

Identification of Ions and Gases

Question Paper 6

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 6

Time Allowed: 51 minutes

Score: /42

Percentage: /100

1 The label below is from a bottle of concentrated lemon drink.

Concentrated lemon drink
Ingredients: Water, sugar, citric acid, preservatives, potassium sorbate
(artificial sweetener). Yellow colourings E102 and E104.

(a) What is meant by the term *concentrated*?

..... [1]

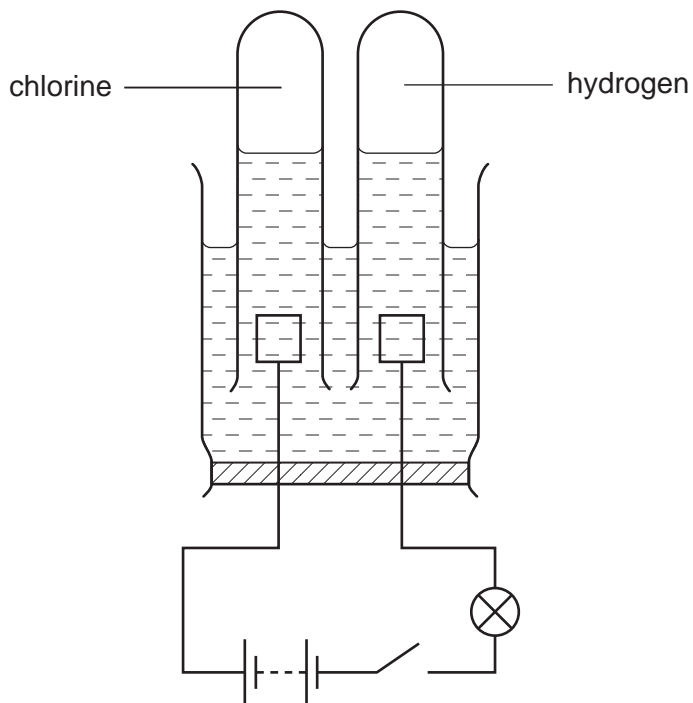
(b) Predict the pH of the lemon drink.

..... [1]

(c) Describe an experiment to show that two different yellow colourings are present in the drink.

[4]

2 The diagram shows the apparatus used to pass an electric current through concentrated hydrochloric acid.



(a) Label the electrodes. [1]

(b) Give two observations when the current is switched on.

- 1
- 2 [2]

(c) Give a test for the product at the negative electrode (cathode).

- test
- result [2]

- 3 A solid compound **X** was analysed. Solid **X** was an aluminium salt. The tests on **X** and some of the observations are in the following table.

Complete the observations in the table.

tests	observations
<p>(a) One spatula measure of X was placed into a hard-glass test-tube. The solid was heated gently then strongly. The gas was tested with pH indicator paper.</p>	<p>condensation at top of tube</p> <p>paper went red</p>
<p>Distilled water was added to X and shaken to dissolve. The solution was divided into five portions in test-tubes.</p> <p>(b) (i) To the first portion, drops of aqueous sodium hydroxide were added. Excess aqueous sodium hydroxide was then added.</p> <p>(ii) To the second portion, drops of aqueous ammonia were added.</p> <p>Excess ammonia was then added.</p> <p>(iii) To the third portion of solution, hydrochloric acid and barium chloride solution were added.</p> <p>(iv) To the fourth portion of solution, nitric acid and lead nitrate solution were added.</p> <p>(v) To the fifth portion, aqueous sodium hydroxide and a spatula measure of aluminium granules were added. The mixture was warmed and the gas tested with indicator paper.</p>	<p>.....</p> <p>.....</p> <p>..... [3]</p> <p>.....</p> <p>.....</p> <p>..... [3]</p> <p>no visible change</p> <p>no visible change</p> <p>pungent gas</p> <p>paper went blue, pH 10</p>

(c) What does test (a) tell you about the gas given off?

..... [1]

(d) What conclusions can you draw about **X** from tests (b)(iii) and (iv)?

(b)(iii)

(b)(iv) [2]

(e) Identify the gas in (b)(v).

..... [1]

(f) What conclusions can you draw about substance **X**?

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

4 A mixture of two calcium compounds **C** and **D** was tested.

C is partially soluble in water and **D** is soluble in water.

Complete the observations in the table.

tests	observations
The mixture of C and D was added to distilled water in a boiling tube. The tube was shaken. The mixture was filtered.	
<p>(a) The filtrate was divided into five equal portions.</p> <p>(i) To the first portion was added drops of aqueous sodium hydroxide, a little at a time, with shaking.</p> <p>Excess aqueous sodium hydroxide was added.</p> <p>(ii) To the second portion was added excess aqueous ammonia, a little at a time.</p> <p>(iii) To the third portion was added dilute sodium hydroxide and aluminium powder. The mixture was boiled and the gas tested with damp litmus paper.</p> <p>(iv) The pH of the fourth portion was tested with Indicator paper.</p> <p>(v) Carbon dioxide was bubbled through the fifth portion.</p>	<p>..... [2]</p> <p>..... [1]</p> <p>..... [1]</p> <p>red litmus went blue</p> <p>pH about 10</p> <p>solution turned milky/cloudy</p>

(b) Name the gas given off in **(a)(iii)**.

..... [1]

(c) Suggest an explanation for the observation in **(a)(v)**.

..... [1]

(d) What conclusions can you draw about the identity of the anions in solid **C** and **D**?

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

- 5 Describe a chemical test to **distinguish** between each of the following pairs of substances. An example is given.

potassium chloride and potassium iodide

test: add aqueous lead(II) nitrate

result: potassium chloride gives a white precipitate, potassium iodide gives a yellow precipitate

(a) water and ethanol

test

result with water

result with ethanol [2]

(b) sulphuric acid and aqueous sodium sulphate

test

result with sulphuric acid

result with aqueous sodium sulphate [2]

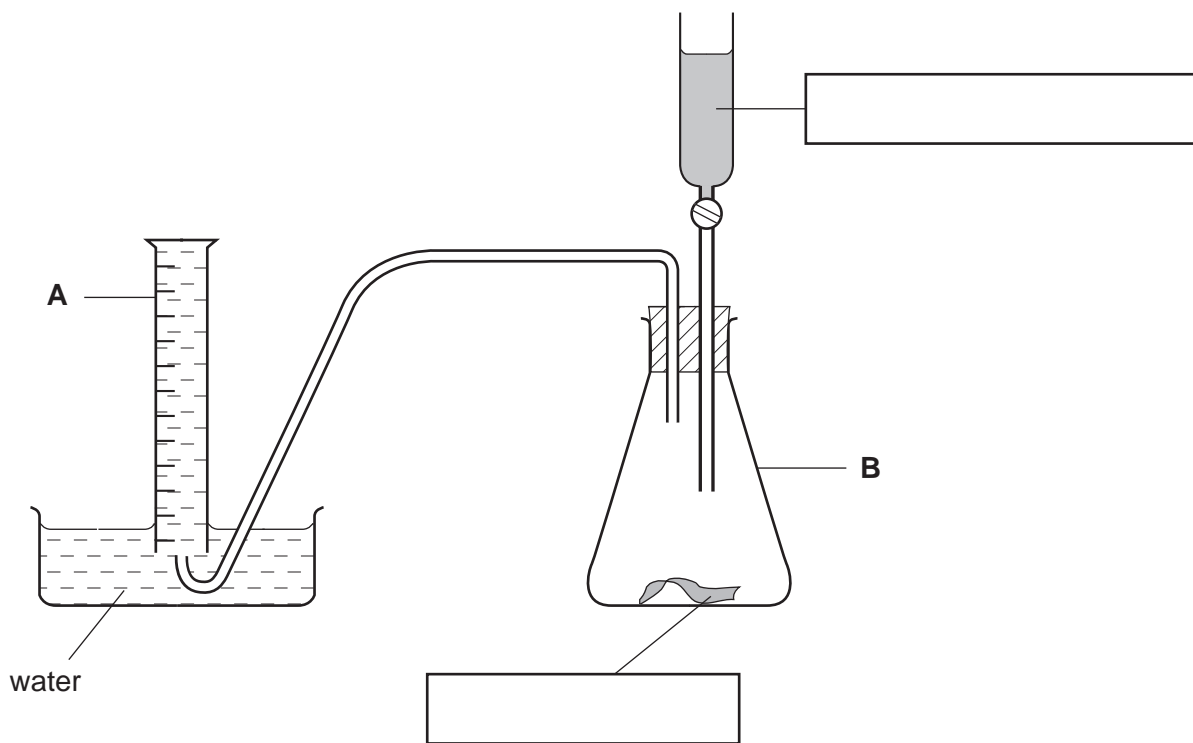
(c) hydrochloric acid and nitric acid

test

result with hydrochloric acid

result with nitric acid [2]

6 The apparatus below was used to make hydrogen. Dilute hydrochloric acid was added to zinc.



(a) Identify the pieces of apparatus labelled

A,

B. [2]

(b) Complete the boxes [1]

(c) Give a test for hydrogen.

test

result [2]