

# Water Cheat Sheet

Monday, June 24, 2019 19:50

What	PH
Pilsner Malt with Distilled Water	7
Mash of above ends up as	5.7 - 5.8
Target Mash PH	5.1 - 5.5
Dark or crystal Malt for 20% of grain bill	.5 PH reduction
Yeast need how much Magnesium (mg)	10 - 20 PPM

## Famous Brewing Waters

Mineral	Calcium	Magnesium	Sodium	Sulfate	Bicarbonate	Chloride
Plzen	10	3	3	4	3	4
Dortmund	225	40	60	120	220	60
Munich	109	21	2	79	171	36
Edinburgh	100	18	20	105	160	45
Vienna	163	68	8	216	243	39
Dublin	118	4	12	54	319	19
London	52	32	86	32	104	34
Burton	352	24	44	820	320	16

**Pilzn** - The very low hardness and alkalinity allow the proper mash pH to be reached with only base malts. These characteristics, combined with the lack of sulfate, yields the rounded malt character and mellow hop bitterness of the Czech Premium Pale Lager style.

**Dortmund** – The higher level of all minerals in this city and other regions of Northern Germany enables brewers of the Dortmunder Export and German Pils styles to produce pale lagers that are bolder, drier, and lighter in color than their counterparts from the Czech Republic.

**Munich and Edinburgh** – The mineral profiles of the waters of these cities are remarkably similar. The darker malts used to brew amber and dark German lagers and Scottish ales balance the carbonates and acidify the mash, yielding a very smooth malt character. The relatively low sulfate content also provides a mellow hop bitterness.

**Vienna** - The level of calcium in the water of this city is too low to balance the bicarbonate level to achieve a sufficiently low pH when brewing pale colored lagers. However by kilning malt at higher temperatures, the malt developed more color and acidity, and this led to the birth of the reddish-amber colored Vienna lager style.

**Dublin** – The water from this city has an ever greater imbalance of calcium and bicarbonate than Vienna, and this led to creation of the Irish Stout style, which is brewed using a high percentage of roasted barley and malts. This style has a relatively high IBU level, but the finish is softened by the low levels of sodium, chloride and sulfate in the water.

**London** - The bicarbonate level of London water is nearly twice that of calcium, and brewers were forced to use a higher percentage of dark malts to balance the mash pH. The high sodium content and low sulfate content of the water help smooth out the flavor profile of brown British beers such as Dark Mild and English Porter.

**Burton-on-Trent** – The calcium and sulfate are both much higher than for any other city listed in the table above, but the calcium is nearly perfectly balanced by the bicarbonate. This enabled brewers to produce British Bitters which were lighter in color than the ales brewed in London. The high level of sulfate and low level of sodium produce an assertive, clean hop bitterness.