

Presentation of Data & Observation

Question Paper 1

Level	Pre U
Subject	Chemistry
Exam Board	Cambridge International Examinations
Topic	Presentation of data & Observation
Booklet	Question Paper 1

Time Allowed: 66 minutes

Score: /55

Percentage: /100

Grade Boundaries:

1. (a) **FA 3** is a solution containing three unknown **cations**. By choosing appropriate reagents you will be able to identify the cations that are present.

Carry out tests to identify the three cations. Record your observations in the space below.

Where gases are released they should be identified by a test, **described in the appropriate place in your observations**.

If any solution is warmed a boiling tube MUST be used.

Results

The three cations in **FA 3** are , and [7]

- (b) Solution **FA 3** contains either the sulfate or sulfite anion.

- (i) State reagents that will allow you to determine which anion is present.

.....
..... [1]

- (ii) Use these reagents to test solution **FA 3**. Record your tests and observations in the space below and hence determine which anion is present.

The anion in **FA 3** is [3]

- (iii) A student analysed a solid sample which was known to contain the sulfite ion. He made up a solution of the salt but then left it for a number of days in an open beaker before carrying out his tests. He found his results were incorrect in that they showed the presence of the sulfate ion. Explain why this was the case and outline how he should have analysed the sample.

.....
.....
..... [1]

(c) (i) Carry out the following tests.

test	observations
To a 1 cm depth of FA 3 in a boiling tube add a 1 cm depth of hydrogen peroxide, then	
add to the mixture a 1 cm depth of sodium hydroxide. Stir the contents of the boiling tube carefully.	

[3]

(ii) Suggest an explanation for your observations.

.....

.....

.....

..... [2]

[Total: 17]

2. (a) **FA 5**, **FA 6** and **FA 7** are different salts, each of which is one of the following.

- a hydrated metal carbonate
- a hydrated metal chloride
- a metal nitrate

By heating each of the solids and analysing the gases given off, you will be able to assign the identities of the different salts.

In this case the metal nitrate undergoes thermal decomposition to give the metal nitrite as well as the gaseous product.

For each solid, place a small spatula measure into hard-glass test-tube and heat strongly. Record your observations in the following table. Describe the positive tests you carried out on the gases released and suggest the identity of each gas.

	<i>observations</i>	<i>gas test and identity of gas</i>
FA 5		
FA 6		
FA 7		

From your observations assign **FA 5**, **FA 6** and **FA 7**.

The hydrated metal carbonate is

The hydrated metal chloride is

The metal nitrate is

[9]

(b) FA 8 is a solution that contains two different anions.

(i) Carry out the following tests and record your observations in the space below. Keep the contents of each test-tube for a further test in **(ii)**.

<i>test</i>	<i>observations</i>
To a 1 cm depth of FA 8 in a test-tube add 1 cm depth of aqueous barium chloride (or aqueous barium nitrate).	
To a 1 cm depth of FA 8 in a second test-tube add 1 cm depth of dilute nitric acid followed by a 1 cm depth of aqueous silver nitrate.	

(ii) Carry out two additional tests, one on the contents of each test-tube, to identify the anions present in **FA 8**.

test one

.....

observation

test two

.....

observation.....

The anions in **FA 8** are and

[6]

[Total: 15]

- 3 (a) **FA 5** is a solution containing three unknown **cations**. By choosing appropriate reagents you will be able to identify the cations that are present.

Carry out tests to identify the three cations. Record your observations in the space below.

Where gases are released they should be identified by a test, **described in the appropriate place in your observations**.

If any solution is warmed a boiling tube MUST be used.

Results

The three cations in **FA 5** are , and [7]

- (b) Solution **FA 5** contains either the sulfate or sulfite anion.

- (i) State reagents that will allow you to determine which anion is present.

.....

.....[1]

- (ii) Use these reagents to test solution **FA 5**. Record your tests and observations in the space below and hence determine which anion is present.

The anion in **FA 5** is [3]

- (c) (i) Carry out the following tests.

test	observations
To a 1 cm depth of FA 5 in a boiling tube add 1 cm depth of hydrogen peroxide, then	
add to the mixture a 1 cm depth of aqueous sodium hydroxide. Stir the contents of the boiling tube carefully.	

[3]

- (ii) Suggest an explanation for your observations.

.....

.....

.....

.....[2]

[Total: 16]

Before starting question 3, half-fill a 250cm³ beaker with water and heat it with a Bunsen burner to between 50 °C and 70 °C. You will use this as a hot water-bath in this question. Turn off the Bunsen burner.

4. **FA 7, FA 8** and **FA 9** each contain a single compound which could be butan-1-ol, butanal or butanone. By reacting each of the compounds first with acidified potassium dichromate(VI) and then with Tollens' reagent you should identify each of the three samples.

Tollens' reagent must be prepared immediately before use.

Method

Test with acidified potassium dichromate(VI)

1. Into separate test-tubes, to a depth of approximately 1 cm, pour **FA 7, FA 8** and **FA 9**.
2. Add approximately 1 cm depth of dilute sulfuric acid to each test-tube.
3. Add a few drops of aqueous potassium dichromate(VI).
4. If no initial reaction is seen, warm the test-tube in the hot water-bath.

Preparation of Tollens' reagent

5. Pour aqueous silver nitrate into a boiling tube to a depth of approximately 2 cm.
6. Add approximately 0.5 cm depth of aqueous sodium hydroxide.
7. Add aqueous ammonia a little at a time with continuous shaking until the brown precipitate **just** dissolves. Be careful not to add an excess of aqueous ammonia.

Test with Tollens' reagent

8. Into separate, clean, dry test-tubes, to a depth of approximately 1 cm, pour **FA 7, FA 8** and **FA 9**.
9. Add a few drops of Tollens' reagent.
10. If no initial reaction is seen, warm the test-tube in the hot water-bath.

- (a) Record all your observations in a single table.

(b) Identify each sample. In each case explain the observations leading to your conclusion.

FA contains butan-1-ol.

explanation
.....[1]

FA contains butanal.

explanation
.....[1]

FA contains butanone.

explanation
.....[1]

[Total: 7]