

Write your name here

Surname

Other names

Edexcel Certificate

**Edexcel
International GCSE**

Centre Number

--	--	--	--	--

Candidate Number

--	--	--	--	--

Chemistry

Unit: KCH0/4CH0

Paper: 2C

Wednesday 16 January 2013 – Morning

Time: 1 hour

Paper Reference

**KCH0/2C
4CH0/2C**

You must have:

Ruler

Calculator

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.*
- Show all the steps in any calculations and state the units.

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.*

Advice

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

Turn over ►

P41539A

©2013 Pearson Education Ltd.

1/1/1/1/



PEARSON

THE PERIODIC TABLE

Period 1 2 3 4 5 6 7 0

Group

Period

4	He	Helium	2
---	----	--------	---

1	H	Hydrogen	1
---	---	----------	---

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
86	Rb Rubidium 37	88	Sr Strontium 38	89	Y Yttrium 39	91	Zr Zirconium 40	93	Nb Niobium 41	96	Mo Molybdenum 42	99	Tc Technetium 43	101	Ru Ruthenium 44	106	Pd Palladium 46	108	Ag Silver 47	112	Cd Cadmium 48	115	In Indium 49	119	Sn Tin 50	122	Sb Antimony 51	127	Te Tellurium 52	127	I Iodine 53	131	Xe Xenon 54		
133	Cs Caesium 55	137	Ba Barium 56	139	La Lanthanum 57	179	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	210	Po Polonium 84	210	At Astatine 85	222	Rn Radon 86
223	Fr Francium 87	226	Ra Radium 88	227	Ac Actinium 89													271	Uu Ununseptium 113	272	Uub Unbibium 114	277	Uut Untriseptium 115	281	Uuh Unhennium 119	286	Uus Unseptium 121	293	Uuo Ununoctium 122						

BLANK PAGE



Answer ALL questions.

1 The melting points of three related compounds are

capric acid 32 °C

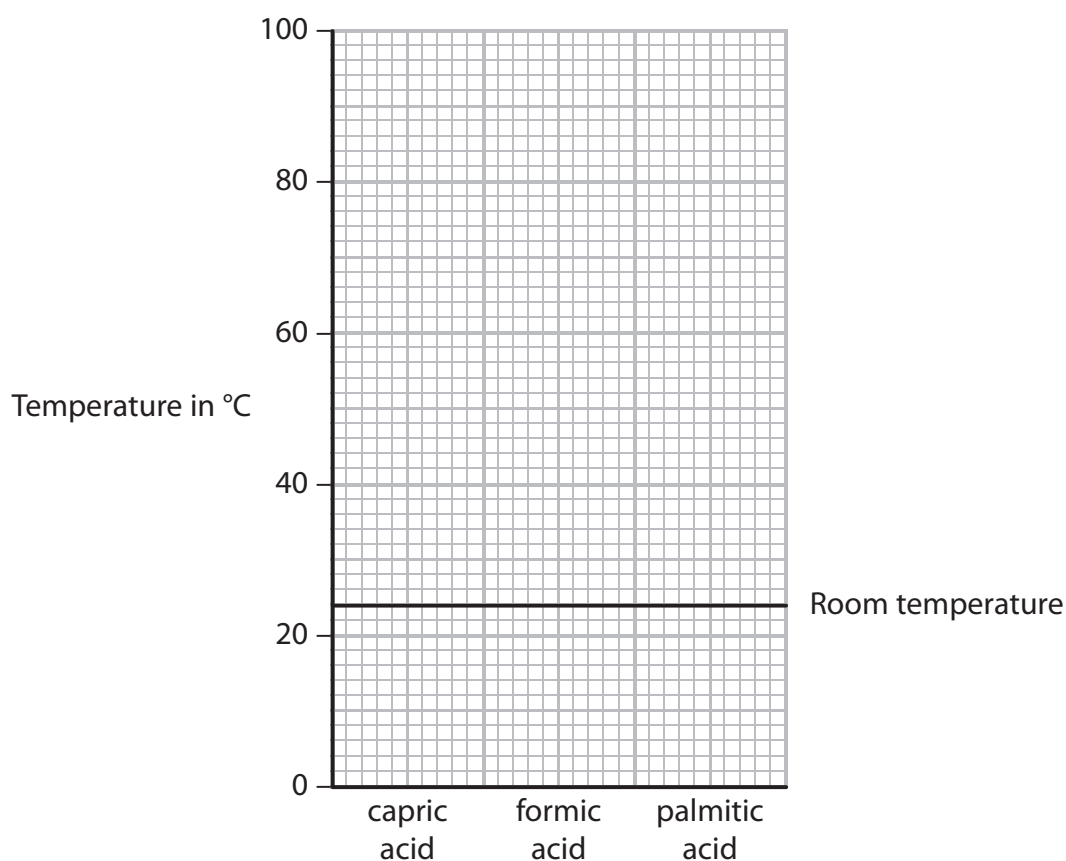
formic acid 8 °C

palmitic acid 63 °C

The boiling point of all these compounds is above 100 °C

(a) Use the grid to draw a bar chart of the melting points.

(2)



(b) Room temperature has been marked on the grid.

Use your bar chart to give the physical state of each acid at room temperature.

(2)

capric acid

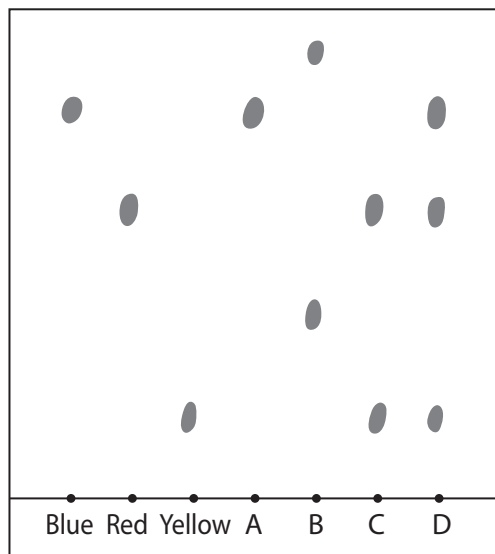
formic acid

palmitic acid

(Total for Question 1 = 4 marks)



2 A student produces this chromatogram for four dyes, **A**, **B**, **C** and **D**.



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

(i) Which one of the dyes contains three colours?

(1)

☐ **A**

☐ **B**

☐ **C**

☐ **D**

(ii) Which one of the dyes contains one colour only?

(1)

☐ **A**

☐ **B**

☐ **C**

☐ **D**

(b) Each dye is made from one or more of the colours blue, red and yellow.

The student thinks that the result for one dye is incorrect.

Suggest which result is incorrect. Explain your answer.

(2)

The incorrect result is

because

.....

(Total for Question 2 = 4 marks)



3 The photograph shows an aeroplane that has a rocket motor.



(a) One of the tanks on the aeroplane contains liquid oxygen.

- (i) Complete the diagram to show the arrangement of the particles in a liquid. One particle has been drawn for you.

(2)



- (ii) Much more oxygen can be stored in the tank when the oxygen is a liquid rather than a gas.

Give a reason for this in terms of the arrangement of the particles.

(1)

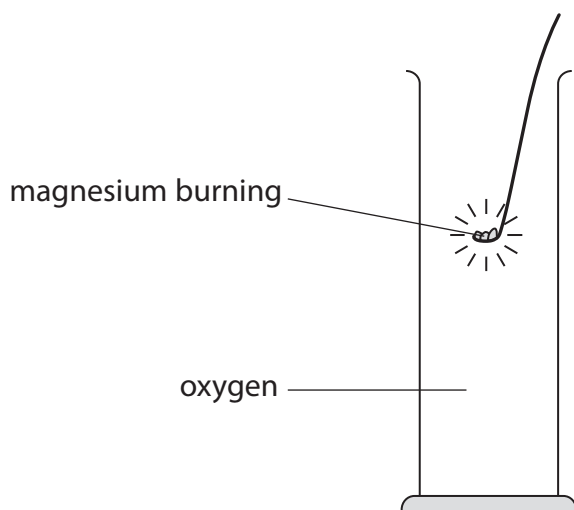
.....

.....

.....



(b) Magnesium burns in oxygen to form magnesium oxide.



(i) State **two** observations that can be made when magnesium burns in oxygen.

(2)

1

2

(ii) Give the formula of magnesium oxide.

(1)

.....

(c) A small amount of magnesium oxide is dissolved in water. When universal indicator is added to this solution, the indicator turns blue.

(i) What does the observation with the indicator show about magnesium oxide?

(1)

.....

(ii) Identify the ion that is responsible for the universal indicator turning blue.

(1)

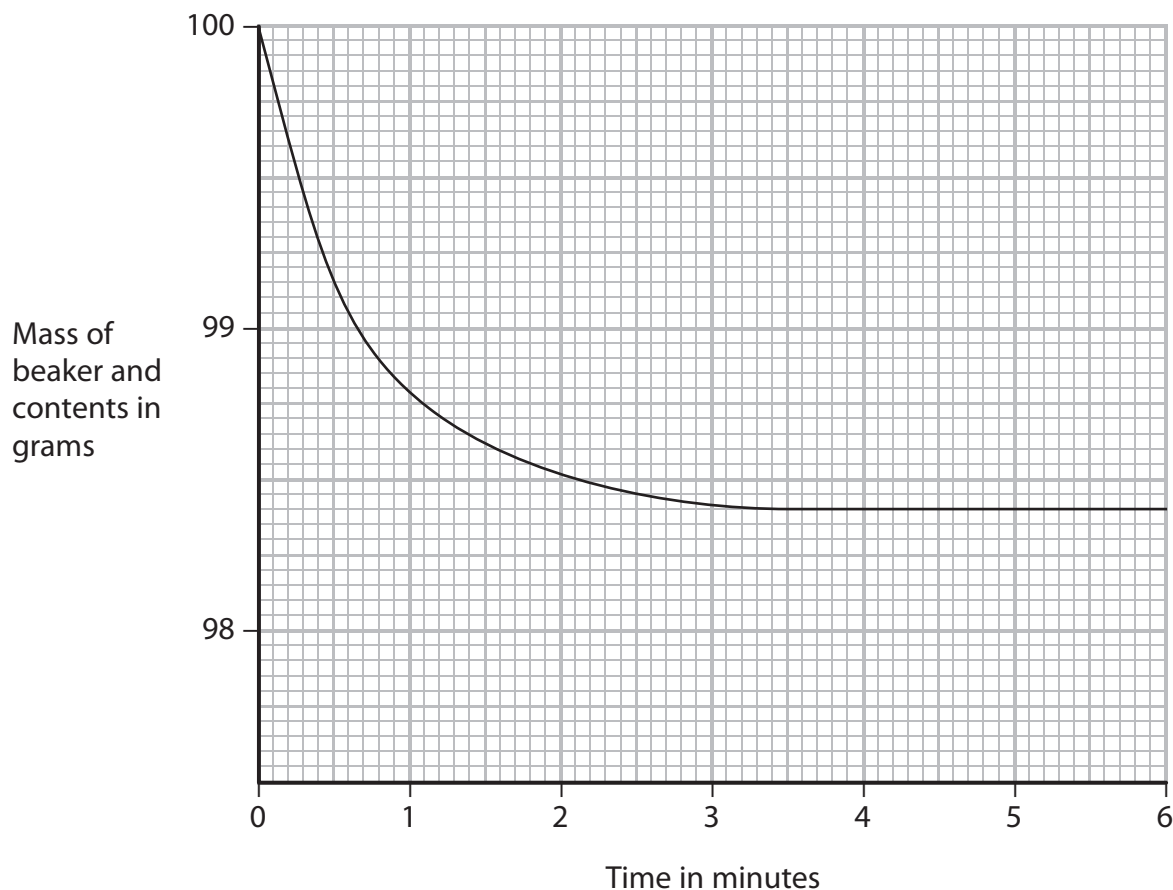
.....

(Total for Question 3 = 8 marks)

.....



- 4 An excess of dilute hydrochloric acid was added to a lump of calcium carbonate in a beaker. The mass of the beaker and contents was recorded every 30 seconds. The graph shows the results.



The equation for the reaction is



- (a) State **two** observations that can be made when dilute hydrochloric acid is added to calcium carbonate.

(2)

1

2

- (b) Give the test for carbon dioxide gas.

(2)

Test

Result



(c) Describe the relationship between the mass of the beaker and contents, and the time. (1)

.....

.....

(d) (i) After how many minutes did the reaction stop? (1)

.....

(ii) State why the reaction eventually stopped. (1)

.....

.....

(e) Identify the compounds, other than water, present in the solution in the beaker
(i) after two minutes (1)

.....

(ii) after five minutes (1)

.....

(f) The experiment was repeated using the same mass of calcium carbonate, but as a powder instead of a single lump.
On the graph, sketch the curve you would expect to obtain from this second experiment. (2)

(Total for Question 4 = 11 marks)

.....



5 Soluble salts can be made by reacting an acid with a metal hydroxide, a metal oxide, or a metal carbonate.

Insoluble salts can be made by using a precipitation reaction.

(a) Complete the table to show which acid or metal compound is used to make each salt listed.

For each metal compound, state whether it would be used as a solid or in aqueous solution.

(5)

Salt made	Acid used	Metal compound	
		Name	Solid or aqueous solution
copper(II) sulfate		copper(II) oxide	
silver chloride	hydrochloric acid		aqueous solution
potassium nitrate		potassium carbonate	

(b) An acid is a source of hydrogen ions, H^+

Write an equation to show the ions formed when sulfuric acid is dissolved in water.

(2)



- (c) Lead(II) chloride is an insoluble salt that can be prepared by reacting lead(II) nitrate with sodium chloride.

Describe how you would prepare a **pure, dry** sample of lead(II) chloride starting from solid lead(II) nitrate and solid sodium chloride.

(5)

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

(Total for Question 5 = 12 marks)



6 This is a recipe for making plum wine.

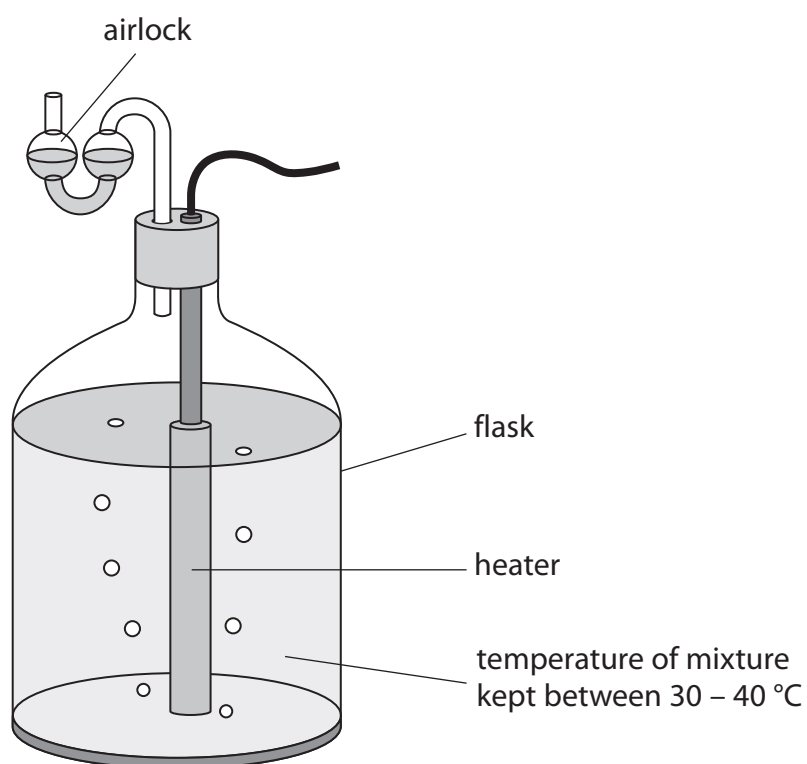
Dissolve 1.5 kg of sugar in 5 dm³ of warm water.

Add yeast and 8 kg of plums.

Pour the mixture into a flask.

Leave the flask for several weeks until the reaction has stopped.

Remove the solid yeast and pour the clear liquid into bottles.



(a) Sugar contains sucrose, $C_{12}H_{22}O_{11}$

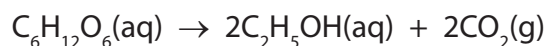
When yeast is added, water reacts with sucrose to form glucose, $C_6H_{12}O_6$

Write a chemical equation for this reaction.

(1)



(b) The glucose is then converted into ethanol by the yeast



(i) How would you know when the reaction has stopped?

(1)

(ii) How could the solid yeast be removed from the mixture?

(1)

(c) Ethanol can be converted into chloroethene, $\text{CH}_2=\text{CHCl}$, in three stages.

Stage 1 Ethanol is dehydrated to form ethene, $\text{CH}_2=\text{CH}_2$

Stage 2 Ethene is converted into 1,2-dichloroethane, $\text{CH}_2\text{ClCH}_2\text{Cl}$

Stage 3 1,2-dichloroethane is converted into chloroethene and hydrogen chloride

(i) Why is the reaction in **Stage 1** described as dehydration?

(1)

(ii) Identify the catalyst used in the reaction in **Stage 1**.

(1)

(iii) Suggest the name or formula of the substance used to react with ethene in **Stage 2**.

(1)

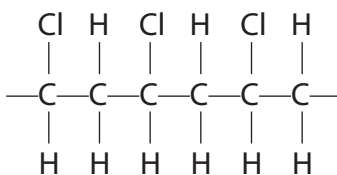
(iv) Write a chemical equation for the reaction in **Stage 3**.

(1)



(d) Chloroethene can be used to make the polymer poly(chloroethene), also known as PVC.

The displayed formula for part of the PVC molecule is



(i) Draw a displayed formula for a chloroethene molecule.

(1)

(ii) Describe, in terms of structure and bonding, what happens when chloroethene molecules are converted into poly(chloroethene).

(3)

.....

.....

.....

.....

.....

.....

.....

.....

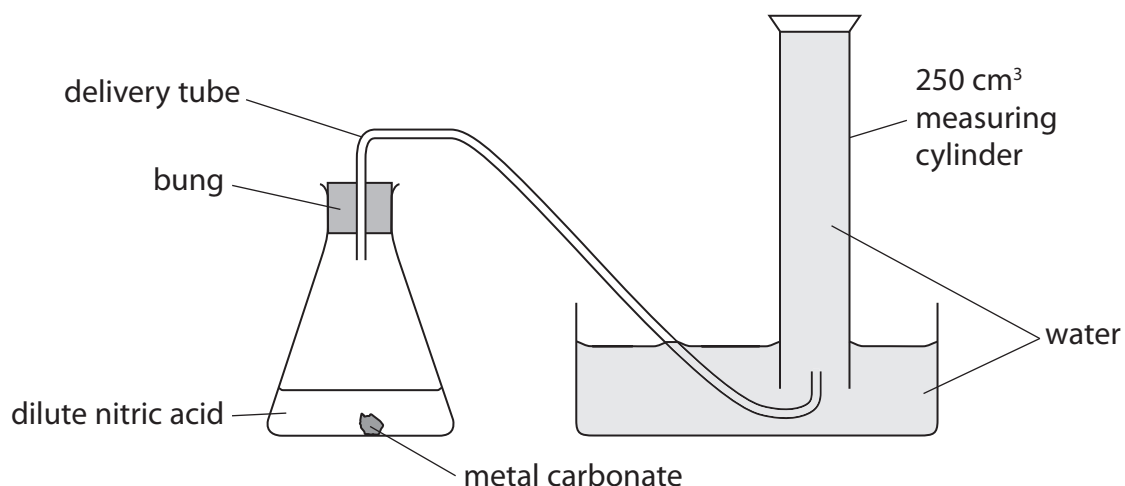
(Total for Question 6 = 11 marks)



BLANK PAGE



- 7 A student set up this apparatus to measure the volume of carbon dioxide given off when a sample of a carbonate of a Group 2 metal was reacted with dilute nitric acid.



She weighed out some of the carbonate and put it in a conical flask. She then added an excess of dilute nitric acid.

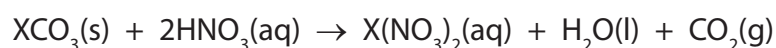
After adding the acid she placed the bung and delivery tube into the conical flask.

She measured the total volume of gas collected at room temperature and pressure (rtp) in the measuring cylinder.

Her results are shown in the table.

Mass of Group 2 carbonate	0.888 g
Volume of gas collected	144 cm ³

The equation for the reaction is



where X is the symbol for the Group 2 metal.



- (a) (i) Calculate the amount, in moles, of carbon dioxide gas collected.
(Assume that one mole of gas has a volume of 24 000 cm³ at rtp)

(2)

Amount of carbon dioxide gas collected = mol

- (ii) Deduce the amount, in moles, of the carbonate that reacted.

(1)

Amount of carbonate reacted = mol

- (iii) Using the mass of the carbonate and your answer to (a)(ii), calculate the relative formula mass (M_r) of this carbonate.

Give your answer to the nearest whole number.

(2)

Relative formula mass =

- (iv) Calculate a value for the relative atomic mass of the Group 2 metal, X, and use the Periodic Table on page 2 to suggest its identity.

(3)

Relative atomic mass of X =

Identity of X =



(b) After the student had completed the experiment she was told that the metal carbonate was calcium carbonate.

She calculated that 0.888 g of calcium carbonate would produce 213 cm³ of carbon dioxide.

She was certain that she had measured the mass of the metal carbonate correctly.

Suggest **two** reasons why the volume of gas she collected was less than 213 cm³.

(2)

1

.....

2

.....

(Total for Question 7 = 10 marks)

(TOTAL FOR PAPER = 60 MARKS)



BLANK PAGE



BLANK PAGE

