11 Qualitative Analysis

Set B Exam practice

Name	Time 45 minutes	Total 20 marks	Score ____ / 20

Use a copy of the Periodic Table where you need one.

Marks by notes section For the marker: total each row. A score below the target means that section of the notes needs revising.

Notes section	Questions	Marks	Target	Score
1 Testing for Cations	1, 5, 6(a), 6(b), 7	13	8	
2 Testing for Anions	3, 4, 6(c)	4	3	
3 Testing for Gases	2	1	1	
2 Bases and Alkalis *(Topic 08)*	8	2	2	

A Multiple choice

5 MARKS

1 Which set of aqueous solutions will form only a colourless solution when mixed together in the same conical flask?

A $NaOH$, $FeCl_3$, $NaCl$
B $Ba(NO_3)_2$, K_2SO_4, H_2SO_4
C $CuSO_4$, KCl, H_2SO_4
D KNO_3, $NaOH$, Na_2SO_4

/1

Answer ☐ [1]

Source: 2020 SJI Year 3 End-of-Year P1 Q21

2 Which statement about the reaction between ammonium carbonate and dilute hydrochloric acid is false?

A Ammonium chloride is produced.
B Ammonia gas is produced.
C The gas evolved turned damp blue litmus paper red.
D Water is produced.

/1

Answer ☐ [1]

Source: 2024 CHIJ Prelim P1 Q13

3 Which reagent could be used to distinguish between dilute sulfuric acid and dilute hydrochloric acid?

A barium nitrate solution
B calcium carbonate
C Universal Indicator
D sodium hydroxide solution

/1

Answer ☐ [1]

Source: 2024 CHIJ Prelim P1 Q19

4 Aqueous ammonium sulfate is warmed with an excess of aqueous sodium hydroxide. The resulting mixture is neutralised with dilute nitric acid. The mixture is then mixed with aqueous barium nitrate. The precipitate is filtered off and the filtrate is evaporated to leave a white solid. What could the white solid be?

A ammonium nitrate **B** barium hydroxide **C** barium sulfate **D** sodium nitrate

Answer ☐ [1]

/1

Source: 2024 SJI Prelim P1 Q18

5 A white solid reacted with dilute hydrochloric acid to form a colourless solution and a gas.
Test 1: with aqueous silver nitrate, the colourless solution gave a white precipitate.
Test 2: with aqueous ammonia in excess, the colourless solution gave a colourless solution.
Test 3: the gas formed a white precipitate when bubbled into aqueous calcium hydroxide.
What is the white solid?

A aluminium carbonate **B** aluminium chloride **C** zinc carbonate **D** zinc chloride

Answer ☐ [1]

/1

Source: 2024 SJI Prelim P1 Q19

B Structured questions

15 MARKS

6 A powdered mixture of compound A and metal B is tested. The results are shown in the table.

test	observation
1 The mixture is mixed with excess dilute hydrochloric acid.	Gas D, which gives a white precipitate with limewater, is given off. Colourless solution C forms, and metal B is left.
2 The mixture is filtered. A few drops of aqueous sodium hydroxide are added to solution C.	White precipitate E forms.
3 Excess aqueous sodium hydroxide is added.	The white precipitate is insoluble.
4 Metal B is heated strongly in oxygen to form metal oxide F. F is added to dilute sulfuric acid.	Blue solution G forms.

(a) Identify A, C, D and E.

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..... **[4]**

(b) Write an ionic equation, with state symbols, for the formation of precipitate E.

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

(c) A student adds aqueous barium nitrate and aqueous silver nitrate to separate samples of solution C. Describe what would be observed with each.

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[2]

/7

Source: 2024 CHS Sec 3 End-of-Year Section B Q8 (adapted)

7 Mixture S contains one cation and two anions. A series of tests was performed on mixture S. The results are shown in the table.

test	observation
1 Dilute hydrochloric acid is added to mixture S.	Gas U is given off and solution T forms. Gas U gives a white precipitate in limewater.
2 Aqueous sodium hydroxide is added to solution T.	Green precipitate V forms. It turns red-brown on standing.
3 The mixture from test 2 is warmed with a piece of aluminium foil.	A gas is given off which turns moist red litmus paper blue.
4 Acidified silver nitrate is added to solution T.	White precipitate W forms.

(a) Identify T, U, V and W.

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[4]

(b) Suggest the identities of the ions present in mixture S.

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[1]

(c) Write a balanced chemical equation for one of the reactions in the tests.

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[1]

/6

Source: 2023 PRSS Prelim P2 A3 (adapted)

8 Ammonium-based fertilisers are made from ammonia.

Explain why it is not advisable to add ammonium-based fertilisers to soil which has been limed with calcium hydroxide.

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[2]

/2

Source: 2021 SJI Prelim P2 A2(a)(ii)