

**GENERAL CERTIFICATE OF SECONDARY EDUCATION
GATEWAY SCIENCE
CHEMISTRY B**

B642/01

Unit 2 Modules C4 C5 C6 (Foundation Tier)

WEDNESDAY 18 JUNE 2008

Afternoon
Time: 1 hour

Candidates answer on the question paper.

Additional materials (enclosed):

None

Calculators may be used.

Additional materials: Pencil
Ruler (cm/mm)



Candidate
Forename

Candidate
Surname

Centre
Number

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Candidate
Number

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INSTRUCTIONS TO CANDIDATES

- Write your name in capital letters, your Centre Number and Candidate Number in the boxes above.
- Use blue or black ink. Pencil may be used for graphs and diagrams only.
- Read each question carefully and make sure that you know what you have to do before starting your answer.
- Answer **all** the questions.
- Do **not** write in the bar codes.
- Write your answer to each question in the space provided.

INFORMATION FOR CANDIDATES

- The number of marks for each question is given in brackets [] at the end of each question or part question.
- The total number of marks for this paper is **60**.
- The Periodic Table is printed on the back page.

FOR EXAMINER'S USE

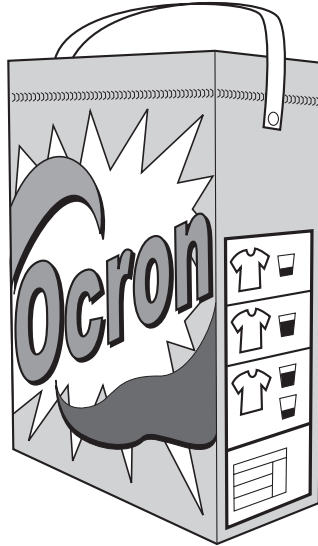
Section	Max.	Mark
A	20	
B	20	
C	20	
TOTAL	60	

This document consists of **20** printed pages.

Answer **all** the questions.

Section A – Module C4

1 Stowmarket Synthetics make a washing powder.



The washing powder is used to clean clothes in a washing machine.

It contains different ingredients.

Draw a straight line to join each **ingredient** to the **reason** it is used.

One line has been drawn for you.

ingredient

reason why it is put into washing powder

enzymes

optical brightener

bleach

water softener

detergent

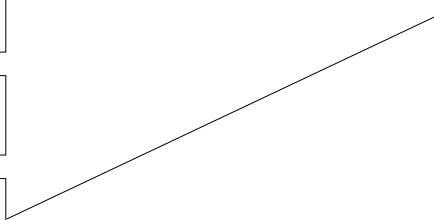
removes coloured stains

gives a 'whiter than white' appearance

helps to remove food stains in low temperature washes

active cleaner

softens hard water



[3]

[Total: 3]

2 Diamond and graphite have different properties and different uses.

Look at the table.

It shows some information about the properties of diamond and graphite.

property	diamond	graphite
state at room temperature	solid
appearance at room temperature	colourless, clear and lustrous	dull black
melting point	very high
hardness	very hard	soft
solubility in water	insoluble	insoluble
electrical conductivity	does not conduct	good conductor

(a) Complete the table by writing in

- the state of graphite at room temperature
- the melting point of graphite.

[2]

(b) Diamond is used in jewellery.

This is because diamond is colourless, clear and lustrous.

Diamond is also used to make cutting tools.

Write about **two** properties of diamond that make it suitable for making cutting tools.

Use the table to help you.

.....

.....

.....

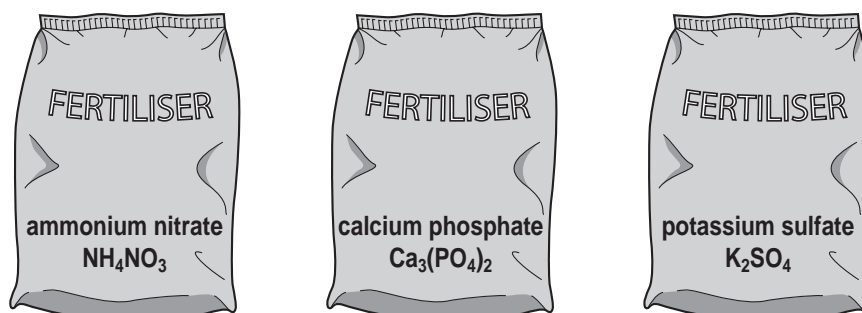
.....[2]

[Total: 4]

3 Natalie enjoys gardening.

She visits a garden centre and buys three bags of different chemical fertilisers.

The names of the fertilisers are shown.



(a) Natalie has to choose the correct fertiliser for her plants.

She uses the internet to find out about fertilisers.

(i) Natalie finds out that **nitrogen** is used to improve leaf and stem growth.

Which chemical fertiliser will improve leaf and stem growth?

Choose from the list.

ammonium nitrate, NH_4NO_3
 calcium phosphate, $\text{Ca}_3(\text{PO}_4)_2$
 potassium sulfate, K_2SO_4

answer[1]

(ii) Natalie finds out that **phosphorus** will improve root growth.

Which chemical fertiliser will improve root growth?

Choose from the list.

ammonium nitrate, NH_4NO_3
 calcium phosphate, $\text{Ca}_3(\text{PO}_4)_2$
 potassium sulfate, K_2SO_4

answer[1]

(b) Ammonium nitrate can be made by reacting an alkali with an acid.

(i) What is the name of the alkali needed?

.....[1]

(ii) What is the name of the acid needed?

.....[1]

4 Jack investigates sulfuric acid by using the internet.

He finds out that the formula of sulfuric acid is H_2SO_4 .

(a) What is the **total** number of **atoms** in one molecule of sulfuric acid?

.....[1]

(b) Jack finds out that sulfuric acid is used to clean the surface of metals.

Write down one **other** use of sulfuric acid.

.....[1]

(c) Jack decides to do some experiments with dilute sulfuric acid.

(i) He measures the pH of dilute sulfuric acid.

Suggest a pH value for dilute sulfuric acid.

.....[1]

(ii) Jack adds some sodium hydroxide solution to dilute sulfuric acid.

Sodium hydroxide is an alkali.

The pH value of the acid changes as the sodium hydroxide is added.

Describe and explain what happens to the pH value.

.....
.....
.....[2]

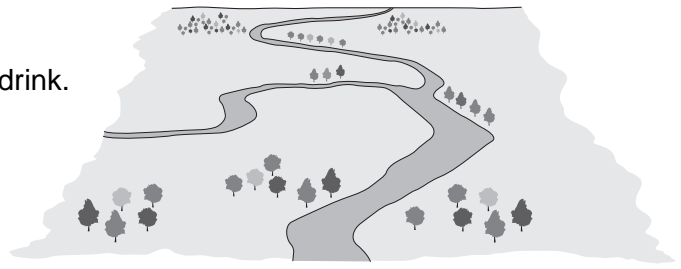
(iii) A salt is made when sodium hydroxide reacts with dilute sulfuric acid.

What is the name of this salt?

.....[1]

[Total: 6]

- 5 River water is sometimes polluted.
It must be purified before the water is safe to drink.



A sample of river water is analysed to see if it contains pollutants.
Look at the table. It shows the results of the analysis.

pollutant	mass of pollutant in the water sample in grams
lead ions	2.3
nitrate ions	96.1
pesticide	0.2
phosphate ions	48.1

- (a) Which pollutant was found in the **least** amount in the water sample?

Choose from the table.

.....[1]

- (b) River water may contain dangerous microbes.

These microbes are killed during water purification.

What is the name of the process that kills microbes?

Choose from the list.

- chlorination
- filtration
- precipitation
- sedimentation

answer[1]

- (c) Water is an important industrial resource.

Suggest why.

.....[1]

[Total: 3]

Section B – Module C5

6 Tim wants to dilute a sample of concentrated sodium chloride solution.

(a) How can Tim dilute the concentrated solution?

.....[1]

(b) What is the unit for concentration?

Choose from the list.

dm^3

g/mol

mol/dm^3

answer[1]

(c) Liquid medicines given to children are usually diluted.

Suggest why.

.....

.....[1]

[Total: 3]

7 Sulfuric acid is made in the Contact Process.

Look at the word equation.

It describes one reaction that happens in the Contact Process.



(a) What is the meaning of the symbol \rightleftharpoons ?

.....[1]

(b) The oxygen used in the Contact Process comes from a very cheap raw material.

What is the name of this raw material?

.....[1]

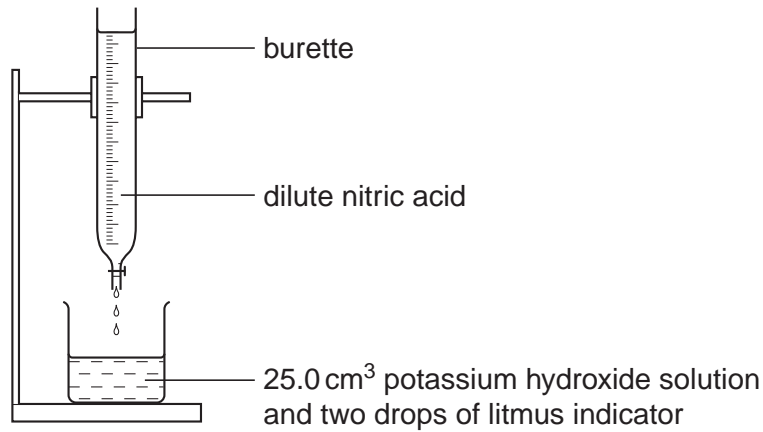
[Total: 2]

8 This question is about acid-base titrations.

Judy wants to find out the volume of dilute nitric acid needed to neutralise 25.0 cm^3 of an alkali.

The alkali used is potassium hydroxide solution.

Look at the apparatus she uses.



She adds dilute nitric acid slowly until the litmus changes colour.

(a) What is the colour of litmus in alkali and in acid?

colour in alkali

colour in acid [1]

(b) She repeats the experiment two more times.

Look at Judy's results table.

titration number	1	2	3
final burette reading in cm ³	29.7	27.0	34.8
initial burette reading in cm ³	8.5	6.9	14.9
volume of acid used (titre) in cm ³	20.1	19.9

(i) Calculate the titre for titration number 1.

Write your answer in the results table. [1]

(ii) Judy decides to only use the second and third titration results.

Explain why.

.....[1]

(iii) Calculate the **average** titre for titration numbers 2 and 3.

.....

average titre = cm³ [1]

[Total: 4]

9 Silicon dioxide and sodium ferrate have been discovered on the planet Mars.

(a) Silicon dioxide, SiO_2 , has a molar mass of 60 g/mol.

Calculate the molar mass of sodium ferrate, Na_2FeO_4 .

The relative atomic mass (A_r) for O is 16, for Na is 23, for Si is 28 and for Fe is 56.

.....

.....

.....

.....

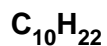
molar mass = g/mol [1]

(b) Compound **X** has been discovered on the planet Mars.

Compound **X** has the empirical formula CH.

Which two formulae could be compound **X**?

Choose from the list.



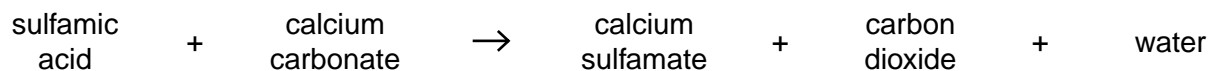
answer and [2]

[Total: 3]

10 Sulfamic acid solution is used to remove limescale in kettles.

Limescale is mostly calcium carbonate.

Sulfamic acid reacts with calcium carbonate as shown in the equation.



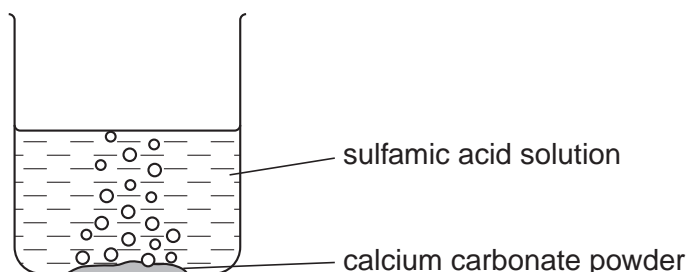
(a) One of the **products** of this reaction is a **gas**.

Which one?

.....[1]

(b) Robin investigates sulfamic acid solution.

(i) Look at the diagram.



Robin adds 1.0 g of calcium carbonate powder to 100 cm³ of sulfamic acid solution.

There is a lot of fizzing, but after a minute the reaction stops.

Why does the reaction stop?

.....
[1]

(ii) Robin wants to find the pH value of the sulfamic acid solution.

One way is to use a pH probe and a pH meter.

Describe one **other** way Robin can find out the pH value.

.....

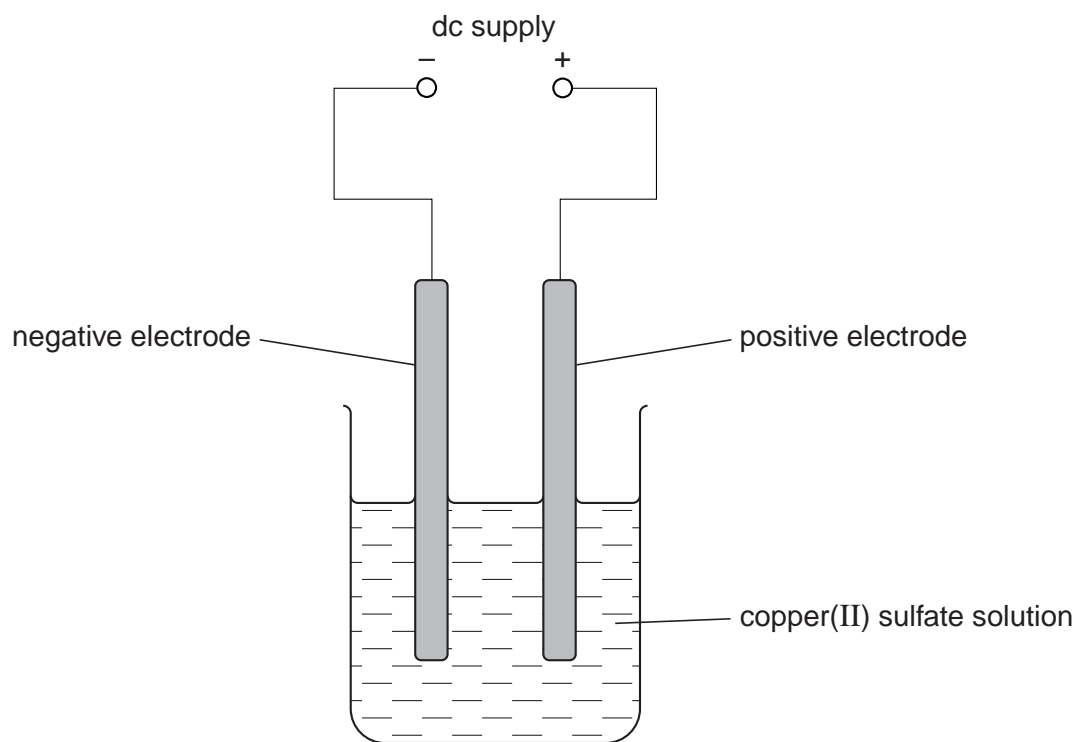
[2]

[Total: 4]

11 Azhar does an electrolysis experiment.

He uses copper(II) sulfate solution.

Look at the apparatus he uses.



Azhar uses copper electrodes.

(a) Look at this list of ions.



All these ions are in copper(II) sulfate solution.

Write down **one** ion that is attracted towards the negative electrode.

Choose from the list.

answer

[1]

(b) Which **two** of the following observations are correct?

Put a tick (✓) next to each of the **two** correct answers.

The positive electrode gets plated with copper.

A colourless gas is made at the negative electrode.

The blue colour of the electrolyte becomes colourless.

The negative electrode gains mass.

The positive electrode loses mass.

[2]

(c) Azhar decides to replace copper(II) sulfate solution with solid copper(II) sulfate.

Electrolysis does not happen.

Explain why.

.....

.....[1]

[Total: 4]

Section C – Module C6

12 This question is about hydrogen and oxygen.

(a) Look at the list.

It shows some tests that can be done on gases.

- A A lighted splint burns with a squeaky pop.
- B A glowing splint relights.
- C Orange bromine water decolourises.
- D Moist litmus paper is bleached.

(i) Which is the test for hydrogen?

Choose from **A**, **B**, **C** or **D**.

answer

[1]

(ii) Which is the test for oxygen?

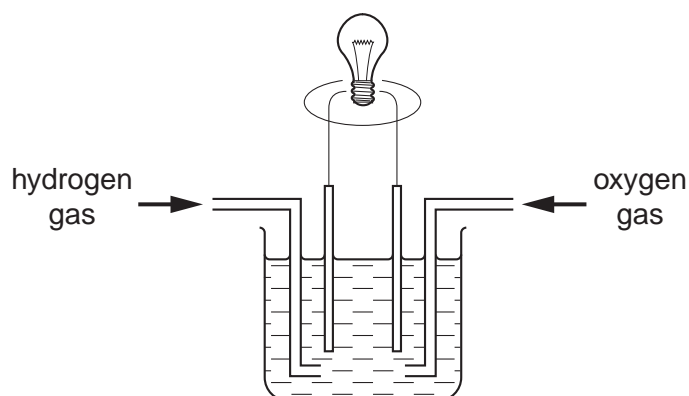
Choose from **A**, **B**, **C** or **D**.

answer

[1]

(b) Hydrogen and oxygen are used in fuel cells.

Fuel cells make water and release energy.



Write a **word** equation for the reaction in a hydrogen-oxygen fuel cell.

..... + → [1]

(c) Fuel cells release only a small amount of heat energy.

Look at the list. It shows some different types of energy.

electrical

kinetic

sound

What is the **main** type of energy produced by a fuel cell?

Choose from the list.

answer[1]

(d) Fuel cells are used in spacecraft.

Write down one **advantage** of using fuel cells rather than batteries in spacecraft.

.....[1]

[Total: 5]

13 This question is about rusting.

(a) A piece of unprotected iron is left outside.

It quickly goes rusty.

Write down the names of **two** substances that are needed for iron to rust.

..... and[2]

(b) One way to stop iron rusting is to paint it.

(i) Why does painting stop the iron from going rusty?

.....
.....[1]

(ii) Write down two **other** ways that can be used to stop iron from rusting.

1
2[2]

(c) The rusting of iron involves both **oxidation** and **reduction**.

What is the name of this type of process?

Choose from the list.

displacement

fermentation

oxred

redox

answer[1]

[Total: 6]

14 This question is about fats and oils.

(a) Complete the following sentences.

Choose words from the list.

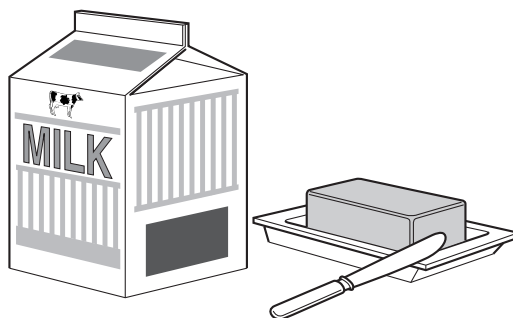
gases liquids solids

Fats are at room temperature.

Oils are at room temperature.

[2]

(b) Butter and milk are examples of emulsions.



What is an emulsion?

.....
.....
.....[2]

(c) Vegetable oil is used to make soap.

What substance reacts with the oil to make soap?

Choose from the list.

calcium carbonate
iron oxide
sodium nitrate
sodium hydroxide

answer[1]

[Total: 5]

15 Aspirin is an example of an **analgesic** drug.

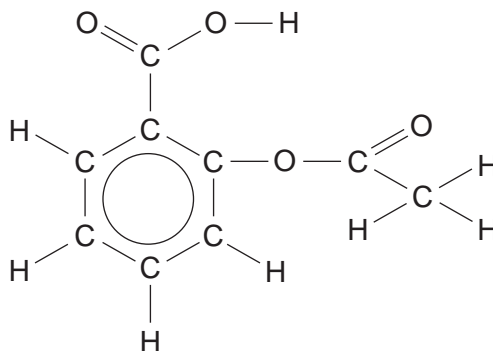
(a) What does analgesic mean?

.....[1]

(b) Write down the name of **another** analgesic drug.

.....[1]

(c) Look at the displayed formula of aspirin.



Put numbers into the boxes to complete the molecular formula for aspirin.

C H O

[1]

(d) Many people use **soluble** aspirin.

Write down one **advantage** that soluble aspirin has compared to an insoluble aspirin tablet.

.....[1]

[Total: 4]

END OF QUESTION PAPER

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