

Write your name here

Surname

Other names

Pearson
Edexcel GCSE

Centre Number

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Candidate Number

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Chemistry

Unit C3: Chemistry in Action

Foundation Tier

Thursday 19 June 2014 – Afternoon

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.
- 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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2

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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** Am₃
- ☐ **B** HN
- ☐ **C** NH₃
- ☐ **D** N₃O

(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 (X) 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)

.....

.....

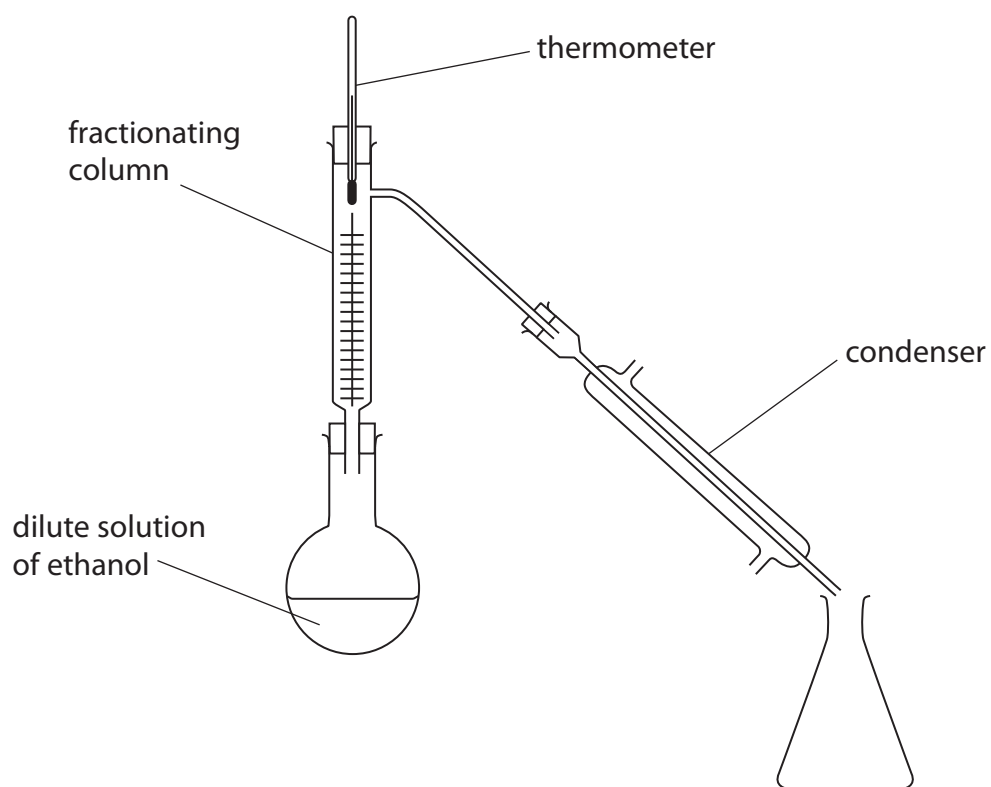
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(b) A dilute solution of ethanol is concentrated by fractional distillation.



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
<div>aluminium ions, Al^{3+}</div>	<div>blue</div>
<div>copper ions, Cu^{2+}</div>	<div>green</div>
<div>iron(III) ions, Fe^{3+}</div>	<div>red-brown</div>
	<div>white</div>



- (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 (X) 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)

.....

.....

.....

.....

(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 cm³ of the liquid is shaken vigorously with a few drops of soap solution.

Test 3: 20 cm³ 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
A	conducts	scum formed, no lather	scum formed, no lather
B	conducts	scum formed, no lather	lather formed
C	does not conduct	lather formed	lather formed

(i) State which of the liquids are electrolytes.

(1)

(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)

(Total for Question 4 = 10 marks)



Salts

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

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

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

The solid was dissolved in water to make 500 cm^3 solution.

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

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

(2)

concentration = 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 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 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.

[illegible]

(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)



(c) Describe how some soap could be made from an oil and concentrated sodium hydroxide solution.

(2)

*(d) Vinegar contains ethanoic acid.

Ethanoic acid is a typical acid.

All acids have some characteristic reactions in common.

Describe some characteristic reactions that show that ethanoic acid is a typical acid.

(6)

(Total for Question 6 = 12 marks)

TOTAL FOR PAPER = 60 MARKS



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