

Analysis, Conclusions & Evaluation

Question Paper

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

Time Allowed: 34 minutes

Score: /28

Percentage: /100

Grade Boundaries:

Before starting Question 3, half-fill a 250cm³ beaker with water and heat with a Bunsen burner to between 60 and 70 °C. You will use this as a hot water bath in this question. Turn off the Bunsen burner.

1. (a) **FA 4** is a solution of a metal nitrate. The cation present in **FA 4** is listed in the Qualitative Analysis Notes. By carrying out a series of tests you will identify this cation.

(i) Carry out the following tests on **FA 4** and record your observations.

test	observations
To approximately 1 cm depth of FA 4 in a test-tube add aqueous sodium hydroxide, then	
add excess sodium hydroxide.	
To approximately 1 cm depth of FA 4 in a test-tube add aqueous ammonia, then	
add excess aqueous ammonia.	

[2]

(ii) Suggest possible identities for the cation in **FA 4**.

..... [1]

(iii) State a reagent that would help you to confirm the identity of the cation. Carry out a test on **FA 4** with this reagent and record your observations.

reagent

observations [2]

(iv) Identify the cation in **FA 4**.

..... [1]

- (b) **FA 5, FA 6 and FA 7** are samples, one of which is a primary alcohol, one is a tertiary alcohol and one is a solution of glucose. By carrying out the following tests you will assign each of the samples.

For the purposes of safety you must assume all three samples are flammable.

(i) Tests with Tollens' reagent

Preparation of Tollens' reagent

1. Pour aqueous silver nitrate into a boiling tube to a depth of approximately 2 cm.
2. Add approximately 0.5 cm depth of aqueous sodium hydroxide.
3. 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 ammonia.
4. Use this solution to carry out the following tests.

test	observations		
	FA 5	FA 6	FA 7
To 1 cm depth of each compound in a clean, dry test-tube add a few drops of the Tollens' reagent. If no reaction is seen, warm the tube in the hot water bath.			
When you have made your observations, without delay rinse out thoroughly all the test-tubes and the boiling tube that contain any Tollens' reagent.			

[2]

(ii) Tests with acidified potassium manganate(VII)

test	observations		
	FA 5	FA 6	FA 7
To 1 cm depth of each compound in a clean, dry test-tube add approximately 2 cm depth of dilute sulfuric acid. Then add a few drops of aqueous potassium manganate(VII). If no reaction is seen, warm the tube in the hot water bath.			

[2]

(iii) Assign each of the samples, **FA 5**, **FA 6** and **FA 7**.

The primary alcohol is

The tertiary alcohol is

The solution of glucose is [1]

(iv) Discuss how the reactions you have observed for glucose compare to those expected for an aldehyde.

.....

.....[1]

[Total: 12]

- 2 **FA 2, FA 3, FA 4, FA 5** and **FA 6** contain a number of different ions. By making observations when each pair of solutions is mixed it is possible to determine which solution contains which ion. The following ions are present: H^+ , CrO_4^{2-} , SO_4^{2-} , Pb^{2+} , Ba^{2+} and OH^- .

(a) Complete the following table by recording your observations on mixing each pair of solutions.

	FA 3	FA 4	FA 5	FA 6
FA 2				
FA 3				
FA 4				
FA 5				

(b) From your observations, identify which of the solutions contain the following ions.

ion	H ⁺	CrO ₄ ²⁻	SO ₄ ²⁻	Pb ²⁺	Ba ²⁺	OH ⁻
solution						

[6]

(c) **FA 6** is an aqueous solution of a nitrate. Explain how you would confirm the presence of the nitrate anion. **Do not carry out any experimental work.**

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..... [2]

[Total: 16]