

Chris L APA/IPA Water Calc 12Feb15

Step 1: Enter Starting Water Profile

A. Profile

	Calcium (Ca ppm)	Magnesium (Mg ppm)	Sodium (Na ppm)	Chloride (Cl ppm)	Sulfate (SO ₄ ppm)	<input checked="" type="radio"/> Bicarbonate (HCO ₃ ppm) <input type="radio"/> Alkalinity (CaCO ₃ ppm)
Starting Water Profile: (ppm = mg/L)	60	22	84	86	190	165

B. Volume

	Mash Water	Sparge Water
Volume (gallons):	9.25	8
% that is Distilled or RO:	0%	0%

If your water report gives Sulfate as Sulfur (SO₄-S) such as a Ward Lab's report, multiply by that by 3 to get SO₄

Step 2: Enter Grain Info

Crystal Malt:
Caramel malts, Cara Munich, Cara Aroma, etc.

Roasted/Toasted Malt:
Roasted Barley, Black Patent, Carafo, etc.

Acidulated Malt:
Enter in Step 4a.

Select Grain Type	Weight (lb)	Color (°L) (Crystal Malts Only)	Distilled water Mash pH (from chart)
Base - 2-Row ▼	24	3.2	5.70
Crystal Malt ▼	2	40	5.02
Base - Munich ▼	1	10	5.43
Base - Vienna ▼	1	3.5	5.56
- Select Grain - ▼	0	0	0.00
- Select Grain - ▼	0	0	0.00
- Select Grain - ▼	0	0	0.00
- Select Grain - ▼	0	0	0.00
- Select Grain - ▼	0	0	0.00
Total Grain Weight (lb):		28	
Mash Thickness:		1.32 qt/lb	

grain types	dist water pH
1 - Select Grain -	
2 Base - 2-Row	5.70
3 Base - 6-Row	5.79
4 Base - Maris Otte	5.77
5 Base - Munich	5.43
6 Base - Pilsner	5.75
7 Base - Wheat	6.04
8 Base - Vienna	5.56
9 Base - Other	5.70
10 Crystal Malt	calculated
11 Roasted/Toasted	4.71

The above values are used to calculate mash pH. They may vary depending on maltster or other factors - for example Rahr 2-Row has been found to be 5.56. Modify if necessary.

Step 3: View Mash pH

Effective Alkalinity (CaCO ₃ ppm)	Residual Alkalinity	ESTIMATED Room-Temp Mash pH	Desired Room-Temp Mash pH
-32	-147	5.49	5.4 - 5.6

Note: When measuring actual mash pH with a meter, keep in mind that it can take up to 15 minutes for mash pH to stabilize.

There are varying opinions on the optimum range here. Consider doing your own research and/or experimentation to determine what's best for you.

Step 4a: Adjust Mash pH DOWN (if needed)

	Gypsum CaSO ₄	Calc. Chloride CaCl ₂	Epsom Salt MgSO ₄
Mash Water Additions (grams):	8	4	0
Adjusting Sparge Water? (y/n):	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Sparge Water Additions (grams):	0.0	0.0	0.0

acid content:	Acidulated Malt	acid content:	Lactic Acid
oz:	2.0%	ml:	88%
(0% of total wt)	0	Typically 2.0%. Revise if necessary.	5

Some recommend keeping this under 3%.

Step 4b: Adjust Mash pH UP (if needed)

	Slaked Lime Ca(OH) ₂	Baking Soda NaHCO ₃	Chalk CaCO ₃
Mash Water Additions (grams):	0	0	0
Adjusting Sparge Water? (y/n):	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Sparge Water Additions (grams):	0.0	0.0	0.0

Calculations for chalk's true affect on pH are very complex and may require an acid to fully dissolve. This spreadsheet uses half of chalk's full potential based on experimental data w/o acid addition. Results may vary.

Step 5: View Resulting Water Profile

	Calcium (Ca ppm)	Magnesium (Mg ppm)	Sodium (Na ppm)	Chloride (Cl ppm)	Sulfate (SO ₄ ppm)	Chloride / Sulfate Ratio
Mash Water Profile:	143	22	84	141	317	0.44
Mash + Sparge Water Profile:	105	22	84	116	258	0.45
Palmer's Recommended Ranges:	50 - 150	10 - 30	0 - 150	0 - 250	50 - 350	Below .77, May enhance bitterness

There are varying opinions on these ranges. Consider doing your own research and/or experimentation to determine what's best for you.

Mid-Points	100	20 - Accentuates Flavor	75 - Sour/Salty	125 - Enhances Flavor & Fullness	200 - Dry Fuller Flavor & Sharpness	1.35 - < .77 Enhance Bitterness - > 1.3 Enhance Maltiness
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