

Identification of Ions and Gases

Question Paper 4

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 4

Time Allowed: 53 minutes

Score: /44

Percentage: /100

- 1 Three aqueous solutions **K**, **L** and **M**, were analysed. **L** was a solution of sodium hydroxide. The tests on the solutions and some of the observations are in the table. Complete the observations in the table. Do not write any conclusions in the table.

tests	observations
<p>(a) Appearance of the solutions.</p> <p style="padding-left: 40px;">solution K</p> <p style="padding-left: 40px;">solution L</p> <p style="padding-left: 40px;">solution M</p>	<p style="padding-left: 40px;">colourless liquid</p> <p style="padding-left: 40px;">colourless liquid</p> <p style="padding-left: 40px;">colourless liquid</p>
<p>(b) Universal Indicator paper was used to test the pH of each solution.</p> <p style="padding-left: 40px;">solution K</p> <p style="padding-left: 40px;">solution L</p> <p style="padding-left: 40px;">solution M</p>	<p style="padding-left: 40px;">pH 10</p> <p style="padding-left: 40px;">pH</p> <p style="padding-left: 40px;">pH 2</p> <p style="text-align: right;">[1]</p>
<p>(c) <u>tests on solution K</u></p> <p>(i) Drops of solution K were added to copper sulfate solution in a test-tube. Excess of solution K was then added to the test-tube.</p> <p>(ii) Experiment (c)(i) was repeated using aqueous aluminium sulfate instead of aqueous copper sulfate.</p> <p>(iii) A few drops of nitric acid and silver nitrate solution were added to solution K.</p>	<p style="padding-left: 40px;">pale blue precipitate formed</p> <p style="padding-left: 40px;">deep blue solution formed</p> <p style="padding-left: 40px;">white precipitate formed insoluble in excess</p> <p style="padding-left: 40px;">no visible reaction</p>
<p>(d) <u>tests on solution L</u></p> <p>(i) Experiment (c)(i) was repeated using solution L.</p> <p>(ii) Experiment (c)(ii) was repeated using solution L.</p>	<p style="padding-left: 40px;">..... [1]</p> <p style="padding-left: 40px;">.....</p> <p style="padding-left: 40px;">..... [3]</p>
<p>(e) <u>test on solution M</u></p> <p>Experiment (c)(iii) was repeated using solution M.</p>	<p style="padding-left: 40px;">white precipitate formed</p>

(f) What conclusions can you make about solution **K**?

.....
..... [2]

(g) What conclusions can you make about solution **M**?

.....
..... [2]

[Total: 9]

2 Leaves from trees contain a mixture of coloured pigments which are not soluble in water. A student was given these two instructions to investigate the pigments in the leaves.

1. Crush some leaves to extract the coloured pigments.
2. Use the liquid extract to find the number of coloured pigments in the leaves.

(a) What would the student need in order to effectively carry out instruction 1?

.....

.....

.....

..... [3]

(b) Describe an experiment to carry out instruction 2.
A space has been left below if you want to draw a diagram to help answer the question.

.....

.....

.....

.....

..... [4]

[Total: 7]

- 3 Two different solids, **T** and **V**, were analysed. **T** was a calcium salt. The tests on the solids and some of the observations are in the following table. Complete the observations in the table.

tests	observations
<p><u>tests on solid T</u></p> <p>(a) Appearance of solid T.</p>	<p>white solid</p>
<p>(b) A little of solid T was dissolved in distilled water. The solution was divided into three test-tubes.</p> <p>(i) The pH of the first portion of the solution was tested.</p> <p>(ii) To the second portion of solution was added excess aqueous sodium hydroxide.</p> <p>(iii) To the third portion of solution was added excess ammonia solution.</p>	<p>colour orange</p> <p>pH 5</p> <p>.....</p> <p>..... [2]</p> <p>.....</p> <p>..... [2]</p>

tests	observations
<p><u>tests on solid V</u></p> <p>(c) Appearance of solid V.</p>	<p>green crystals</p>
<p>(d) A little of solid V was dissolved in distilled water. The solution was divided into three test-tubes. The smell of the solution was noted.</p> <p>(i) Test (b)(i) was repeated using the first portion of solution.</p> <p>(ii) Test (b)(ii) was repeated using the second portion of the solution.</p> <p>(iii) Test (b)(iii) was repeated using the third portion of solution.</p>	<p>smells of vinegar</p> <p>colour orange</p> <p>pH 6</p> <p>pale blue precipitate</p> <p>pale blue precipitate soluble in excess to form a dark blue solution.</p>

(e) What do tests (b)(i) and (d)(i) tell you about solutions T and V?

..... [2]

(f) What additional conclusions can you draw about solid V?

.....
 [2]

[Total: 8]

4 This label is from a container of 'Bite Relief' solution.

BITE RELIEF

FOR FAST RELIEF FROM INSECT BITES AND STINGS

Active ingredient: Ammonia
Also contains water and alcohol

DIRECTIONS FOR USE: Use cotton wool to dab the solution on the affected area of the skin

(a) Give a chemical test to show the presence of ammonia in Bite Relief solution.

test

result [2]

(b) What practical method could be used to separate the mixture of alcohol (bp 78°C) and water (bp 100°C)?

..... [2]

(c) Give a chemical test to show the presence of water.

test

result [2]

(d) What would be the effect of touching the alcohol with a lighted splint?

..... [1]

[Total: 7]

- 5 Two salt solutions **K** and **L** were analysed. Each contained the same chloride anion but different metal cations. **K** was a copper(II) salt. The tests on the solutions and some of the observations are in the following table. Complete the observations in the table.

tests	observations
<p>(a) Appearance of the solutions.</p> <p>solution K</p> <p>solution L</p>	<p>.....[1]</p> <p>yellow</p>
<p>(b) The pH of each solution was tested.</p> <p>solution K</p> <p>solution L</p>	<p>pH 3</p> <p>pH 2</p>
<u>tests on solution K</u>	
<p>(c) (i) Drops of aqueous sodium hydroxide were added to solution K. Excess aqueous sodium hydroxide was then added to the test-tube.</p> <p>(ii) Experiment (c)(i) was repeated using aqueous ammonia instead of aqueous sodium hydroxide.</p> <p>(iii) A few drops of hydrochloric acid and about 1 cm³ of barium chloride solution were added to a little of solution K.</p>	<p>.....[2]</p> <p>.....[1]</p> <p>excess</p> <p>.....[2]</p> <p>.....[1]</p>

tests	observations
<p>(iv) A few drops of nitric acid and about 1 cm³ of silver nitrate solution were added to a little of solution K.</p>	<p>..... [1]</p>
<p><u>tests on solution L</u></p>	
<p>(d) (i) Experiment (c)(i) was repeated using solution L.</p>	<p>red - brown precipitate</p>
<p>(ii) Experiment (c)(ii) was repeated using solution L.</p>	<p>red – brown precipitate</p>
<p>(iii) Experiment (c)(iii) was repeated using solution L.</p>	<p>..... [1]</p>
<p>(iv) Experiment (c)(iv) was repeated using solution L.</p>	<p>..... [1]</p>

(e) What does test **(b)** indicate?

..... [1]

(f) Identify the metal cation present in solution **L**.

..... [2]

[Total: 13]