Identification of Ions and Gases

Question Paper 1

Level	IGCSE
Subject	Chemistry
Exam Board	CIE
Topic	Acids, Bases and Salts
Sub-Topic	Identification of Ions and Gases
Paper Type	Alternative to Practical
Booklet	Question Paper 1

Time Allowed: **57 minutes**

Score: **/47**

Percentage: **/100**

1 Two substances, **C** and **D**, were analysed. Solid **C** was a salt and solution **D** was an aqueous solution of chromium(III) chloride.
The tests on solid **C**, and some of the observations, are in the following table.

tests	observations
<u>tests on solid **C**</u> Solid **C** was added to distilled water in a test-tube and shaken to dissolve. The solution was divided into two portions in test-tubes, and the following tests carried out. Appearance of the solution. The pH of the first portion of the solution was tested.	colourless liquid pH = 7
Dilute nitric acid was added to the second portion of the solution followed by aqueous silver nitrate.	cream precipitate
A flame test was carried out on solid **C**.	yellow flame colour

(a) Identify solid **C**.

..... [2]

(b) Describe the appearance of solution **D**.

..... [1]

(c) Tests were carried out on solution **D**.

Complete the observations for tests 1, 2 and 3.

(i) test 1

Drops of aqueous sodium hydroxide were added to solution **D**.

Excess aqueous sodium hydroxide was then added to the mixture.

observations .....

..... [3]

(ii) test 2

Excess aqueous ammonia was added to solution **D**.

observations ..... [2]

(iii) test 3

Dilute nitric acid was added to solution **D** followed by aqueous silver nitrate.

observations ..... [1]

(d) Chromium(III) can be converted to chromium(VI). Chromium(VI) is hazardous.

Suggest **one** safety precaution when using chromium(VI).

..... [1]

[Total: 10]

2 Two solids, **L** and **M**, were analysed. Solid **L** was copper(II) chloride and solid **M** was a different salt.
The tests on the solids, and some of the observations, are shown.

tests on solid L

(a) Describe the appearance of solid **L**.

observation ..... [1]

(b) Distilled water was added to solid **L** and shaken to dissolve.

The solution was divided into four equal portions in four test-tubes and the following tests carried out.

(i) Drops of aqueous ammonia were added to the first portion of the solution.

Excess ammonia solution was then added to the mixture and shaken.

observation .....

.....

.....

..... [4]

(ii) Excess aqueous sodium hydroxide was added to the second portion of the solution.

observation .....

..... [1]

(iii) Dilute nitric acid was added to the third portion of the solution followed by aqueous silver nitrate.

observation ..... [1]

(iv) Dilute nitric acid was added to the fourth portion of the solution followed by aqueous barium nitrate.

observation ..... [1]

tests on solid M

Tests are carried out and the following observations made.

tests on solid **M**	observations
Appearance of the solid.	white crystals
The solid was heated and the gas given off was tested with damp red litmus paper.	a sublimate formed on the sides of the test-tube litmus paper turned blue
Solid **M** was dissolved in water to form a solution. Aqueous sodium hydroxide was added to the solution and the mixture heated. The gas given off was tested.	pungent gas evolved pH paper showed pH 10
Dilute nitric acid was added to the solution followed by aqueous silver nitrate.	yellow precipitate

(c) Identify solid **M**.

.....

..... [2]

[Total: 10]

3 The label on a bottle of orange drink stated 'contains no artificial colours'. A scientist thought that the orange colour in the drink was a mixture of two artificial colours:

- Sunset Yellow E110
- Allura Red E129

Plan an investigation to show that the orange colour in the drink did **not** contain these two artificial colours.
You are provided with samples of E110, E129 and the orange colouring from the drink. You are also provided with common laboratory apparatus.
You may draw a diagram to help answer the question.

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..... [6]

[Total: 6]

4 A solid **U** was analysed. **U** was a soluble metal sulfate.
The tests on **U**, and some of the observations are in the following table.
Complete the observations.

tests	observations
tests on solid **U** **(a)** Appearance of solid **U**.	pink crystals
(b) Solid **U** was heated gently and then strongly in a test-tube.	condensation droplets formed on the sides of the test-tube
(c) Solid **U** was added to distilled water in a test-tube and shaken until dissolved. The solution was divided into three equal portions in separate test-tubes and the following tests carried out. Several drops of aqueous sodium hydroxide were added to the first portion of the solution and the test-tube shaken. Then hydrogen peroxide solution was added to the mixture and the gas given off tested.	pale brown precipitate effervescence glowing splint relit
(d) Dilute nitric acid was added to the second portion of the solution followed by barium nitrate solution.	.... [2]
(e) Dilute nitric acid was added to the third portion of the solution followed by silver nitrate solution.	..... [1]

(f) What does test **(e)** tell you about solid **U**?

..... [1]

(g) Name the gas given off in test **(c)**.

..... [1]

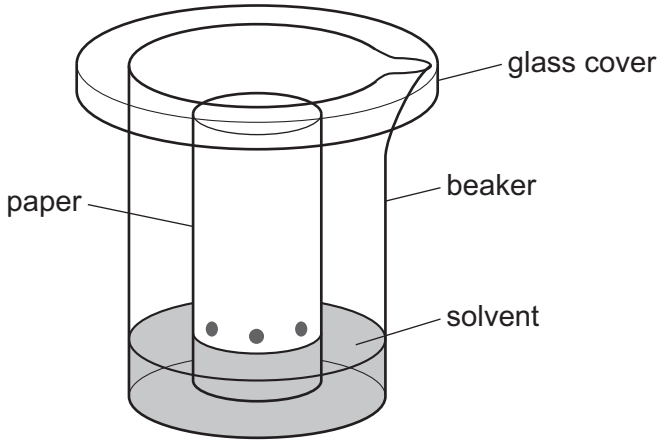
(h) What conclusions can you draw about solid **U**?

.....

..... [2]

[Total: 7]

5 A student investigated the colours present in a fruit drink. The fruit drink was tested to check that no artificial colours had been added. The apparatus below was used.



(a) (i) Name the method used.

..... [1]

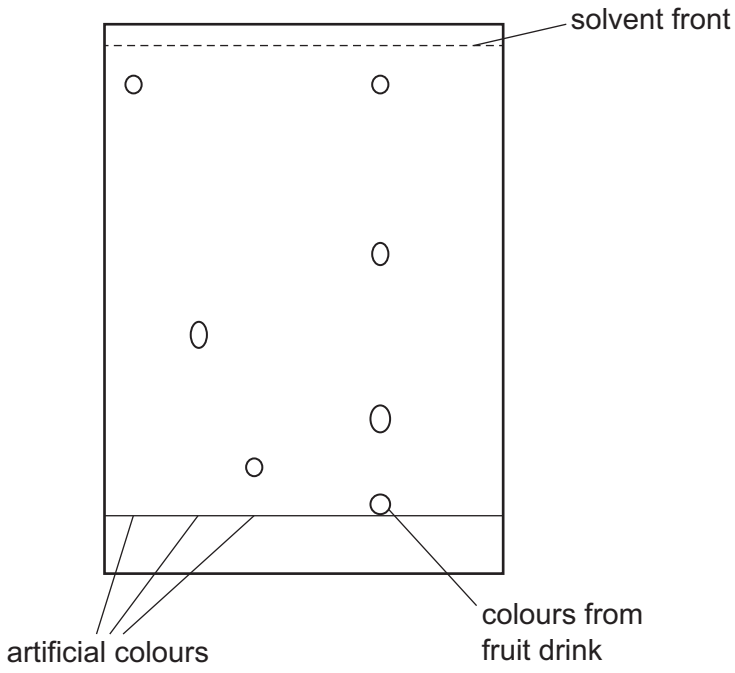
(ii) Why is there a glass cover on the beaker?

..... [1]

(b) When should the paper be removed from the beaker?

..... [1]

(c) The diagram shows the results of the experiment.



(i) How many different coloured compounds were present in the fruit drink?

..... [1]

(ii) Are there any of the artificial colours present in the fruit drink? Explain your answer.

.....

.....

..... [2]

[Total: 6]

6 A solid **D**, which is a soluble metal sulfate, was analysed.
The tests on **D**, and some of the observations, are in the following table.
Complete the observations in the table.

tests	observations
<u>tests on solid **D**</u> **(a) (i)** Appearance of solid **D**.	pale green crystals
(ii) Solid **D** was heated in a test-tube gently and then strongly.	condensation formed at the top of the test-tube
<u>tests on the aqueous solution</u> Solid **D** was added to distilled water and shaken to dissolve. The solution was divided into four equal portions in separate test-tubes.	
(b) (i) Several drops of aqueous sodium hydroxide were added to the first portion of the solution.	green precipitate
Excess aqueous sodium hydroxide was added to the mixture.	green precipitate remained
(ii) Excess aqueous ammonia was added to the second portion of the solution.	green precipitate
(c) Aqueous silver nitrate and dilute nitric acid were added to the third portion of the solution.	..... [1]
(d) Aqueous barium nitrate and dilute nitric acid were added to the fourth portion of the solution.	..... [2]

(e) What does test **(a)** tell you about solid **D**?

..... [2]

(f) What conclusions can you draw about the identity of solid **D**?

.....

..... [3]

[Total: 8]