GROUP D CATIONS

Cu ²⁺	Mσ ²⁺	Ni ²⁺	7n ²⁺	Cd ²⁺
Cu	I IVID	141	6 11	Cu

Group D cations readily form ammonia complexes when (NH₄)₂C₂O₄ is added:

$$\begin{array}{lll} Cu^{2+}_{(aq)} \ + \ 4NH_{3(aq)} \ \rightleftharpoons \ Cu(NH_3)_4{}^{2+}_{(aq)} & ; \ royal \ blue \\ \\ Cd^{2+}_{(aq)} \ + \ 4NH_{3(aq)} \ \rightleftharpoons \ Cd(NH_3)_4{}^{2+}_{(aq)} & ; \ colorless \\ \\ Ni^{2+}_{(aq)} \ + \ 4NH_{3(aq)} \ \rightleftharpoons \ Ni(NH_3)_4{}^{2+}_{(aq)} & ; \ green \\ \\ Zn^{2+}_{(aq)} \ + \ 4NH_{3(aq)} \ \rightleftharpoons \ Zn(NH_3)_4{}^{2+}_{(aq)} & ; \ colorless \\ \end{array}$$

Compared to the other cations of Group D, Mg^{2+} does not form complexes with NH_3 but both its hydroxide and oxalate are more soluble thus, it won't precipitate out. All Group D cations remains in the supernatant.

Ni ²⁺	Configurate ways against 10/ dispost buildly outline of degrees and address
IVI=	Confirmatory reagent: 1% dimethylglyoxime (deprotonated by
	6 M NH₃)
	 Production of cherry red precipitate
	 The solution needs to be basic for precipitation to occur
Cu ²⁺	Confirmatory reagent: 0.1 M K₄Fe(CN) ₆
	 Production of maroon precipitate
	 The solution needs to be slightly acidic for precipitation to
	occur and to prevent formation of toxic HCN gas
Mg ²⁺	Confirmatory reagent: 0.1 M Na₂HPO₄
	 Production of white precipitate
	 The supernatant is blue due to the presence of unreacted
	Cd ²⁺ , Zn ²⁺ , Ni ²⁺ , and Cu ²⁺ forming a complex with NH ₃
Zn ²⁺	Confirmatory reagent: 0.1 M K ₄ Fe(CN) ₆
	 Production of white precipitate
	 The acid that was added reacts with the hydroxide ligands
	liberating the Zn ²⁺ ions
Cd ²⁺	Two confirmatory reagents:
	 0.2 M Na₂S: produces yellow CdS precipitates
	 0.1 M K₄Fe(CN)₆: produces white Cd₂Fe(CN)₆ precipitates

© Chem 18.1 University Chemistry Laboratory Manual (2018); and, CHEM 17.1: General Chemistry II Laboratory | TEACHER'S GUIDE