Salt Analysis Chart · Class 11–12 (CBSE / ISC)

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1. Physical examination

Blue	Cu^{2+}
Light green	Fe^{2+} (Ni^{2+} is bright green)
Yellowish-brown	Fe^{3+}
Pink / light pink	Co^{2+} (pink), Mn^{2+} (light pink)
Ammonia smell	NH_4^+
Vinegar smell	CH_3COO^-
Rotten-egg smell	S^{2-}

2. Flame test

Golden yellow	Na^+
Lilac; crimson through blue glass	K^+
Brick red	Ca^{2+}
Crimson red	Sr^{2+}
Apple green	Ba^{2+}
Green with blue centre	Cu^{2+}

3. Anion (acidic radical)

Test	Ion	Observation	Confirmatory test
Dilute H_2SO_4	**CO_3^{2-}**	Brisk effervescence; CO_2 turns lime water milky	Lime water milky, clears with excess CO_2
Dilute H_2SO_4	**S^{2-}**	Rotten-egg smell; lead acetate paper black	Sodium nitroprusside: purple
Dilute H_2SO_4	**SO_3^{2-}**	Burning-sulphur smell; $K_2Cr_2O_7$ paper green	$BaCl_2$: white ppt soluble in dil. HCl; $KMnO_4$ decolourised
Dilute H_2SO_4	**NO_2^-**	Brown fumes; KI–starch paper blue	KI + starch + acetic acid: blue
Dilute H_2SO_4	**CH_3COO^-**	Vinegar smell	Ester test: fruity smell; neutral $FeCl_3$: deep red
Conc. H_2SO_4	**Cl^-**	Colourless gas; white fumes with NH_4OH rod	$AgNO_3$: curdy white ppt soluble in NH_4OH; chromyl chloride
Conc. H_2SO_4	**Br^-**	Reddish-brown vapours	Layer test: orange-brown; $AgNO_3$: pale yellow ppt
Conc. H_2SO_4	**I^-**	Violet vapours	Layer test: violet; $AgNO_3$: yellow ppt insoluble in NH_4OH
Conc. H_2SO_4	**NO_3^-**	Brown fumes, denser with Cu turnings	Brown ring test
Conc. H_2SO_4	**$C_2O_4^{2-}$**	CO + CO_2; CO burns blue	$CaCl_2$: white ppt; decolourises warm $KMnO_4$
Independent	**SO_4^{2-}**	No gas with either acid	$BaCl_2$: white ppt insoluble in conc. HCl
Independent	**PO_4^{3-}**	No gas with either acid	Ammonium molybdate + HNO_3: canary yellow ppt

4. Cation (basic radical): run groups in order, stop at the first precipitate

Group	Group reagent	Ions	Precipitate	Confirmatory test
0	NaOH, heat	**NH_4^+**	NH_3 gas: red litmus blue	Nessler's reagent: brown ppt
I	Dilute HCl	**Pb^{2+}**	White $PbCl_2$, dissolves in hot water	KI: yellow PbI_2 (golden spangles); K_2CrO_4: yellow
II	H_2S in dilute HCl	**Pb^{2+}, Cu^{2+}, As^{3+}**	PbS, CuS black; As_2S_3 yellow	Cu^{2+}: NH_4OH deep blue; $K_4[Fe(CN)_6]$ chocolate ppt
III	NH_4Cl + NH_4OH (after conc. HNO_3)	**Al^{3+}, Fe^{3+}**	$Al(OH)_3$ white gelatinous; $Fe(OH)_3$ reddish-brown	Al^{3+}: blue lake test; Fe^{3+}: Prussian blue, KSCN blood red
IV	H_2S in NH_4Cl + NH_4OH	**Zn^{2+}, Mn^{2+}, Ni^{2+}, Co^{2+}**	ZnS white; MnS flesh; NiS, CoS black	Zn^{2+}: $K_4[Fe(CN)_6]$ bluish-white; Ni^{2+}: DMG red; Co^{2+}: KNO_2 yellow
V	Solid $(NH_4)_2CO_3$ in NH_4Cl + NH_4OH	**Ba^{2+}, Sr^{2+}, Ca^{2+}**	White carbonates	Ba^{2+}: K_2CrO_4 yellow; Sr^{2+}: $(NH_4)_2SO_4$ white; Ca^{2+}: $(NH_4)_2C_2O_4$ white; flame
VI	Na_2HPO_4 in NH_4OH	**Mg^{2+}**	White crystalline $Mg(NH_4)PO_4$ (warm, scratch the tube)	Na_2HPO_4 ppt; Magneson: blue ppt