

SYSTEMATIC ANALYSIS OF SIMPLE SALTS

ANALYSIS OF ACID RADICALS (ANIONS)			
No.	Experiment	Observation	Inference
IDENTIFICATION TESTS			
1.	Test with dil. Hydrochloric acid (HCl): A little of the salt is added to dil. HCl taken in a test tube.	A colourless, odourless gas is evolved which turns lime water milky. [No characteristic reaction]	Presence of carbonate (CO_3^{2-}) [Absence of carbonate]
2.	Test with dil. Sulphuric acid (H_2SO_4): A little of the salt is rubbed with Dil. H_2SO_4 in a watch glass and the smell is noted.	Smell of vinegar	Presence of acetate (CH_3COO^-)
3.	Test with Conc. H_2SO_4: A little of the salt is treated with conc. H_2SO_4 taken in a test tube.	A colourless gas fuming in moist air is evolved. Dense white fumes are formed when a glass rod dipped in ammonium hydroxide (NH_4OH) is shown at the mouth of the test tube.	Presence of chloride (Cl^-)
4.	Paper ball test: A little of the salt is <i>heated</i> with Conc. H_2SO_4 and a paper ball is added to it.	Reddish brown vapours are evolved.	Presence of nitrate (NO_3^-)
CONFIRMATORY TESTS FOR ANIONS			
1.	Carbonate (CO_3^{2-}): A little of the salt solution is treated with BaCl_2 solution.	A white precipitate is formed which is soluble in dil. HCl with the evolution of CO_2 .	Presence of carbonate confirmed.
2.	Acetate (CH_3COO^-): To a little of the salt solution a few drops of neutral ferric chloride (FeCl_3) is added.	A reddish brown colouration	Presence of acetate confirmed.
3.	Chloride (Cl^-): A little of the salt solution is acidified with dil. Nitric acid (HNO_3) and Silver nitrate (AgNO_3) solution is added.	A white precipitate readily soluble in NH_4OH is formed	Presence of chloride confirmed.
4.	Nitrate (NO_3^-) [Brown ring test]: To a little of the salt solution freshly prepared Ferrous sulphate (FeSO_4) solution is added and mixed well. A few drops of Conc. H_2SO_4 is added through the sides of the test tube.	A brown ring is formed at the junction of the two liquids.	Presence of nitrate confirmed.
ANALYSIS OF BASIC RADICALS (CATIONS)			
1.	A little of the salt solution is treated with sodium carbonate (Na_2CO_3) solution.	No precipitate	Presence of zero group cation (NH_4^+).
2.	To a little of the salt solution add dil. HCl	White precipitate.	Presence of Group I cation (Pb^{2+}).
3.	To a little of the salt solution add dil. HCl and then pass hydrogen sulphide (H_2S) gas.	Black precipitate.	Presence of Group II cation (Cu^{2+}).
4.	To a little of the salt solution add ammonium chloride (NH_4Cl) and ammonium hydroxide (NH_4OH) solutions.	White gelatinous precipitate	Presence of Group III cation (Al^{3+}).
5.	To a little of the salt solution add NH_4Cl , NH_4OH and disodium hydrogen phosphate (Na_2HPO_4).	White crystalline precipitate.	Presence of Group VI cation (Mg^{2+}).

	ANALYSIS OF ZERO GROUP (NH₄⁺)		
1.	A little of the salt is boiled with sodium hydroxide (NaOH) solution.	A colourless pungent smelling gas is evolved. Dense white fumes are formed when a glass rod dipped in Conc. HCl is shown into it.	Presence of ammonium (NH ₄ ⁺)
2.	To a little of the salt solution Nessler's reagent is added.	A reddish brown precipitate is formed.	Presence of ammonium confirmed.
	ANALYSIS OF GROUP I (Pb²⁺)		
1.	To a little of the salt solution add potassium iodide (KI) solution.	A golden yellow precipitate is formed which is soluble in hot water and crystallised as golden spangles on cooling.	Presence of lead (Pb ²⁺)
2.	To a little of the salt solution add dil. Acetic acid (CH ₃ COOH) and potassium chromate (K ₂ CrO ₄).	Yellow precipitate is formed.	Presence of lead confirmed.
	ANALYSIS OF GROUP III (Al³⁺)		
1.	A little of the salt solution is treated with NaOH solution.	A white gelatinous precipitate soluble in excess NaOH	Presence of Aluminium (Al ³⁺)
2.	Ash Test: A little of the salt is boiled with 1 mL each of Conc. HNO ₃ and cobalt nitrate [Co(NO ₃) ₂] solution. A filter paper dipped in this solution is dried and burnt.	Blue ash	Presence of aluminium confirmed.
	ANALYSIS OF GROUP VI (Mg²⁺)		
1.	To a little of the salt solution Magneson reagent is added.	Lake blue ppt which is soluble in excess of NaOH to form deep blue solution.	Presence of Magnesium (Mg ²⁺)
2.	Ash Test: A little of the salt is boiled with 1 mL each of Conc. HNO ₃ and cobalt nitrate [Co(NO ₃) ₂] solution. A filter paper dipped in this solution is dried and burnt..	Pink ash	Presence of Magnesium (Mg ²⁺) confirmed.