Identifying ions

Chemistry required practical | AQA GCSE Chemistry 8462 only (not Combined Science) | 14 questions, 35 marks

GCSE science required practicals

This practical online

Name: _____ **Date:** _____ **Score:** _____ **/ 35**

Aim: To identify the positive and negative ions in unknown ionic compounds using flame tests, sodium hydroxide, and tests for carbonate, halide and sulfate ions.

Equipment: nichrome wire loop in a handle; Bunsen burner and heatproof mat; dilute hydrochloric acid (to clean the wire); test tubes and test tube rack; dropping pipettes; sodium hydroxide solution (dilute); dilute nitric acid and silver nitrate solution; barium chloride solution; limewater and a delivery tube; safety goggles.

Results

Hassan was given six unlabelled white or coloured solids, P to U. He made a solution of each and carried out every test. A dash means no change.

Sample	Flame colour	Add sodium hydroxide	Add dilute acid, then gas through limewater	Add nitric acid then silver nitrate	Add hydrochloric acid then barium chloride
P	Crimson	-	Fizzes; limewater turns milky	-	-
Q	Green	Blue precipitate	-	White precipitate	-
R	No clear colour	Green precipitate	-	-	White precipitate
S	Lilac	-	-	Cream precipitate	-
T	Orange-red	White precipitate	-	Yellow precipitate	-
U	Yellow	-	-	-	White precipitate

Questions

1 Explain why the wire loop is dipped in hydrochloric acid and held in the flame before each flame test.

(2 marks)

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2 Give two things Hassan should do to make sure each test is fair and his results can be trusted.

(2 marks)

3 Barium chloride solution is toxic. Describe how Hassan should reduce the risk when he uses it.

(2 marks)

4 Name the compound in sample S. Explain how the results show this.

(2 marks)

5 Name the compounds in samples P, Q and R.

(3 marks)

6 Sample T gave a white precipitate with sodium hydroxide. This could be calcium, magnesium or aluminium ions. Explain how the results show it is calcium, and describe a further test that would rule out aluminium.

(2 marks)

7 Explain why dilute hydrochloric acid is added before barium chloride in the sulfate test.

(2 marks)

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8 The white precipitate in the halide test on sample Q is silver chloride, AgCl. Calculate its relative formula mass (M_r). Relative atomic masses: Ag = 108, Cl = 35.5.

(2 marks)

9 The white precipitate from sample U with barium chloride is barium sulfate, $BaSO_4$. Calculate its M_r. Relative atomic masses: Ba = 137, S = 32, O = 16.

(2 marks)

10 **Higher tier**

Hassan filtered, dried and weighed the barium sulfate from a sample of U. He got 0.466 g. Use your answer to question 9 to calculate the number of moles of barium sulfate. Give your answer in standard form. Show your working.

(3 marks)

11 **Higher tier**

Write a balanced ionic equation, with state symbols, for the formation of the blue precipitate in sample Q.

(2 marks)

12 Hassan's partner used hydrochloric acid instead of nitric acid before adding silver nitrate to sample U. She got a white precipitate and decided U was a chloride. Explain her mistake.

(2 marks)

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13 A sample contains a mixture of sodium and potassium ions. Explain why a flame test cannot easily identify both, and suggest an instrumental method that would. (3 marks)

14 A technician has three bottles that have lost their labels. She knows they are iron(III) chloride solution, magnesium sulfate solution and sodium iodide solution, but not which is which. Describe how you would use chemical tests to work out which bottle is which. (6 marks)

End of questions | Total 35 marks | The answers sheet has the full method as revision notes.

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