Treating Portland Water With Style

by Gary Corbin

Basics Style considerations Technical details

Most homebrewers understand and pay proper attention to the contributions that malt, hops, and yeast each make to the flavor and character of their beer. Many, however, overlook the role of their brew's most plentiful ingredient: water. But the pH, mineral content, and hardness of brewing water can significantly affect the all-grain brewer's ability to extract fermentable sugars from the grain, and hence, the brewer's ability to obtain the desired flavor profile for a particular style of beer.

This article takes a practical look at the mineral treatment of Portland (Bull Run Reservoir) water for brewing purposes, and in particular, for brewing different styles of beer.

Basic water treatment

One of the easiest steps you can take to improve the character of your water is to boil all brewing water for 15-30 minutes a day in advance of brewing, then cool and decant it out of the kettle. This removes the chlorine from the water (abundant in most city water supplies) and precipitates out undesired dissolved solids (particularly carbonates). It also has the effect of moderating your water's pH — an important factor in mashing. Alternatively, you can use an activated carbon filter to remove most of the chlorine and solids right at the tap.

The pH of most tap water, including Portland's, is basically fine for brewing. The key is to make sure your mash (not brewing water) has a pH of 5.0 - 5.5. The water you begin with will likely have a much higher pH than this, but it will drop significantly once you mix in the grist. Once you've adjusted the mineral content of your water (see below), use pH papers or a pH meter to measure the pH of the mash to make sure you're in the range.

If you find you need to lower the pH, you have at least a few easy options. One, adjust the mash with a small quantity of lactic or other mild acids. Second, you could do an acid rest: resting the mash at about 95 degrees F. for 20 or so minutes.1 Your third option — recommended for beginning mashers using Portland water — just don't worry while you relax and have a homebrew.

Style considerations

Many beer styles are associated with particular cities -- for instance, Pale Ales with Burton-upon-Trent, England; Stouts with Dublin, Ireland; and so on. Part of the reason that these beers were successful in their respective cities, and became so closely associated with these cities, is that the character of the cities' water is particularly well-suited to the characteristics of the beer style. For example, the hard water of Burton-upon-Trent is high in sulfates, which accentuates hop bitterness and flavor. It stands to reason, then, that if we can treat Portland's water to match Burton-upon-Trent's water, then we should be able to produce a more authentic IPA.

Fortunately, the water we get in Portland is soft and low in most minerals. Thus, all we need to do is add the appropriate salts in the right proportion to emulate the target city's water.

Technical details

The mineral content of Portland's water is summarized in Table I (Source: Bureau of Water Works, 1993). Table II summarizes the impact of adding 1 gram of a given salt to 1 gallon of water.

Table I: Portland Water

Calcium	Magnesium	Sodium	Chloride	Sulfates	Carbonates	Hardness
1.8	0.75	1.6	10	0.5	7.5	8.6

Table II: Effect (+ppm) of adding 1 gram of salt per gallon of water

Salt	Calcium	Magnesium	Sodium	Chloride	Sulfates	Carbonates	Hardness
Baking soda			75			190	190
Calcium chloride	72			127			0
Chalk	106					159	159
Epsom salts		26			103		26
Gypsum	62				148		0
Table salt			104	160			0

Given the water characteristics of a given city, we can now apply these salts to Portland's water to approximate the water characteristics of that city. Table III summarizes the water characteristics of several cities important in the brewing world, and notes the style of beer associated with each city. For each city in the table, the first line summarizes the characteristics of the water actually in that city; the second line is Portland water, adjusted with brewing salts. The amount of salts added per gallon is given in Table IV.

Table III: Beer Styles and Water Characteristics of Brewing Cities
(Second line: Portland Water, adjusted as per Table IV)

City/Style	Calcium	Magnesium	Sodium	Chloride	Sulfates	Carbonates	Hardness
Burton-on-Trent	295	45	55	25	725	300	850
Pale Ales	*294*	*45*	*54*	*10*	*620*	*300*	*345*
Dortmund	250	25	70	100	280	550	750
Malty, bitter ambers	*250*	*24*	*77*	*99*	*212*	*420*	*445*
Dublin	115	4	12	19	55	200	300
Dry stouts	*116*	*1*	*17*	*10*	*45*	*189*	*190*
Edinburgh	120	25	55	20	140	225	350
Malty Ales, low bitterness	*120*	*24*	*50*	*50*	*123*	*224*	*248*
London	50	20	100	60	80	160	400
Porter	*50*	*14*	*62*	*74*	*82*	*160*	*174*
Munich	75	20	10	2	10	200	250
Dark malty lagers	*76*	*1*	*2*	*10*	*1*	*119*	*120*
Pilzen	7	2	2	5	5	15	30
Light lagers	*2*	*1*	*2*	*10*	*1*	*8*	*9*
Vienna	200	60	8	12	125	120	750

Oktoberfest	*192*	*1*	*2*	*10*	*126*	*214*	*215*

Table IV: Portland Water Treatment (grams/gallon)
(See Table III for results)

City	Baking Soda	Calcium Chloride	Chalk	Epsom Salts	Gypsum	Table Salt
Burton-on-Trent	3.5		5.	8.5	15.	
Dortmund	5.	3.5	7.	4.5	4.	
Dublin	1.		4.5		1.5	
Edinburgh	1.5		5.	4.5	1.	1.25
London	4.	2.5		2.5	1.	
Munich			3.5			
Pilzen	0	0	0	0	0	0
Vienna			6.5		4.25	

Water treatment is another tool for the all-grain brewer to use to control the yield of the mash and flavor of the finished beer. The different flavor profiles associated with each style depend in part on the pH, mineral content, and hardness of the brewing water. However, your mash will tolerate significant deviations in mineral content from those found in the city of a particular style's origin, and in fact avoiding the extremes of some cities' water is probably a good idea. The minimalist approach is best; start on the low side, experiment, take good notes, record your results, and adjust accordingly the next time.

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