

## Elements and their potential precipitates under various geochemical conditions

([https://clu-in.org/techfocus/default.focus/sec/in\\_situ\\_chemical\\_reduction/cat/Overview/](https://clu-in.org/techfocus/default.focus/sec/in_situ_chemical_reduction/cat/Overview/))

**Table 1. Elements and Potential In-Situ Precipitates**

Element	Primary Oxidation States in the Environment	Potential In Situ Precipitates <sup>1</sup>
Antimony	+3, +5	Sulfide
Arsenic	+3, +5	Typically requires co-precipitation <sup>2</sup>
Barium	+2	Sulfate
Boron	+3	Typically requires co-precipitation
Cadmium	+2	Carbonate, phosphate, sulfide
Chromium	+3, +6	Hydroxide
Copper	+1, +2	Hydroxide, phosphate, sulfide
Iron	+2, +3	Hydroxide, carbonate, sulfide
Lead	+2	Carbonate, phosphate, sulfide
Manganese	+2, +3, +4	Oxide, carbonate, sulfide
Mercury	0, +1, +2	Sulfide
Molybdenum	+4, +5, +6	Sulfide
Nickel	+2	Hydroxide, sulfide
Selenium	-2, 0, +4, +6	Elemental, mixed iron-Se
Thallium	+1, +3	Hydroxide, carbonate, sulfide
Uranium	+4, +6	Oxide, phosphate
Vanadium	+3, +4, +5	Typically requires co-precipitation
Zinc	+2	Hydroxide, carbonate, sulfide

<sup>1</sup> Reflects easily formed precipitates relevant to in situ remediation, not all possible solid phases.

<sup>2</sup> Co-precipitation is understood to mean the carrying down by a precipitate of substances normally soluble under the conditions employed (Patnaik 2004). For arsenic this includes adsorption to an iron (oxy)hydroxide or formation of arsenopyrite (AsFeS). Horst et al. 2010.