Surname	Centre Number	Candidate Number
Other Names		0

GCSE

245/01

SCIENCE CHEMISTRY
FOUNDATION TIER
CHEMISTRY 3

A.M. WEDNESDAY, 25 May 2011

45 minutes

For Examiner's use only		
Question	**Maximum Mark**	**Mark Awarded**
1.	**4**	
2.	**8**	
3.	**7**	
4.	**6**	
5.	**4**	
6.	**6**	
7.	**5**	
8.	**8**	
9.	**2**	
Total	**50**	

0245 010001

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. The box below gives the names of some separation methods used in chemistry.

chromatography	**crystallisation**	**distillation**
evaporation	**filtration**	

From the box, choose the most suitable method to separate:

(a) sand from water; ..... [1]

(b) the colours in ink; ..... [1]

(c) alcohol and water; ..... [1]

(d) salt from water. ..... [1]

4

2. *(a)* Read the information in the box below.

Sulphuric acid and ethanoic acid are two common acids. They both have a pH below 7 and turn litmus red. Both react with alkalis to produce a salt and water. This type of reaction is known as neutralisation.

An example of neutralisation is the reaction between sulphuric acid and sodium hydroxide to produce sodium sulphate and water.

Acids also react with metals. Sulphuric acid reacts with magnesium to produce magnesium sulphate and hydrogen. The reaction is fast and produces a lot of bubbles. It produces heat and is therefore an exothermic reaction. Ethanoic acid reacts more slowly with magnesium and the reaction produces less heat.

Use only the information in the box to answer the questions that follow.

(i) Give the pH of an acid. ..... [1]

(ii) State what is meant by a neutralisation reaction. [1]

.....

.....

(iii) Name the salt produced when sulphuric acid reacts with sodium hydroxide solution. [1]

.....

(iv) Give the **word equation** for the reaction taking place between sulphuric acid and magnesium. [2]

..... + ... ⟶ ..... + ...

(v) State how the reaction with magnesium shows that ethanoic acid is a weaker acid than sulphuric acid. [1]

.....

(b) The following table shows the colours of universal indicator at different pH values.

Colour	Red	Orange	Yellow	Green	Blue	Navy blue	Purple
pH	0-2	3-4	5-6	7	8-9	10-12	13-14

A student is given some common household substances and is asked to find their pH values using universal indicator. His results are shown in the table below.

Substance	Colour of universal indicator	pH	Acid, alkali or neutral
vinegar	orange	4	alkali
toothpaste	blue	9	alkali
water	green	5	neutral
lemonade	yellow	5	acid

There are two errors in the table. Identify the **two** errors. [2]

Error 1 .....

Error 2 .....

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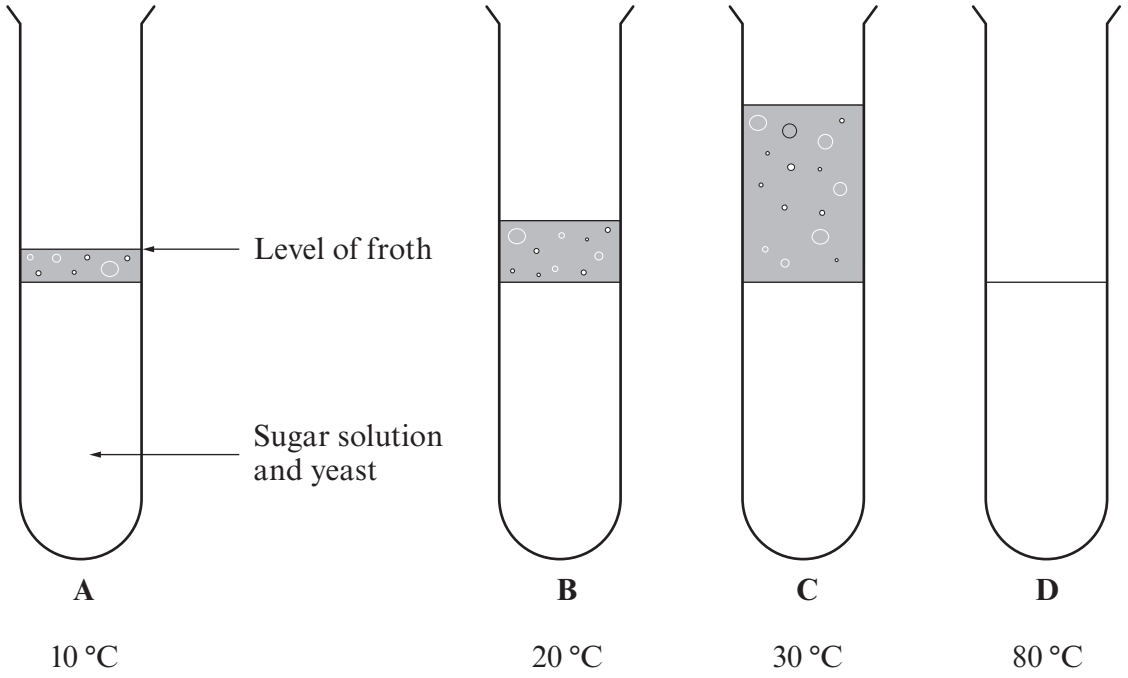
3. A student carried out an experiment to find out how changes in temperature affected the rate of fermentation of sugar. He placed 20 cm^3 of sugar solution in each of boiling tubes **A**, **B**, **C** and **D**, and added 1 cm^3 of yeast to each tube. They were placed in water baths at different temperatures for 30 minutes. The results of the experiment are shown below.



(a) (i) Complete the diagram by showing the level of froth expected for tube **D**. [1]

(ii) Give a reason for your answer. [1]

.....

.....

(b) State **two** ways in which the experiment was made a fair test. [2]

1. .....

2. .....

(c) The gas produced during this reaction turns limewater milky. Choose from the box below the name of this gas. [1]

ammonia	**carbon dioxide**	**nitrogen**	**oxygen**

The gas produced is ..... .

(d) Give a **word** equation for the fermentation process. [2]

..... $\xrightarrow{\text{yeast}}$ ..... + ...

Examiner only

4. *(a)* The boxes below show some common ions and tests that could be used to identify them. Draw **one** line from each ion to the appropriate test. [4]

Ion	Test
	produces carbon dioxide gas when it reacts with acid
Na^+	produces a lilac colour in flame test
Cu^{2+}	gives a blue precipitate with sodium hydroxide solution
Cl^-	gives a white precipitate with silver nitrate solution
CO_3^{2-}	produces a yellow colour in flame test
	gives a yellow precipitate with silver nitrate solution

(b) A pupil was given a gas jar containing oxygen.
Describe a test that could be carried out to prove that it was oxygen. Give the expected result for the test. [2]

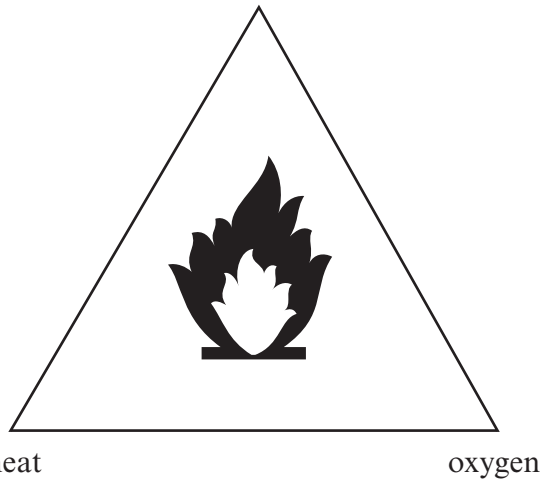
.....

.....

.....

Examiner only

5. The following diagram shows the fire triangle.



(a) Complete the diagram of the fire triangle. [1]

(b) Describe **briefly** what information the fire triangle provides. [1]

.....

.....

(c) Use your knowledge of the fire triangle to explain how each of the following fire fighting methods works.

(i) Pouring water on to paper burning in a bin. [1]

.....

(ii) Putting a damp cloth over the top of a burning chip pan. [1]

.....

4

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6. Limestone, made of calcium carbonate, is an important raw material. It is converted into other important substances as shown below:

limestone ⟶ quicklime ⟶ slaked lime

(a) (i) State how limestone is converted into quicklime. [1]

.....

(ii) State what is added to quicklime in order to form slaked lime. [1]

.....

(b) The following box gives the formulae of some calcium compounds.

$CaCO_3$	$Ca(OH)_2$	CaO	$CaCl_2$

Choose the correct formula for

(i) limestone, ... [1]

(ii) quicklime, ... [1]

(iii) slaked lime. ..... [1]

(c) Give a use for limestone. ..... [1]

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7. *(a)* The following table shows the number of people admitted to a particular hospital for treatment for the effects of alcohol abuse over a period of five years.

Year	2004	2005	2006	2007	2008
Number of people treated	264	346	466	499	571

(i) State how the number of people treated for the effects of alcohol abuse has changed over time. [1]

.....

(ii) Give **one** social problem caused by alcohol abuse. [1]

.....

(iii) State **one** possible effect of long term alcohol abuse on an individual's health. [1]

.....

(b) Alcohol is used as a biofuel. State **one** advantage and **one** disadvantage of the use of alcohol as a biofuel. [2]

Advantage .....

.....

Disadvantage .....

.....

5

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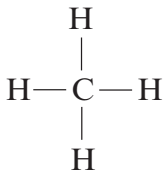
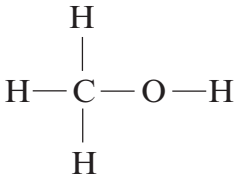
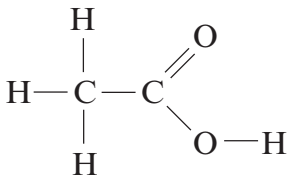
8. The following table shows the names and formulae of some organic compounds.

Name	Formula	Structural formula
methane	CH_4	
propane	C_3H_8	
	CH_3OH	
ethene	C_2H_4	
ethanoic acid		

(a) Complete the table. [4]

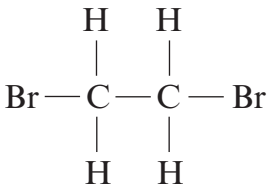
(b) Name the **two** compounds in the table that are members of the **alkane** homologous series. [1]

..... and .....

(c) Name the compound produced when alcoholic drinks containing ethanol are left exposed to air for a period of time. [1]

.....

(d) (i) Name the substance that reacts with bromine water to form [1]



.....

(ii) Give **one** observation that you would make during this reaction. [1]

.....

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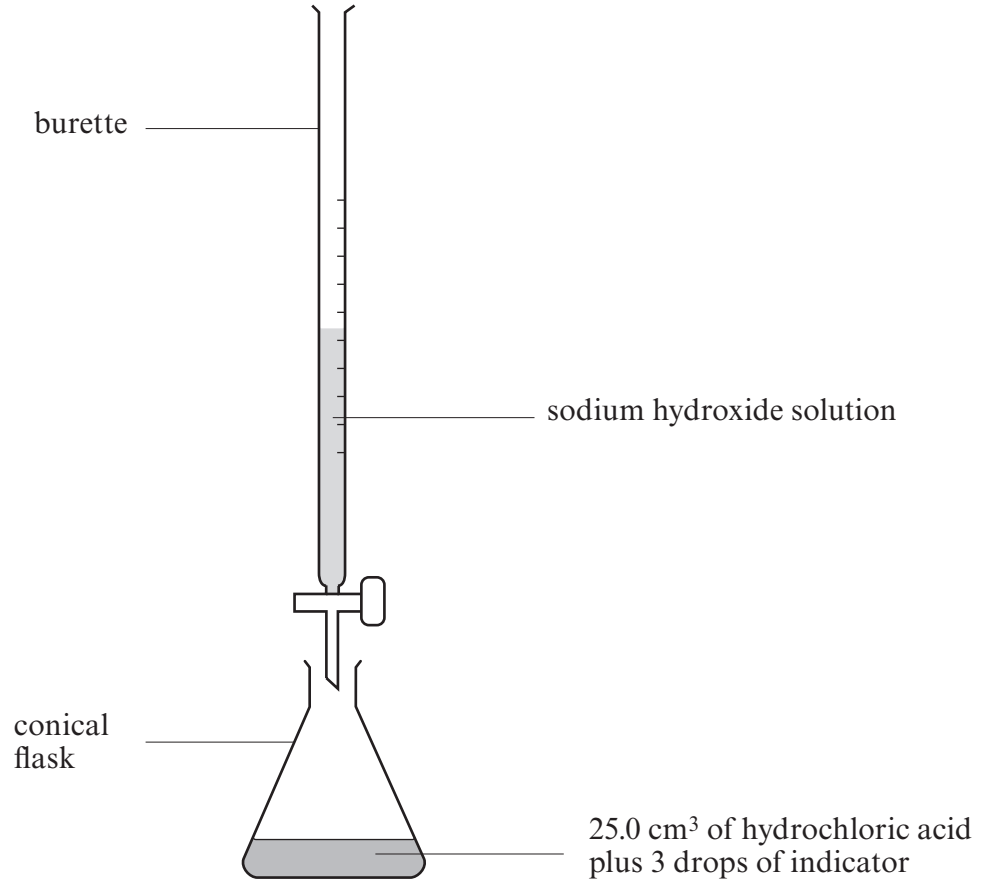
9. A student added sodium hydroxide solution to 25.0 cm^3 of hydrochloric acid as shown in the diagram below.



$$NaOH + HCl \longrightarrow NaCl + H_2O$$

The titration was carried out three times and the results are shown below.

	Titration readings		
	1	2	3
Volume of sodium hydroxide used / cm^3	24.9	25.1	25.0

State what the readings tell you about the relative concentrations of hydrochloric acid and sodium hydroxide solution. Give a reason for your answer. [2]

.....

.....

.....

2

FORMULAE FOR SOME COMMON IONS

POSITIVE IONS		NEGATIVE IONS	
Name	**Formula**	**Name**	**Formula**
Aluminium	Al^{3+}	Bromide	Br^{-}
Ammonium	NH_4^{+}	Carbonate	CO_3^{2-}
Barium	Ba^{2+}	Chloride	Cl^{-}
Calcium	Ca^{2+}	Fluoride	F^{-}
Copper(II)	Cu^{2+}	Hydroxide	OH^{-}
Hydrogen	H^{+}	Iodide	I^{-}
Iron(II)	Fe^{2+}	Nitrate	NO_3^{-}
Iron(III)	Fe^{3+}	Oxide	O^{2-}
Lithium	Li^{+}	Sulphate	SO_4^{2-}
Magnesium	Mg^{2+}		
Nickel	Ni^{2+}		
Potassium	K^{+}		
Silver	Ag^{+}		
Sodium	Na^{+}		

Turn over.

PERIODIC TABLE OF ELEMENTS

1	2	Group										3	4	5	6	7	0
								$^{1}_{1}$H Hydrogen									$^{4}_{2}$He Helium
$^{7}_{3}$Li Lithium	$^{9}_{4}$Be Beryllium											$^{11}_{5}$B Boron	$^{12}_{6}$C Carbon	$^{14}_{7}$N Nitrogen	$^{16}_{8}$O Oxygen	$^{19}_{9}$F Fluorine	$^{20}_{10}$Ne Neon
$^{23}_{11}$Na Sodium	$^{24}_{12}$Mg Magnesium											$^{27}_{13}$Al Aluminium	$^{28}_{14}$Si Silicon	$^{31}_{15}$P Phosphorus	$^{32}_{16}$S Sulphur	$^{35}_{17}$Cl Chlorine	$^{40}_{18}$Ar Argon
$^{39}_{19}$K Potassium	$^{40}_{20}$Ca Calcium	$^{45}_{21}$Sc Scandium	$^{48}_{22}$Ti Titanium	$^{51}_{23}$V Vanadium	$^{52}_{24}$Cr Chromium	$^{55}_{25}$Mn Manganese	$^{56}_{26}$Fe Iron	$^{59}_{27}$Co Cobalt	$^{59}_{28}$Ni Nickel	$^{64}_{29}$Cu Copper	$^{65}_{30}$Zn Zinc	$^{70}_{31}$Ga Gallium	$^{73}_{32}$Ge Germanium	$^{75}_{33}$As Arsenic	$^{79}_{34}$Se Selenium	$^{80}_{35}$Br Bromine	$^{84}_{36}$Kr Krypton
$^{86}_{37}$Rb Rubidium	$^{88}_{38}$Sr Strontium	$^{89}_{39}$Y Yttrium	$^{91}_{40}$Zr Zirconium	$^{93}_{41}$Nb Niobium	$^{96}_{42}$Mo Molybdenum	$^{99}_{43}$Tc Technetium	$^{101}_{44}$Ru Ruthenium	$^{103}_{45}$Rh Rhodium	$^{106}_{46}$Pd Palladium	$^{108}_{47}$Ag Silver	$^{112}_{48}$Cd Cadmium	$^{115}_{49}$In Indium	$^{119}_{50}$Sn Tin	$^{122}_{51}$Sb Antimony	$^{128}_{52}$Te Tellurium	$^{127}_{53}$I Iodine	$^{131}_{54}$Xe Xenon
$^{133}_{55}$Cs Caesium	$^{137}_{56}$Ba Barium	$^{139}_{57}$La Lanthanum	$^{179}_{72}$Hf Hafnium	$^{181}_{73}$Ta Tantalum	$^{184}_{74}$W Tungsten	$^{186}_{75}$Re Rhenium	$^{190}_{76}$Os Osmium	$^{192}_{77}$Ir Iridium	$^{195}_{78}$Pt Platinum	$^{197}_{79}$Au Gold	$^{201}_{80}$Hg Mercury	$^{204}_{81}$Tl Thallium	$^{207}_{82}$Pb Lead	$^{209}_{83}$Bi Bismuth	$^{210}_{84}$Po Polonium	$^{210}_{85}$At Astatine	$^{222}_{86}$Rn Radon
$^{223}_{87}$Fr Francium	$^{226}_{88}$Ra Radium	$^{227}_{89}$Ac Actinium															

Key: