Centre No.						Paper Reference							Surname	Initial(s)
Candidate No.						x	x	x	x	/	x	x	Signature	

Paper Reference(s)

xxxx/xx

Edexcel GCSE

Separate Science (Chemistry)

Sample Paper

Time: 1 hour

Examiner's use only

Team Leader's use only

Question Number	Leave Blank
1	
2	
3	
4	
5	
6	
7	
Total	

Materials required for examination
Nil

Items included with question papers
Nil

Instructions to Candidates

In the boxes above, write your centre number, candidate number, your surname, initials and signature.
The paper reference is shown above.
Answer **ALL** questions in the spaces provided in this book.
Show all stages in any calculations and state the units. Calculators may be used.
Include diagrams in your answers where these are helpful.

Information for Candidates

The marks for individual questions and the parts of questions are shown in round brackets: e.g. **(2)**.
There are 7 questions in this question paper. The total mark for this paper is 60.
There are 12 pages in this question paper. Any blank pages are indicated.

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1. The "Really Useful Chemicals" Factory makes sulphuric acid using the Contact Process.

The Contact Process involves three stages. The first stage involves producing sulphur dioxide by burning sulphur in excess air.

(a) Write a word equation for the first stage of the contact process.

.....

(1)

(b) The second stage involves producing sulphur trioxide from the sulphur dioxide. This reaction is carried out in the presence of a vanadium(V) oxide catalyst.

(i) Write a symbol equation for this second stage of the contact process.

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(2)

(ii) What does a catalyst do?

.....

(1)

(c) The conversion of sulphur dioxide into sulphur trioxide is a reversible, exothermic reaction. At the Really Useful Chemicals factory this conversion takes place at a temperature of 450°C and results in a 95% conversion rate of sulphur dioxide into sulphur trioxide. A change in temperature affects both the rate of reaction and the yield of sulphur trioxide.

(i) State and explain one disadvantage of using a temperature higher than 450°C.

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(3)

(ii) State and explain one advantage of using a temperature higher than 450°C in this conversion.

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(3)

Leave blank

(d) Sulphuric acid is used as a catalyst in the preparation of esters, a group of compounds found in flavourings and perfumes. Complete the word and symbol equations for the preparation of the ester methyl ethanoate.

_____ + CH_3COOH → CH_3COOCH_3 +

methanol + _____ → methyl ethanoate + _____

(3)

Q1

(Total 13 marks)

2. A fisherman has noticed that there are less fish in the river than in previous years and thinks a river may be polluted.
You work for an environmental science laboratory. Part of your work is to analyse samples of river water to see what substances are present in them. The fisherman has some samples of the river water and wants your help in identifying any pollutant present.

(a) One of the other scientists you work with thinks the pollutant in the water may be potassium sulphate. She suggests you carry out a flame test and also carry out a test using dilute hydrochloric acid and barium chloride solution.

(i) State whether the above tests are qualitative or quantitative tests.

.....

(1)

(ii) Complete the table to show the colours you would expect to see when flame tests are carried out on substances containing the following metal ions.

Metal Ion	Colour
Na^+	yellow
K^+	
Ca^{2+}	
Cu^{2+}	

(3)

Leave blank

(iii) Explain why your colleague suggested the above tests.

Flame Test .....

.....

Hydrochloric acid and barium chloride test .....

.....

(3)

Before testing the sample river water you decide to carry out the tests using a sample of potassium sulphate crystals from a bottle in the laboratory.

(iv) Describe how you would carry out the two tests.

Flame Test .....

.....

.....

.....

(3)

Hydrochloric acid and barium chloride test .....

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(2)

(v) Describe the results you would obtain from the hydrochloric acid and barium chloride test

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(1)

(vi) Suggest why it would be difficult to obtain reliable flame test results from the sample of river water.

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(2)

Q2

(Total 15 marks)

Leave blank

3. In 1869, Mendeleev arranged the elements in the form of the periodic table. Before this many other scientists tried to make sense of all the information about the elements.

In 1817, the German chemist Dbereiner put forward his idea that elements were grouped in threes called 'Triads'. Calcium, strontium and barium have similar chemical and physical properties and form one triad. Also the relative atomic mass of strontium (88) is almost midway between those of calcium (40) and barium (137).

(a) (i) Suggest one similarity in physical properties of these three elements.

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(1)

(ii) These three elements have a similar chemical reaction with water.
Name the common product which is formed when any of these three elements react with water.

.....

(1)

Complete and balance the equation for the reaction between lithium and water.

$$Li + H_2O \rightarrow \quad +$$

(2)

One of the products from the reaction of sodium and water can be used to manufacture soap.

(a) Name the organic series that reacts with this product to form soap.

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(b) Give an example of a compound in this series and its formula.

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(2)

(c) State an advantage of using a detergent instead of soap in a hard water area.

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(1)

Leave blank

(d) Illustrate below the detergent action of a surfactant in lowering surface tension to remove dirt and or oil/grease.

(3)

Q3

(Total 11 marks)

Leave blank

4. A titration was carried out using 20.00 cm^3 samples of dilute sulphuric acid and sodium hydroxide solutions.

The results are shown in the table.

Table A

	1st titration	2nd titration	3rd titration
2nd burette reading	15.00	12.30	14.70
1st burette reading	2.30	0.10	2.50
Total volume of NaOH used	12.70		

(a) Complete the table.

(2)

(b) Using the results in the table, explain why it was necessary to carry out three titrations.

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(2)

(c) State two pieces of glass apparatus (other than a burette) needed to carry out a titration.

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(2)

Leave blank

(d) The equation for the reaction is

$$2NaOH + H_2SO_4 \longrightarrow Na_2SO_4 + 2H_2O$$

The concentration sodium hydroxide (NaOH) solution used in the titration is 0.2 mol dm^{-3}. Using the results from the 3rd titration, calculate the concentration in mol dm^{-3} of sulphuric acid (H_2SO_4) in the dilute sulphuric acid.

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(4)

Q4

(Total 10 marks)

Leave blank

5. (a) Sulphuric acid is used to make copper sulphate, which is used in the purification of copper.

Copper sulphate can be made by warming copper oxide with sulphuric acid. The equation for the reaction is

$$CuO + H_2SO_4 \rightarrow CuSO_4 + H_2O$$

Calculate the maximum mass of copper oxide which can react with 9.8g sulphuric acid in this reaction.

[Relative atomic masses H = 1; O = 16; S = 32; Cu = 64]

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(5)

Leave blank

(b) (i) Draw a labelled diagram of a cell which could be used to produce pure copper from a strip of impure copper.

(4)

(ii) Complete the equation for the reaction taking place at the cathode of the cell.

$Cu^{2+}(aq)$ + _____ ⟶ Cu(s)

(1)

(iii) Explain why this reaction can be described as reduction of copper ions.

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(1)

Q5

(Total 11 marks)

TOTAL FOR PAPER: 60 MARKS

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