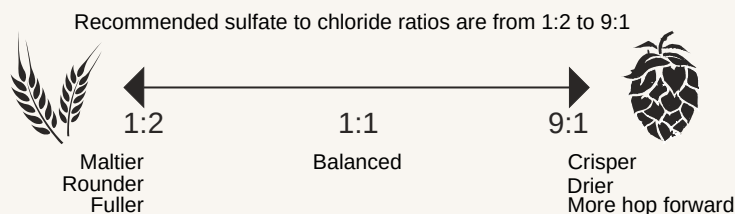


Some Important Water Ions

Ion		Suggested Range	Effect
Calcium	(Ca ⁺²)	50 - 150 ppm	Important to fermentation and mash. Promotes clarity, flavor, and stability in finished product. Over 250 ppm can impair fermentation
Chloride	(Cl ⁻)	0 - 100 ppm	Emphasize malt character Over 250 ppm will taste salty (high chloride levels can also cause stainless pitting)
Magnesium	(Mg ⁺²)	0 - 40 ppm	Fermentation health, sufficient magnesium supplied from malt in all grain.
Sodium	(Na ⁺)	0 - 50 ppm	Low levels round out flavors and accentuate sweetness, too high and it tastes salty
Sulfate	(SO ₄ ⁻²)	0 - 250 ppm	Emphasize hop character
Zinc	(Zn ⁺²)	0.1 - 0.5 ppm	Vital to fermentation health. Malt and source water may provide sufficient zinc. Yeast nutrient can supplement zinc if needed (Suggested if using RO water)

Sulfate-to-Chloride Ratio

Ratio of sulfate to chloride is said to greatly influence the hoppy-to-malty or dryness-to-fullness balance of the beer.
The ratio is more important than the actual amounts (*if the amounts are above the minimum thresholds*).

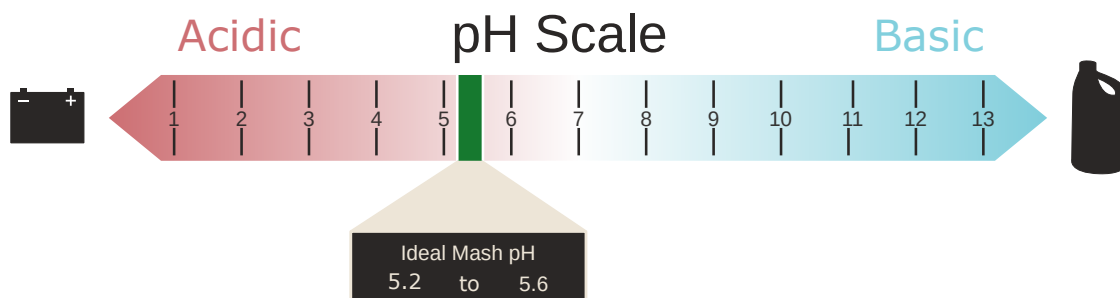


Recommended concentrations to influence flavor

Chloride (Cl⁻)
50-200 ppm

Sulfate (SO₄⁻²)
50-500 ppm

Mash pH



Salt Additions

Lower pH

CaCl₂ Calcium Chloride
CaSO₄ Gypsum
MgSO₄ Epsom Salt

Raise pH

CaCO₃ Chalk
(Relatively insoluble, recommended against using)
NaHCO₃ Baking Soda
Ca(OH)₂ Slaked Lime