

**TABLE 1. GUIDELINES FOR EVALUATING SOLUBLE MINERALS IN SOILS**

Concern	Parameter	Chemical Symbol	Low When Less Than or Equal to:	High When Greater Than or Equal to:
Total Soluble Minerals	Total Dissolved Solids, Young Vines	TDS	– (1)	960 ppm
	Total Dissolved Solids, Mature Vines (2)	TDS	450 ppm	1600 ppm
	Electrical Conductivity, Young Vines	EC	–	1.5 dS/m
	Electrical Conductivity, Mature Vines (2)	EC	0.7 dS/m	2.5 dS/m
Soluble Macronutrient Anions	Nitrate-Nitrogen	NO3-N	1 ppm (3)	25 ppm
	Phosphorus	P	3 ppm	–
	Sulfate	SO4-S	10 ppm	100 ppm (4)
Soluble Macronutrient Cations	Potassium	K	15 ppm	–
	Magnesium	Mg	12 ppm	–
	Calcium	Ca	50 ppm	–
	Sodium	Na	–	20 ppm (5)
Soluble Micronutrient Cations	Iron	Fe	0.30 ppm	–
	Manganese	Mn	0.10 ppm	–
	Copper	Cu	0.08 ppm	–
	Zinc	Zn	0.08 ppm	–
Soluble Micronutrient Anions	Boron	B	0.5 ppm	–
Foliar Tissue Toxicity Risk	Sodium Adsorption Ratio	SAR	–	6 to 13
	Chloride	Cl	–	350 ppm
	Boron (Soluble)	B	–	1.5 ppm (6)
	Boron (Hot Water Extract)	B	–	2 ppm

1. A dash (–) indicates there are no known guidelines currently available or that guidelines are not necessary because problems are not known to exist.
2. Mature vine tolerance to high soil EC increases with salt tolerant rootstocks by as much as 1.0 dS/m.
3. 1 ppm ≈ 4 lb/acre 1 foot soil
4. High SO4-S (≥ 100 ppm) lowers the activities of K, Mg, and Ca and correspondingly, their effective concentration.
5. High soluble Na is a concern because it competes with other soluble cations for uptake by roots.
6. In Sacramento River Delta soils saturation extract B correlates well with hot water extract B (e.g.,  $Y = 0.60272x - 0.918$ ,  $R^2 = 0.96341$ ).