Ion alone	OH^-	NH_3	CO_3^{2-}	additional info
Ag^+	↓ brown	↓ brown, xs. sol.	↓ cream	+ Cl^- ↓ in NH_3 sol. / + S^{2-} ↓
Ba^{2+}	↓ clouding	-	↓	+ SO_4^{2-} ↓ + $C_2O_4^{2-}$ ↓ + CrO_4^{2-} ↓ + $Cr_2O_7^{2-}$ ↓ ↓ insol. in HOAc
Cu^{2+}	↓ blue	↓ turquoise xs.:°deep blue	↓ turquoise	+ $K_4[Fe(CN)_6]$ ↓ + S^{2-} ↓
Cu^+	↓ dark red			+ SCN^- ↓
Fe^{2+}	↓ olive green turns brown	↓ green-brown turns brown	↓ green	$[Fe(CN)_6^{3-}]$:↓ dark blue ox.: brown + S^{2-} ↓
Fe^{3+}	↓ orange-brown	↓ red-brown	↓ brown	$[Fe(CN)_6^{4-}]$:↓ dark blue SCN^-: blood red I^-: yellowish brown +S^{2-} ↓
H_3O^+			↑ CO_2	pH paper: acidic
NH_4^+	T↑: smell pH paper	-	-	
Ni^{2+}	↓green	↓green xs.: °blue	↓green	+ S^{2-} ↓
Al^{3+}	↓, xs. sol.	↓	↓	
Bi^{3+} acidic	↓, (T↑: yellow)	↓, (T↑: yellow)	↓, (T↑: yellow)	I^- :↓black xs.: °orange +S^{2-} ↓orange
Ca^{2+}	↓	-	↓	+ $C_2O_4^{2-}$ ↓ + SO_4^{2-}maybe clouding
Co^{2+}	↓ blue	↓ blue	↓purple	+ S^{2-} ↓
Cr^{3+}	↓ grey-green xs.: °green	↓ grey-green	↓blue-grey	+S^{2-} ↓ blue-grey
Mg^{2+}	↓	↓	↓	
Mn^{2+}	↓ turns black		↓ light pink	+ S^{2-} ↓ pink
Pb^{2+}	↓, xs. sol.	↓	↓	+ I^- ↓ yellow + CrO_4^{2-} ↓ yellow sol. in HOAc + Cl^- ↓ +SO_4^{2-} ↓ + S^{2-} ↓
Sr^{2+}	↓	-	↓	+ SO_4^{2-} ↓ +CrO_4^{2-} ↓yellow
Zn^{2+}	↓, xs. sol.	↓, xs. sol.	↓	+ S^{2-} ↓

Legend:

↓	white precipitate	↓ colour	coloured precipitate
°colour	solution coloured	-	no rxn
xs.	in excess	sol.	soluble
T	apply heat	↑	gas evolution

Ion alone	H^+ (H_2SO_4) maybe T	Ag^+	Ba^{2+}	other rxns
F^-	DON'T DO THIS	-	↓ ?	If you add acid to this, write your testament.
Cl^-	-	↓ UV: turns dark insol. in HNO_3 sol. in dil. NH_3	-	
Br^-	-	↓ light yellow insol. in HNO_3 sol. in conc. NH_3	-	
I^-	-	↓ yellow insol. in HNO_3 insol. in NH_3	-	+ Fe^{3+}: brown (I_2) + Cu^{2+}: brown + ↓ white
HCO_3^-	↑			T: ↑, gas into $Ca(OH)_2$ solution: clouding
CO_3^{2-}	CO_2 ↑	↓ white, turns yellow sol. in HNO_3	↓ powdery	+ Ca^{2+}: clouding
CH_3COO^-	vinegar smell	↓, dissolves in dil. HNO_3	TOXIC	
S^{2-}	stinks like hell	↓ blackish-grey		+ $Pb(OAc)_2$: ↓ black
SO_4^{2-}	-	-	↓ fine	
OH^-	-	↓ brown	maybe clouding	pH paper basic
NO_3^-	-	-	-	ring test
CrO_4^{2-}	°orange	↓ brown-red	↓ yellow	
$Cr_2O_7^{2-}$	-	↓ brown-red	↓ yellow-orange	
MnO_4^-	-	-	-	oxidises Fe^{2+}, H_2O_2, $C_2O_4^{2-}$
PO_4^{3-}	-	↓ yellow sol. in HNO_3	↓ fine flaky	
SCN^-	-	↓ fine UV: turns purple insol. in HNO_3 sol. in dil. NH_3	-	+ Fe^{3+} blood-red
$C_2O_4^{2-}$	-	↓, sol. in acid	↓, sol. in acid	Ca^{2+}: ↓, sol. in acid +MnO_4^- + H^+ + heat: discolours

Legend:

↓	white precipitate	↓ colour	coloured precipitate
°colour	solution coloured	-	no rxn
xs.	in excess	sol.	soluble
T	apply heat	↑	gas evolution

Special detection reactions

Formate ($HCOO^-$)

Prepare a reagent solution consisisting of 0.5 g citric acid monohydrate + 10.0 g acetamide in 100 mL ^{i}PrOH. Prepare a sodium acetate solution by dissolving 30.0 gNaOAc in 100 mLH_2O. Mix 0.5 mL sample with 1.0 mL reagent solution, 1 drop NaOAc solution, and 3.5 mL acetic anhydride. If a raspberry-red colour develops, the test is positive for formate.

Nitrite ($NO_2{}^-$)

Acidify solution with conc. HOAc. Add 2-3 drops sulfanilic acid + 2-3 drops 1-naphthylamine. If the solution turns a deep red colour, the test is positive for nitrite. Attention: test reaction is very sensitive to other ions such as Br^-, I^-, $ClO_3{}^-$, $IO_3{}^-$, S^{2-}, $SO_3{}^{2-}$, $S_2O_3{}^{2-}$, SCN^-, $CrO_4{}^{2-}$, $[Fe(CN)_6]^{4-}$, $[Fe(CN)_6]^{3-}$.

Sulfite ($SO_3{}^{2-}$)

Mix 10.0 mL of a solution of $KMnO_4$ in HOAc and 10 drops dil. $BaCl_2$ solution. Quickly add the sample. If a white precipitate of $BaSO_4$ forms, the test is positive for sulfite. Careful: once the testing solution of permanganate and barium chloride is prepared, it must be immediately used, since it degrades very quickly. When in doubt, repeat experiment.

Ring test (for $NO_3{}^-$)

Transfer your sample to a test tube. Add a few drops $FeSO_4$ solution and a few drops dil. H_2SO_4 to your sample solution. Then tilt your test tube about 45° and slowly add 2-3 drops conc. H_2SO_4 along the wall of the tube. This will allow the denser concentrated acid to slip underneath the solution. If a brownish/purple ring forms at the interface, the test is positive for nitrate.

Special detection reaction for Mg^{2+}

Acidify your test solution with hydrochloric acid. Add a solution of Na_2HPO_4. If crystals form upon addition of ammonia, the test is positive for magnesium. Calcium ions interfere negatively with this reaction.