

Name:

Date:

C8 - Test 6
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.

- (a) 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 chemicals are correctly named.

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.

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

In each case give the reagent(s) you would use and state what you would see.

Test and result for carbonate ions:

Test and result for chloride ions:

Test and result for nitrate ions:

Test and result for sulfate ions:

(5)

(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.

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

(2)

(Total 8 marks)

2.

This is part of an article about food additives.

THE PERIL OF FOOD ADDITIVES

Some orange drinks contain the additives E102 (Tartrazine), E104 (Quinoline Yellow) and E110 (Sunset Yellow). These three coloured additives are thought to cause hyperactivity in children.

(a) State **two** reasons that a manufacturer might give to justify the use of these additives.

1. _____

2. _____

(2)

(b) Some scientists asked 4000 twelve-year-old children to help them investigate if there is a link between these three coloured additives and hyperactivity.

How would the scientists use these 4000 children to investigate if there is a link between these three coloured additives and hyperactivity in children?

(4)

(c) A manufacturer used an independent scientist to show that their orange drink did not contain these three coloured additives.

(i) Suggest why the manufacturer would use a scientist who was independent instead of using their own scientist.

(1)

- (ii) The scientist had samples of E102, E104 and E110 and the orange drink. The scientist used paper chromatography for the test.

Describe how the scientist could use the results to show if the orange drink contained any of these three coloured additives.

You may include a diagram of the paper chromatography results.

(2)

(Total 9 marks)

3.

Acids and bases are commonly found around the home.

- (a) Baking powder contains sodium hydrogencarbonate mixed with an acid.

- (i) When water is added, the baking powder releases carbon dioxide. How could you test the gas to show that it is carbon dioxide?

Test _____

Result of test _____

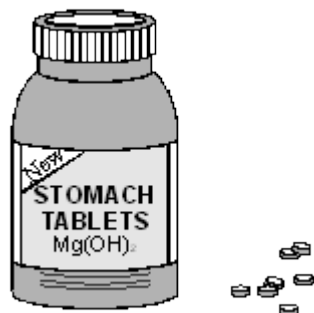
(2)

- (ii) Complete and balance the chemical equation for the reaction of sodium hydrogencarbonate with sulphuric acid.

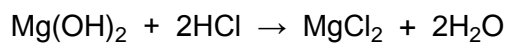


(2)

- (b) Indigestion tablets contain bases which cure indigestion by neutralising excess stomach acid.



- (i) One type of indigestion tablet contains magnesium hydroxide. This base neutralises stomach acid as shown by the balanced chemical equation.



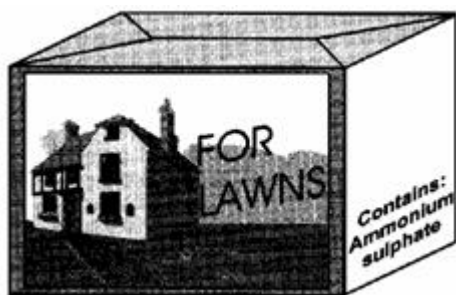
Write a balanced **ionic** equation for the neutralisation reaction.

(2)

- (ii) How does the pH in the stomach change after taking the tablets?

(1)

(c) Ammonium sulphate is used as a lawn fertiliser.



Using ammonia solution, describe how you would make the fertiliser ammonium sulphate.

(3)

(Total 10 marks)

4.

A student was investigating a magnesium salt, **X**.

The student found that **X**:

- has a high melting point
- does not conduct electricity
- dissolves in water and the solution conducts electricity.

(a) (i) What is the type of bonding in magnesium salt **X**?

(1)

(ii) Explain why solid **X** does **not** conduct electricity but a solution of **X** does conduct electricity.

(2)

(b) The student dissolved **X** in water.

The student added dilute nitric acid and silver nitrate solution to the solution of **X**.

A white precipitate was formed.

Salt **X** contains chloride ions.

Explain why a white precipitate was formed.

(2)

(c) The student dissolved **X** in water.

The student added a few drops of sodium hydroxide solution to the solution of **X**.

A white precipitate was formed.

(i) Salt **X** contains magnesium ions.

Name **two** other metal ions that would give a white precipitate when a few drops of sodium hydroxide solution are added.

1. _____

2. _____

(2)

- (ii) Describe the **two** further tests the student would have to do to show that salt **X** contains magnesium ions, and **not** the two metal ions you identified in part (c) (i).

Give the expected results of each test.

(4)

(Total 11 marks)

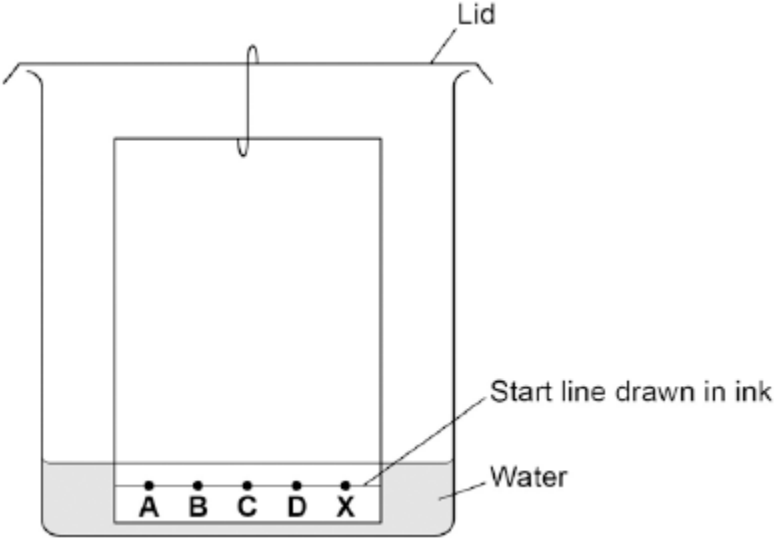
5. A student investigated food dyes using paper chromatography.

This is the method used.

1. Put a spot of food colouring **X** on the start line.
2. Put spots of four separate dyes, **A**, **B**, **C** and **D**, on the start line.
3. Place the bottom of the paper in water and leave it for several minutes.

Figure 1 shows the apparatus the student used.

Figure 1



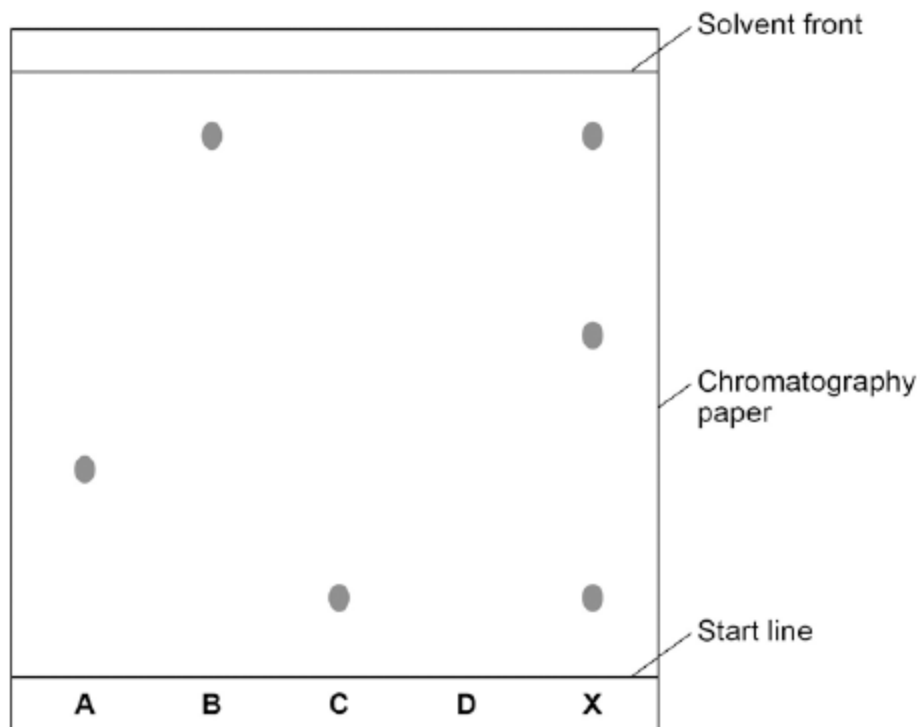
(a) Write down **two** mistakes the student made in setting up the experiment and explain what problems one of the mistakes would cause.

(2)

(b) Another student set up the apparatus correctly.

Figure 2 shows the student's results. The result for dye **D** is not shown.

Figure 2



Calculate the R_f value of dye **A**

Give your answer to two significant figures.

R_f value = _____

(3)

(c) Dye **D** has an R_f value of 0.80. Calculate the distance that dye **D** moved on the chromatography paper.

Distance moved by dye **D** = _____

(1)

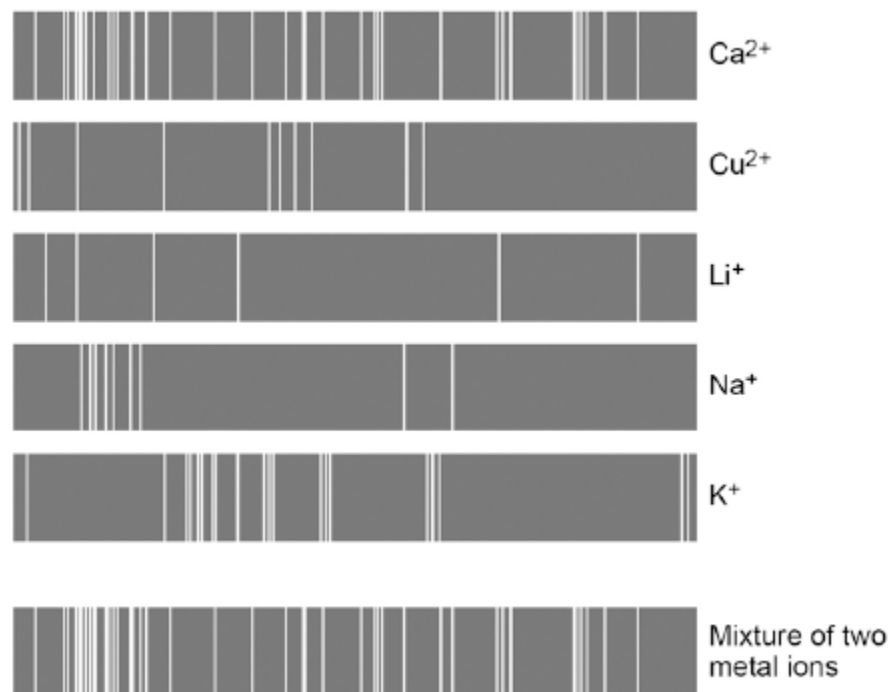
(d) Explain how the different dyes in **X** are separated by paper chromatography.

(4)

(e) Flame emission spectroscopy can be used to analyse metal ions in solution.

Figure 3 gives the flame emission spectra of five metal ions, and of a mixture of two metal ions.

Figure 3



Use the spectra to identify the **two** metal ions in the mixture.

(2)

(f) Explain why a flame test could **not** be used to identify the two metal ions in the mixture.

(2)

(g) Two students tested a green compound **X**.
The students added water to compound **X**.
Compound **X** did not dissolve.

The students then added a solution of ethanoic acid to compound **X**.
A gas was produced which turned limewater milky.

Student **A** concluded that compound **X** was sodium carbonate.
Student **B** concluded that compound **X** was copper chloride.

Which student, if any, was correct?

Explain your reasoning.

(4)

(Total 18 marks)