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Student number

Name _____

Date _____

Attempt/Time taken _____

GCSE
CHEMISTRY

Topic Paper: 8.2 & 8.3 Identification of gases and ions
Part 1

Time allowed: 45 minutes

Materials

For this paper you must have:

- the Periodic Table/Data Sheet, provided as an insert (enclosed)
- a ruler with millimetre measurements
- a calculator, which you are expected to use where appropriate.

Instructions

- Use black ink or black ball-point pen.
- Fill in the boxes at the top of this page.
- Answer **all** questions.
- You must answer the questions in the spaces provided. Do not write outside the box around each page or on blank pages.
- All working must be shown.
- Do all rough work in this book. Cross through any work you do not want to be marked.

Information

- The Periodic Table/Data Sheet is provided as in insert.
- You are reminded of the need for good English and clear presentation in your answers.
- When answering questions you need to make sure that your answer:
  - is clear, logical, sensibly structured
  - fully meets the requirements of the question
  - shows that each separate point or step supports the overall answer.

39 Marks

Q1. Alums are salts. They have been used since ancient times in dyeing and medicine and still have many uses today.

Three alums are shown in the table:

Name	Ions present
Ammonium alum	NH_4^+ Al^{3+} SO_4^{2-}
Potassium alum	K^+ Al^{3+} SO_4^{2-}
Sodium alum	Na^+ Al^{3+} SO_4^{2-}

(a) These alums contain sulfate ions (SO_4^{2-}).

Describe and give the result of a chemical test to show this.

Test .....

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Result .....

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(2)

(b) These alums contain aluminium ions (Al^{3+}).

Describe how sodium hydroxide solution can be used to show this.

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(2)

(c) Aluminium ions do not give a colour in flame tests. However, flame tests can be used to distinguish between these three alums.

Explain how these three alums could be identified from the results of flame tests.

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(2)
(Total 6 marks)

Q2. *Drain Buster* is used to clear and degrease drains. Sodium hydroxide is the main chemical substance in *Drain Buster*.

(a) A student planned an experiment to find the concentration of the sodium hydroxide solution in *Drain Buster.*

The teacher had to dilute the *Drain Buster* before the student could use it.

Explain why.

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(2)

(b) *In this question you will get marks on using good English, organising information clearly and using specialist terms where appropriate.*

The student wanted to find the volume of hydrochloric acid that reacts with a known volume of diluted *Drain Buster.*

Describe how the student could do this by titration.
In your description you should include:
the names of pieces of apparatus used
the names of the substances used
a risk assessment

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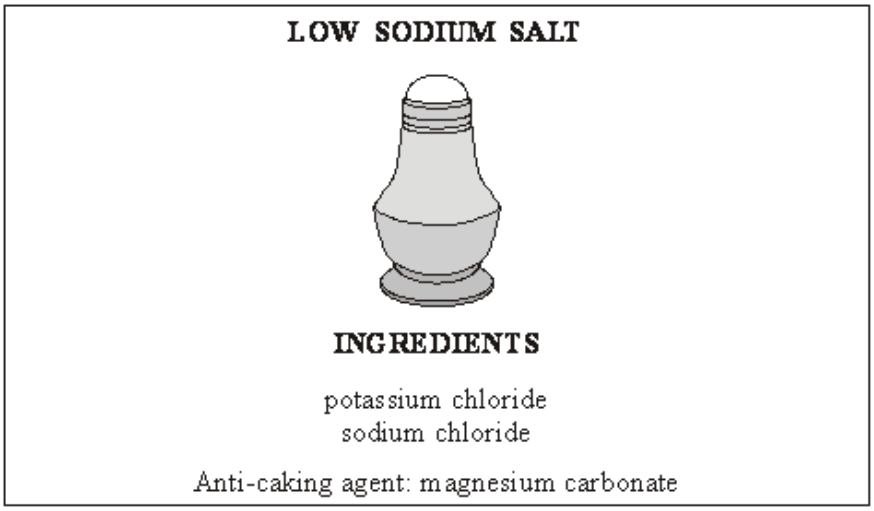
(6)
(Total 8 marks)

Q3. The label is from a packet of Low Sodium Salt.



(a) A student tested some Low Sodium Salt to show that it contains carbonate ions and chloride ions.

(i) Describe and give the result of a test for carbonate ions.

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(2)

(ii) A student identified chloride ions using acidified silver nitrate solution.

State what you would **see** when acidified silver nitrate solution is added to a solution of Low Sodium Salt.

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(1)

(iii) Flame tests can be used to identify potassium ions and sodium ions.

Suggest why it is difficult to identify **both** of these ions in Low Sodium Salt using a flame test.

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(1)

(b) Read the following information and then answer the questions.

Salt – friend or foe?

Sodium chloride (salt) is an essential mineral for our health. It is used to flavour and preserve foods. Too much sodium in our diet may increase the risk of high blood pressure and heart disease. Heart disease is the biggest cause of death in the United Kingdom. Some people claim that excess sodium is a poison that can cause cancer, while others say that more evidence is needed.

Many processed foods contain salt, so it is easy to exceed the recommended daily upper limit of about 5 g of salt per person. A 'healthier' amount should be about 3 g. In the United Kingdom many people consume over 10 g of salt each day.

One way to reduce sodium in our diet is to use Low Sodium Salt. This has two thirds of the sodium chloride replaced by potassium chloride.

A national newspaper asked readers for their views on two options.

Option 1: Ban the use of sodium chloride in foods.

Option 2: Reduce the amount of sodium chloride in all foods to a 'healthier' level.

(i) Suggest why Option **1** was rejected.

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(1)

(ii) Suggest **two** advantages and **one** disadvantage of Option **2**.

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(3)
(Total 8 marks)

Q4. This label has been taken from a packet of *My Baby Food*.

MY BABY FOOD

Infant milk
Pure and natural

Closest to mothers' breast milk
Contains traces of essential minerals

500 g

One of the minerals in *My Baby Food* is calcium carbonate, $CaCO_3$.

(a) Chemical tests are used to identify elements and compounds.

(i) A flame test can be used to identify calcium ions.
What colour do calcium ions give in a flame test?

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(1)

(ii) When a flame test was carried out on *My Baby Food*, the presence of calcium ions was **not** seen. A yellow flame was produced.
Name the ion which gives a yellow flame test.

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(1)

(iii) Suggest **one** advantage of using an instrumental method to detect the elements present in *My Baby Food*.

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(1)

(iv) Name an instrumental method for detecting elements.

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(1)

(b) Read the information in the box below and then answer the question.

> Calcium carbonate occurs naturally as marble and limestone. They are important building materials and are often used for gravestones.
>
> Calcium carbonate is also an essential mineral for good health and is present in many baby foods in small amounts.
>
> *My Baby Food* is recommended as being the closest to a mother's own breast milk. It is given free to mothers in the developing world – without it their babies might die of malnutrition.
>
> *Responsible Mothers Are Us (RMAU)* is a United Kingdom pressure group. They want to ban chemicals in baby foods. The group was founded by Mrs I. M. Right who has made a career in 'goodness' and is paid from donations given to *RMAU* by members of the public.
>
> When interviewed, she said: "Calcium carbonate is a chemical and so it is a pollutant. *My Baby Food* must be banned to prevent the mass medication of babies. I don't feed my baby the stuff of gravestones."

Many people do **not** agree with Mrs Right's ideas.

Suggest why.

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(3)
(Total 7 marks)

Q5. Chlorine and bromine are important Group 7 elements.

(a) Explain why chlorine is added to drinking water.

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(1)

(b) Describe what you would **see** when bromine water is added to an unsaturated organic compound.

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(1)

(c) Bromine can be extracted from seawater. The dissolved bromide ions are reacted with chlorine. Bromine and chloride ions are formed.

(i) Complete and balance the equation below, which represents the reaction between chlorine and bromide ions.

$Cl_2 + 2Br^- \rightarrow$ ..... + ...

(1)

(ii) Describe what you **see** when chlorine is added to a solution containing bromide ions.

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(1)

(d) In terms of electronic structure:

(i) state why bromine and chlorine are both in Group 7

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(1)

(ii) explain why bromine is less reactive than chlorine.

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(3)

(e) What is the result of adding acidified silver nitrate solution to a solution containing:

(i) chloride ions

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(1)

(ii) bromide ions?

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(1)

(Total 10 marks)