

APOLLO

FBISE Chemistry Class 12

Topical workbook - Volume 3 of 3

24 questions arranged by official framework topic.

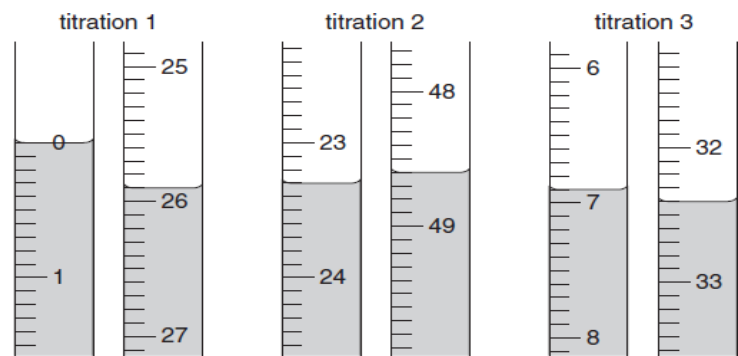
National Curriculum 2022-23; supported examinations from 2027.

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Titration

Domain G: Lab and Practical Skills

- Q No. 2.** The formula for iron (II) sulphate crystals is $\text{FeSO}_4 \cdot x\text{H}_2\text{O}$, where x is a whole number. A student determined the value of ' x ' using 0.0200 M Potassium manganate (VII). This was solution **A**. 28g of a given sample of $\text{FeSO}_4 \cdot x\text{H}_2\text{O}$ is dissolved per dm^3 of solution. This was solution **B**.
- (a) A 25.0 cm^3 sample of solution **B** followed by half test tube of sulfuric acid was measured into the titration flask. Solution **A** was run from a burette into the flask containing Solution **B** until an end-point was reached. What was the colour change at the end point? [1]
- (b) Three titrations were done. The diagrams below show parts of the burette before and after each titration.



Use these diagrams to complete the table of results. [2]

Titration number	1	2	3
Final reading (cm^3)			
First reading (cm^3)			
Volume of solution A used			
Best titration result (✓)			

Summary.
Tick (✓) the best titration results. Using these results, the average volume of **A** was..... cm^3 .

When acidified KMnO_4 reacts with hydrated Iron (II) sulfate, $\text{FeSO}_4 \cdot x\text{H}_2\text{O}$ the following reaction occurs:



- (c) Calculate molarity of hydrated iron (II) sulfate by using the chemical equation and above data. [2]
- (d) By using your answer to (c) and the strength of hydrated Iron (II) sulfate, calculate the value of ' x ' (water of crystallization) in $\text{FeSO}_4 \cdot x\text{H}_2\text{O}$. [1]

Q No. 3. A 25 cm^3 solution of iodine was titrated with 0.1 mol dm^{-3} (molarity) solution of sodium thiosulfate. The titration required 15.5 cm^3 of sodium thiosulfate solution to reach the end point.

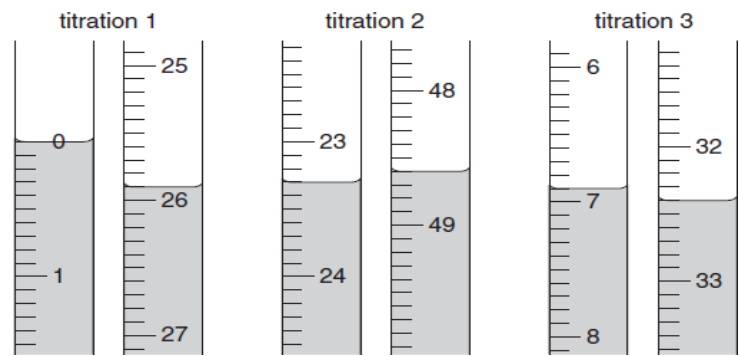
- (a). Write balanced equation for the reaction between iodine and sodium thiosulfate. [1]
- (b). Name the indicator used in this titration. Describe the change in colour that occurs when the end point of the titration is reached. [2]
- (c). Calculate the moles of sodium thiosulfate used in the titration. [1]
- (d). Use your answer to (c), calculate the concentration (molarity) of iodine in mol dm^{-3} . [2]

Q No. 2. The formula for iron (II) sulphate crystals is $\text{FeSO}_4 \cdot x\text{H}_2\text{O}$, where x is a whole number.

A student determined the value of ‘ x ’ using 0.0200 M Potassium manganate (VII). This was solution **A**.

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- Summary.
- Tick (✓) the best titration results. Using these results, the average volume of **A** was cm^3 .
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- (d). Use your answer to (c), calculate the concentration (molarity) of iodine in mol dm^{-3} . [2]

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Measurement of rate of reaction

Domain G: Lab and Practical Skills

Q No. 8. An experiment was conducted to study the rate of reaction between dilute hydrochloric acid and excess calcium carbonate chips by measuring the volume of carbon dioxide gas evolved over time.

- (a). Name two pieces of laboratory apparatus required to collect and measure the volume of gas produced during this reaction. [1]
- (b). Explain why the slope of the curve on a volume vs. time graph decreases as the reaction proceeds. [1]
- (c). How can the initial rate of reaction be determined from the plotted graph? [2]

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Gravimetric analysis

Domain G: Lab and Practical Skills

OR How can Fe^{+3} ions be detected in an aqueous solution? Also write the relevant chemical equation.

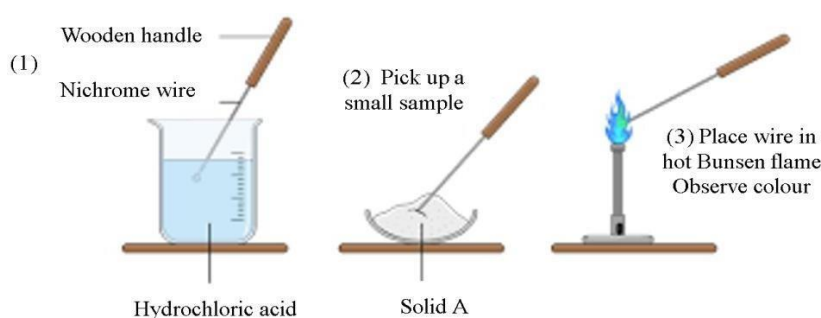
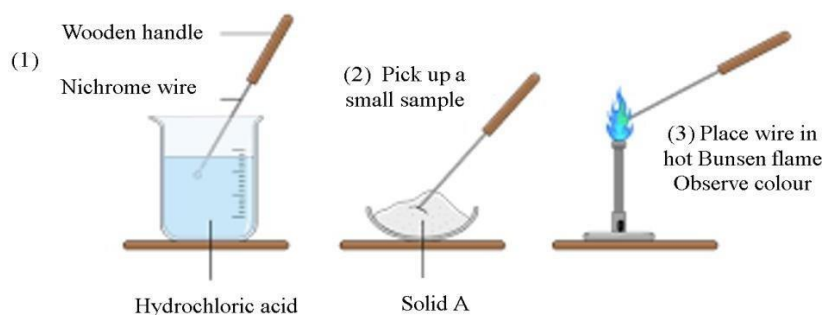
03

FBISE PBA model | Section A Q1(i) | 1 mark

Q No.1. Two solids **A** and solid **B**, were analysed. **A** was Barium chloride. Tests were done on **A** and **B**.

(a) Tests on A

Complete the expected observations.



(i) A Student performs a flame test 'A'. What is the flame colour observed?

[1]

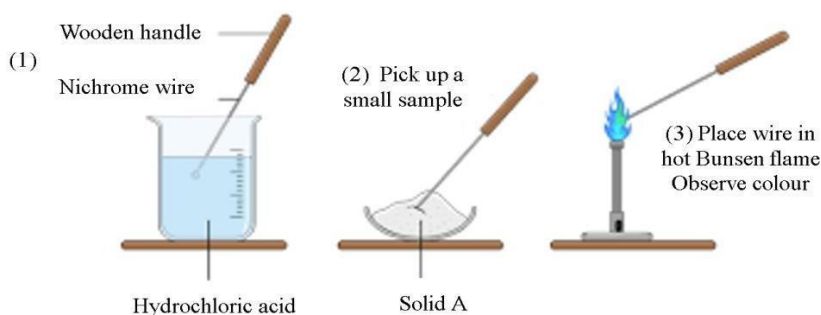
(i) Name the cation present in solution B.

[1]

Q No.1. Two solids **A** and solid **B**, were analysed. **A** was Barium chloride. Tests were done on **A** and **B**.

(a) Tests on A

Complete the expected observations.



(iii) To the first portion of solution **A**, add aqueous silver nitrate followed by a few drops of dilute solution of aqueous ammonia. Write its observation.

[1]

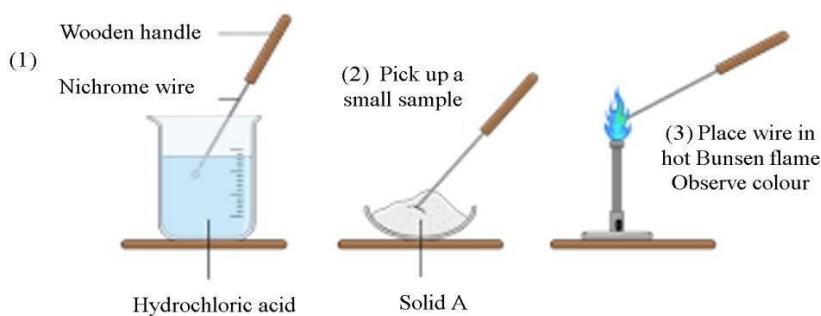
(iii) Write the name of **B**.

[1]

Q No.1. Two solids **A** and solid **B**, were analysed. **A** was Barium chloride. Tests were done on **A** and **B**.

(a) Tests on A

Complete the expected observations.



(vi) To the second portion of solution **A**, add dilute sulfuric acid. Write its observation.

[1]

4. A salt sample **X** containing one cation and one anion was analyzed in the laboratory.

When an aqueous solution of **X** was tested with aqueous sodium hydroxide, a pale blue precipitate was formed.

(i) Identify the cation present in salt **X**. [1]

(ii) Describe the observation and state the formula of the complex formed when excess aqueous ammonia is added to this precipitate. [2]

Dilute nitric acid followed by aqueous silver nitrate was added to another portion of the solution of **X**.

A white precipitate was formed, which dissolved completely when aqueous ammonia was added.

(a) When an aqueous solution of **X** was tested with aqueous sodium hydroxide, a pale blue precipitate was formed.

(i) Identify the cation present in salt **X**. [1]

(b) Dilute nitric acid followed by aqueous silver nitrate was added to another portion of the solution of **X**.

A white precipitate was formed, which dissolved completely when aqueous ammonia was added.

(i) Identify the anion present in salt **X**. [1]

4. A salt sample **X** containing one cation and one anion was analyzed in the laboratory.

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- (a)** When an aqueous solution of **X** was tested with aqueous sodium hydroxide, a pale blue precipitate was formed.
 - (i) Identify the cation present in salt **X**. [1]
 - (ii) Describe the observation and state the formula of the complex formed when excess aqueous ammonia is added to this precipitate. [2]

- (b)** Dilute nitric acid followed by aqueous silver nitrate was added to another portion of the solution of **X**.

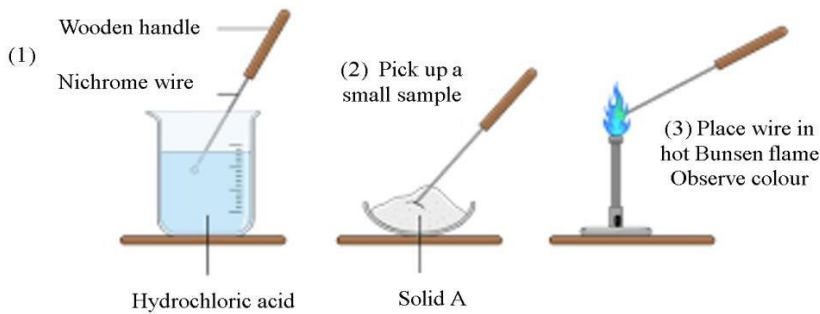
A white precipitate was formed, which dissolved completely when aqueous ammonia was added.

- (i)** Identify the anion present in salt **X**. [1]
- (ii)** Write the balanced ionic equation for the formation of the white precipitate. [1]

Q No.1. Two solids **A** and solid **B**, were analysed. **A** was Barium chloride. Tests were done on **A** and **B**.

(a) Tests on A

Complete the expected observations.



(i) A Student performs a flame test ‘A’. What is the flame colour observed? [1]

Tests	Observations
Test 1 Appearance of B	light green colour
Test 2 An excess of aqueous sodium hydroxide was added to the first portion of solution B .	Green ppts are formed which remain insoluble in excess of sodium hydroxide.
Test 3 Dilute nitric acid and aqueous barium nitrate were added to the second portion of solution B .	White ppts are formed.

(i) Name the cation present in solution B. [1]

(b) Tests on B

Specific amount of **B** was added to distilled water to prepare its solution in a test-tube. Students' divide this solution into two portions.

Following table shows the tests and the student's observations for **compound B**.

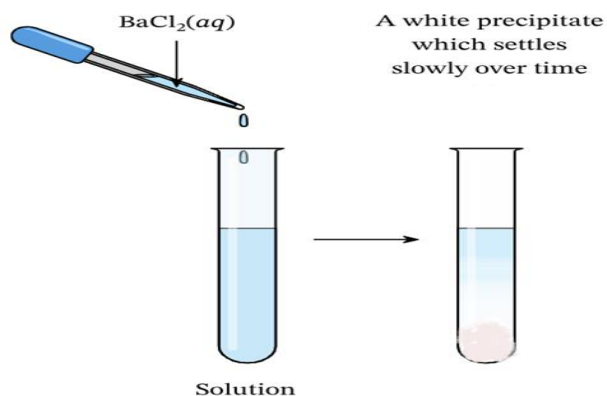
Table

Tests	Observations
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Test 3 Dilute nitric acid and aqueous barium nitrate were added to the second portion of solution B .	White ppts are formed.

- (i) Name the cation present in solution B. [1]
- (ii) Write down formula of the precipitates formed in test 2. [1]

Q.No.1 The purpose of experiment is to analyze anion (acid radical) and cation (basic radical) from the given salt X.



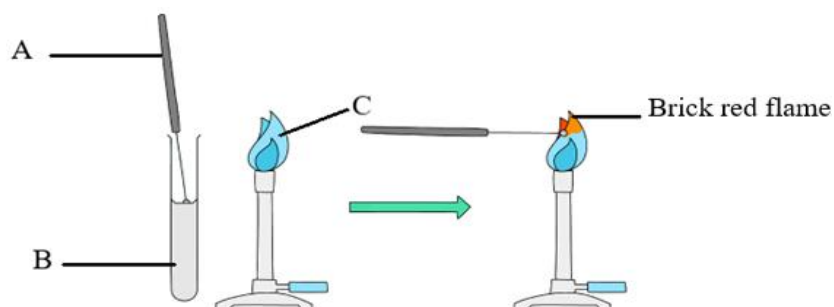
- i. When BaCl_2 solution is added in salt solution, white precipitates are formed. This is the indication of SO_4^{2-} or CO_3^{2-} , how can you identify that precipitates are of SO_4^{2-} not CO_3^{2-} ? **[01]**

ii. Write two confirmatory tests of SO_4^{2-}

[02]

Experiment	Observation	Inference
i.		
ii.		

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iii. When the salt **X** is subjected to flame test, it gives brick red flame. Which basic radical 'Z' is indicated in this result? **[01]**

iv. Give two confirmatory tests of the radical indicated in, **iii**. **[02]**

Experiment	Observation	Inference
i.		
ii.		

v. Write the name and formula of the obtained salt **X**. **[01]**

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Test of Functional groups and organic analysis

Domain G: Lab and Practical Skills

A student is provided with two unlabelled liquid samples: Ethanol and Ethanal.

- (a) Name a specific reagent/s that can produce a yellow precipitate when reacted with both of these compounds. [1]
- (b) Write the chemical formula of the yellow precipitate formed. [1]
- (c) Describe a chemical test (reagent and observation) that can be used to distinguish Ethanal from Ethanol. [2]

- (a)** A mixture contains an aldehyde and a ketone.
Name a laboratory reagent used to selectively identify the aldehyde, and state the expected observation. [1+1]

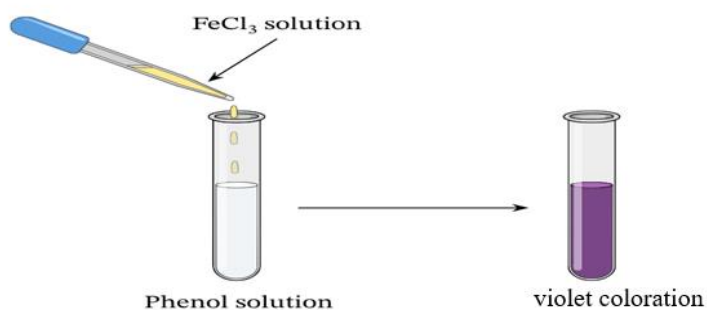
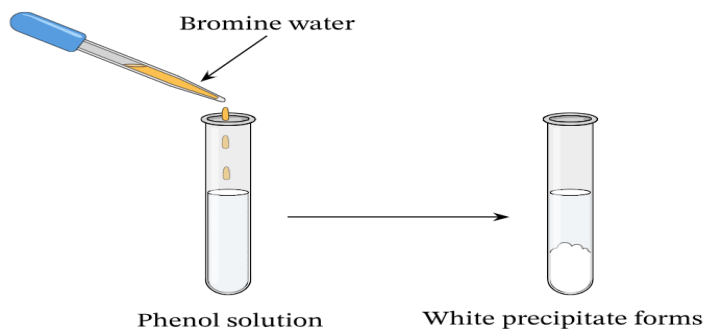
(b) A student performed a chemical test to confirm the presence of the phenol functional group.

- (i) State the observation when aqueous bromine is added to phenol. [1]

(b) A student performed a chemical test to confirm the presence of the phenol functional group.

- (i) State the observation when aqueous bromine is added to phenol. [1]
- (ii) Write the balanced chemical equation for the reaction between phenol and aqueous bromine. [1]

- ii. Following are the two chemical tests carried out for phenol detection. Write complete reaction for observed products for identification of phenol functional group? [02]



iv. Write the name of reagent and observation involved in the identification of carboxylic acid. Also write the chemical equation involved. **[01]**
