

Ions That Matter!

Nitrates/Nitrites

Show up in water as contamination from excessive use of fertilizers. Detrimental to beer flavor (nitrites only). These can be produced by bacteria during beermaking. Levels as low as 25 ppm can be detrimental.

Calcium

Reacts with phosphates present in the malt to acidify the mash. A slightly acidified mash will enhance enzymatic reactions. Ideal concentration depends on style, usually you might wish to have a minimum of 50 ppm with an exception of pils.

Sulfate

Not important in mashing.

Helps draw increased bitterness from the hop during boiling and contributes a drying bitterness to the beer. In excess of 550 ppm, can promote undesirable types of bitterness.

Magnesium

Similar to calcium in reactions, but to a lesser degree. In limited amounts, it's beneficial to yeast metabolism.

Chloride

Accentuates malty characters. Becomes especially evident above 200 ppm.

Sodium

Works with chloride (NaCl). Desirable up to 70 ppm. Above 150 ppm, a salty character begins to interfere with the desirability of the flavor.

Carbonate

Alkaline in nature and neutralizes acids (acts as a buffer). Counteracts some of the benefits of calcium. Contribute to an increase in color extraction during sparging. Undesirable at levels above 50 ppm.

Bicarbonate

Twice the buffering capacity of carbonate. 25 ppm bicarbonate has the buffering capacity of 50 ppm carbonate.

Choice of salts:

Calcium sulfate (gypsum)

Very common! Good source of calcium and sulfate for Burton-On-Trent water.

Calcium Carbonate

Common food additive. Carbonate is a downside, but it's safe for adding calcium up to about 40-50 ppm.

Magnesium carbonate

(see Calcium Carbonate)

Sodium Chloride (table salt)

You shouldn't really need to raise the sodium or chloride ionic strength.

Magnesium Sulfate (Epsom Salt)

Can commonly be used as a laxative. Many sources will suggest using Epsom salts because of their availability. Will react somewhat like gypsum when added to mash. Do you want to add a laxative to your mash?