

Name:

Date:

C8 - Test 5
CHEMISTRY ANALYSIS
Advanced

GCSE

CHEMISTRY

AQA - Triple Science

Mark

Grade

Materials

For this paper you must have:

- Ruler
- Pencil and Rubber
- Scientific calculator, which you are expected to use when appropriate

Instructions

- Answer all questions
- Answer questions in the space provided
- All working must be shown

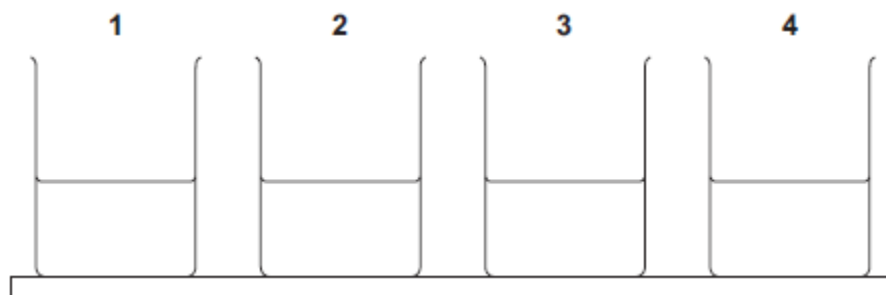
Information

- The marks for the questions are shown in brackets

1.

In this question you will be assessed on using good English, organising information clearly and using specialist terms where appropriate.

A group of students had four different colourless solutions in beakers **1**, **2**, **3** and **4**, shown in the figure below.



The students knew that the solutions were

- sodium chloride
- sodium iodide
- sodium carbonate
- potassium carbonate

but did **not** know which solution was in each beaker.

The teacher asked the class to plan a method that could be used to identify each solution.

She gave the students the following reagents to use:

- dilute nitric acid
- silver nitrate solution.

2.

The colours of fireworks are produced by chemicals.



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(a) Information about four chemicals is given in the table.

Complete the table below.

| Chemical | Colour produced in firework |
|-----------------|-----------------------------|
| barium chloride | green |
| _____ carbonate | crimson |
| sodium nitrate | _____ |
| calcium sulfate | red |

(2)

(b) Describe a test to show that barium chloride solution contains chloride ions.

Give the result of the test.

(2)

(c) A student did two tests on a solution of compound **X**.

Test 1

Sodium hydroxide solution was added.

A blue precipitate was formed.

Test 2

Dilute hydrochloric acid was added.

Barium chloride solution was then added.

A white precipitate was formed.

The student concluded that compound **X** is iron(II) sulfate.

Is the student's conclusion correct?

Explain your answer.

(3)

(Total 7 marks)

3.

A student investigated the colours in three different flowers, **A**, **B** and **C**.

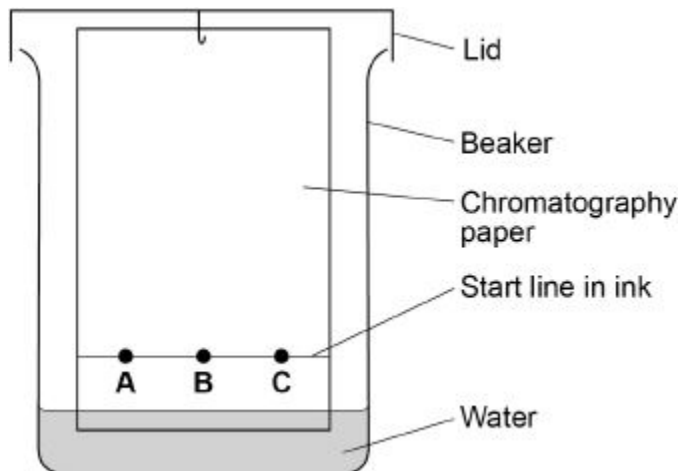
The colours are soluble in ethanol but are insoluble in water.

This is the method used.

1. Crush flower **A**.
2. Add ethanol to flower **A**.
3. Filter the mixture.
4. Put spots of the coloured filtrate on to the chromatography paper.
5. Repeat steps 1-4 with flowers **B** and **C**.

Figure 1 shows the apparatus used.

Figure 1



(a) The student made **two** mistakes in setting up the apparatus.

Give **one** problem caused by each mistake.

Mistake 1 _____

Problem caused _____

Mistake 2 _____

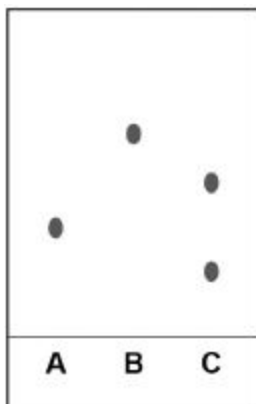
Problem caused _____

(4)

(b) Another student set up the apparatus correctly.

Figure 2 represents the student's results.

Figure 2



Give **two** conclusions you can make from **Figure 2**.

1. _____

2. _____

(2)

(c) Colour **A** has an R_f value of 0.65

Colour **A** moves 3.2 cm

Calculate the distance moved by the solvent.

Distance moved by the solvent = _____ cm

(2)

(Total 8 marks)

4.

This question is about chemical analysis.

(a) A student has solutions of three compounds, **X**, **Y** and **Z**.

The student uses tests to identify the ions in the three compounds.

The student records the results of the tests in the table.

| Compound | Test | | | |
|----------|--------------|-------------------------------|--|---|
| | Flame test | Add sodium hydroxide solution | Add hydrochloric acid and barium chloride solution | Add nitric acid and silver nitrate solution |
| X | no colour | green precipitate | white precipitate | no reaction |
| Y | yellow flame | no reaction | no reaction | yellow precipitate |
| Z | no colour | brown precipitate | no reaction | cream precipitate |

Identify the **two** ions present in each compound, **X**, **Y** and **Z**.

X _____

Y _____

Z _____

(3)

- (b) A chemist needs to find the concentration of a solution of barium hydroxide. Barium hydroxide solution is an alkali.

The chemist could find the concentration of the barium hydroxide solution using two different methods.

Method 1

- An excess of sodium sulfate solution is added to 25 cm³ of the barium hydroxide solution. A precipitate of barium sulfate is formed.
- The precipitate of barium sulfate is filtered, dried and weighed.
- The concentration of the barium hydroxide solution is calculated from the mass of barium sulfate produced.

Method 2

- 25 cm³ of the barium hydroxide solution is titrated with hydrochloric acid of known concentration.
- The concentration of the barium hydroxide solution is calculated from the result of the titration.

Compare the advantages and disadvantages of the two methods.

(5)
(Total 8 marks)

5.

A student investigated an egg shell.



Trish Steel [CC-BY-SA-2.0], via Wikimedia Commons

(a) The student did some tests on the egg shell.

The student's results are shown in the table below.

| Test | | Observation |
|------|---|---|
| 1 | Dilute hydrochloric acid was added to the egg shell. | A gas was produced. The egg shell dissolved, forming a colourless solution. |
| 2 | A flame test was done on the colourless solution from test 1. | The flame turned red. |
| 3 | Sodium hydroxide solution was added to the colourless solution from test 1. | A white precipitate formed that did not dissolve in excess sodium hydroxide solution. |
| 4 | Silver nitrate solution was added to the colourless solution from test 1. | A white precipitate formed. |

(i) The student concluded that the egg shell contains carbonate ions.

Describe how the student could identify the gas produced in test 1.

(2)

(ii) The student concluded that the egg shell contains aluminium ions.

Is the student's conclusion correct? Use the student's results to justify your answer.

(2)

(iii) The student concluded that the egg shell contains chloride ions.

Is the student's conclusion correct? Use the student's results to justify your answer.

(2)

(b) Some scientists wanted to investigate the amount of lead found in egg shells. They used a modern instrumental method which was *more sensitive* than older methods.

(i) Name **one** modern instrumental method used to identify elements.

(1)

(ii) What is the meaning of *more sensitive*?

(1)

(Total 8 marks)

6.

Four bottles of chemicals made in the 1880s were found recently in a cupboard during a Health and Safety inspection at Lovell Laboratories.



Sodium carbonate



Sodium chloride



Sodium nitrate



Sodium sulfate

The chemical names are shown below each bottle.

(a) You are provided with the following reagents:

- aluminium powder
- barium chloride solution acidified with dilute hydrochloric acid
- dilute hydrochloric acid
- silver nitrate solution acidified with dilute nitric acid
- sodium hydroxide solution.
- limewater
- red litmus paper

(i) Describe tests that you could use to show that these chemicals are correctly named.

In each case give the reagent(s) you would use **and** state the result.

Test and result for carbonate ions:

Test and result for chloride ions:

Test and result for nitrate ions:

Test and result for sulfate ions:

(4)

(ii) Suggest why a flame test would **not** distinguish between these four chemicals.

(1)

(b) Instrumental methods of analysis linked to computers can be used to identify chemicals.

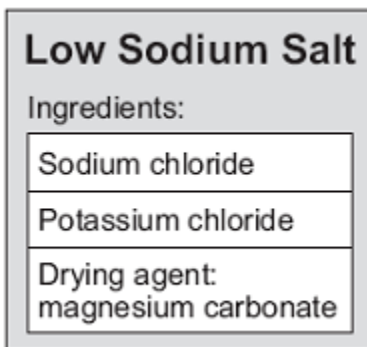
Give **two** advantages of using instrumental methods of analysis.

(2)

(Total 7 marks)

7.

Low sodium salt is used on food. This label is from a packet of low sodium salt.



A student tests the low sodium salt for the substances on the label.

(a) (i) The same test can be used to identify sodium ions and potassium ions.

Describe the test.

Give the result of the test for sodium ions and for potassium ions.

(3)

(ii) It is difficult to identify potassium ions when sodium ions are present.

Suggest why.

(1)

(b) Describe how the student would test a solution of the low sodium salt for chloride ions.

Give the result of the test.

(3)

(c) To test for magnesium ions, the student adds a few drops of sodium hydroxide solution to a solution of the low sodium salt.

A white precipitate is produced.

This test also gives a white precipitate with aluminium ions and calcium ions.

(i) Describe how the student could confirm that the low sodium salt contains magnesium ions and **not** aluminium ions.

(2)

(ii) Describe a test the student could do to confirm that the low sodium salt does **not** contain calcium ions.

(2)

(Total 11 marks)