GROUP B CATIONS

Mn^{2+}	Fe^{3+}	Bi^{3+}	Cr^{3+}

Group B cations are selectively precipitated out using ammonia buffer at pH 9-10 to form hydroxides. Ammonia provides the right amount of hydroxides ions in the solution to selectively precipitate group B cations, and forms stable complexes with the transition metal ions to make sure that these remain in soluble form in the buffered solution:

$$Bi^{3+}_{(aq)} + NH_4OH_{(aq)} \rightleftharpoons Bi(OH)_{3(s)} + NH_4^+{}_{(aq)}$$

$$Fe^{3+}_{(aq)} + NH_4OH_{(aq)} \rightleftharpoons Fe(OH)_{3(s)} + NH_4^+{}_{(aq)}$$

$$Mn^{2+}_{(aq)} + NH_4OH_{(aq)} \rightleftharpoons Mn(OH)_{2(s)} + NH_4^+{}_{(aq)}$$

$$Cr^{3+}_{(aq)} + NH_4OH_{(aq)} \rightleftharpoons Cr(OH)_{3(s)} + NH_4^+{}_{(aq)}$$

Mn^{2+}	➢ **Confirmatory reagent:** 3% H_2O_2/$NaBiO_{3(s)}$ - Reduction of Mn^{4+} to Mn^{2+} by reacting with H_2O_2 first, allows the reaction with BiO_3^- to occur - Production of purple supernatant
Fe^{3+}	➢ **Confirmatory reagent:** 0.1 M KSCN - Formation of blood red thiocyanatoiron (III) complex
Bi^{3+}	➢ **Confirmatory reagent:** 6 M NaOH/$SnCl_{2(s)}$ - Bi^{3+} is reduced to Bi with Sn^{2+} as the reducing agent - This reduction reaction occurring in a basic solution allows the immediate appearance of a black precipitate
Cr^{3+}	➢ **Addition of H_2O_2 + HCl** - Reduces Cr_2O^{2-} to CrO_5 - A flash of blue color in the solution, which decomposes quickly, is observed