

WATER AND WATER TREATMENT (Jan/Feb 1986)

The following was taken from a September 1982 Crescent City Homebrewer's Education Series.

The basic premise of brewing: hard, neutral water is necessary for brewing a light/pale lager or ale, while soft, neutral water is desirable for brewing a dark lager, porter or stout.

What is hardness?

Hardness relates to the amount of calcium and magnesium salts (bicarbonates, carbonates, sulfates) that are in solution. We can ignore the bicarbonates and carbonate content of our water because these salts will precipitate out upon boiling. However, we must be concerned with the amount of calcium and magnesium sulfate in the water because these two salts are unaffected by boiling and will remain in solution as permanent hardness!

Permanent Hardness	Classification
0 – 100 ppm	Soft
100 – 200 ppm	Medium Soft
200 – 400 ppm	Moderately Hard
400 – 600 ppm	Hard
Above 600 ppm	Very Hard

Permanent Hardness		Classification
Ozone	10.3 ppm	Soft
Kentwood	3 ppm	Soft
S&W Board	99.9 ppm	Soft

It is important to note that all three waters have a low permanent hardness and are considered to be soft.

How hard should the water be?

That depends of the type of beer you plan to brew!

		Table 3
Pale Ale		Hard Water
Light Ale		Hard Water
Medium (Mild) Ale		Moderately Hard Water
Dark (Brown) Ale		Soft Water
Porter		Soft Water
Stout		Soft Water
Light Lager		Soft to Hard Water
Pale Lager		Miller (1981)* recommends that the water contain 360 ppm of sulfate.
Dark Lager		Soft Water

Is permanent hardness really that important?

If you use canned or powdered malt extract for your light beers or ales, then the permanent hardness of the water is not that important. The main reason for this is that malt extract is made by boiling the grain solution until the water is evaporated, however the minerals that were contained in the water remain in the malt extract! Still, many homebrewers include gypsum (calcium sulfate) in their recipes, as it acts to mellow the hop flavor, and produces a drier beer with greater clarity. Permanent hardness is very important when making an all grain beer.

How much gypsum do you add?

According to Miller (1981)*, a ½ teaspoon (tsp.) of gypsum per US gallon of water will yield approximately 510 ppm (150 ppm Ca + 360 ppm SO₄) of permanent hardness. Therefore, a ½ tsp. of gypsum per gallon of Ozone or Kentwood will give you hard water. For moderately hard water, just add ¼ tsp. per gallon. If you must use tap water, use ¼ tsp. of gypsum for moderately hard water or 3/8 tsp. per gallon for hard water.

References

*Miller, Dave HOME BREWING FOR AMERICANS, Andover, England: THE AMATEUR WINEMAKER.