and a pale green gas forms at the other electrode.

Use this information to complete the word equation for the reaction that takes place when molten zinc chloride is electrolysed.

(2)

zinc chloride → ..... + ...

(ii) In this electrolysis, chloride ions lose electrons to form the pale green gas.

State the type of reaction that occurs when electrons are lost.

(1)

.....

(c) Copper chloride dissolves in water.

Describe what you **see** when sodium hydroxide solution is added to a solution containing copper ions, Cu^{2+}.

(2)

.....

.....

.....

.....

(d) Sodium is manufactured by the electrolysis of molten sodium chloride.

Explain a large-scale use of sodium.

(2)

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(Total for Question 3 = 10 marks)

Nitrogen, hydrogen and ammonia

4 (a) In industry, ammonia gas, NH_3, is manufactured from nitrogen gas, N_2 and hydrogen gas, H_2.

(i) Give the name of the industrial process used to manufacture ammonia.

(1)

.....

(ii) State the main source of the nitrogen and of the hydrogen used in this process.

(2)

source of nitrogen .....

source of hydrogen .....

(iii) Write the balanced equation for the reaction between nitrogen and hydrogen to produce ammonia.

(2)

.....

(iv) State why the following hazard symbol is seen on a bottle of concentrated ammonia solution.

(1)

.....

.....

(b) The formula of a molecule of ammonia is NH_3.

Use the formula to describe the atoms combined in one molecule of ammonia.

(2)

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(c) Explain why ammonium compounds are important in agriculture.

(2)

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(Total for Question 4 = 10 marks)

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Ethanoic acid

5 (a) A few drops of phenolphthalein indicator are added to dilute ethanoic acid.

Choose the colour of this mixture.

Put a cross (☒) in the box next to your answer.

(1)

☒ **A** colourless

☒ **B** orange

☒ **C** pink

☒ **D** yellow

(b) Sodium ethanoate can be made by reacting ethanoic acid solution with a solution of the alkali sodium hydroxide.
Water is also formed.

(i) Give the name of the type of reaction that occurs when ethanoic acid reacts with sodium hydroxide.

(1)

.....

(ii) Write the word equation for this reaction.

(2)

.....

.....

(c) Ethanoic acid is present in vinegar.

(i) State why vinegar is sprinkled on some foods.

(1)

.....

.....

(ii) State why other foods are stored in vinegar.

(1)

.....

.....

*(d) Magnesium ethanoate is a salt which is soluble in water.
It can be made by reacting magnesium carbonate powder with dilute ethanoic acid.
Magnesium carbonate is insoluble in water.

The equation for the reaction is

$$\underset{\text{acid}}{\text{ethanoic}}\,(aq) + \underset{\text{carbonate}}{\text{magnesium}}\,(s) \rightarrow \underset{\text{ethanoate}}{\text{magnesium}}\,(aq) + \underset{\text{dioxide}}{\text{carbon}}\,(g) + \text{water}\,(l)$$

You are given some dilute ethanoic acid and magnesium carbonate powder.

Describe how you would prepare a pure solution of magnesium ethanoate and how you would obtain pure, dry magnesium ethanoate crystals from that solution.

(6)

(Total for Question 5 = 12 marks)

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Organic compounds

6 (a) The formula of a molecule of ethanol is C_2H_5OH.

(i) State how you know, from its formula, that ethanol is **not** a hydrocarbon.

(1)

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.....

(ii) A dilute solution of ethanol can be produced by the fermentation of a carbohydrate.

Starting from sugar (a carbohydrate), describe how a dilute solution of ethanol can be produced.

(3)

.....

.....

.....

.....

.....

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

(1)

When ethanol reacts with ethanoic acid, ethyl ethanoate is formed.

Ethyl ethanoate is

☒ **A** an alkali

☒ **B** an acid

☒ **C** an ester

☒ **D** an enzyme

(iv) When one molecule of ethanol reacts with one molecule of ethanoic acid, one molecule of ethyl ethanoate and one molecule of another substance are formed.

Complete the equation.

(1)

$$\underset{\text{ethanol}}{C_2H_6O} + \underset{\text{ethanoic acid}}{C_2H_4O_2} \rightarrow \underset{\text{ethyl ethanoate}}{C_4H_8O_2} + \text{.....}$$

*(b) The alkanes and the alkenes are two examples of homologous series.

Name and draw the structures of some alkanes and of some alkenes and use them to show how members of a homologous series are similar in their general formula, names and structures of their molecules.

(6)

(Total for Question 6 = 12 marks)

TOTAL FOR PAPER = 60 MARKS

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