

HARDNESS

Hardness is a measure of the concentration of calcium and magnesium salts in water. They are generally present as bicarbonate salts. Water hardness is derived largely from contact with soil and rock formations. Hard waters usually occur where topsoil is thick and limestone formations are present. Soft waters occur where the topsoil is thin and limestone formations are sparse or absent.

SIGNIFICANCE

Hard and soft waters are both satisfactory for human consumption. However, consumers may object to hard water because of scaling problems it causes in household plumbing fixtures and on cooking utensils. Hardness is also a problem for industrial and commercial users because of scale buildup on boilers and other equipment.

Water most satisfactory for household use contains about 75 to 100 mg/L as CaCO₃. Waters with a hardness of 300 mg/L as CaCO₃ are generally considered too hard. A recent trend in water plant softening has been to partially soften water to 75 to 150 mg/L as CaCO₃, which reduces chemical costs over complete softening and provides water acceptable to the consumer.

Very soft waters, found in some sections of the United States, have hardness concentrations of 30 mg/L as CaCO₃ or less. These waters are generally corrosive and are sometimes treated to increase hardness.

TABLE 11-1 Comparative classifications of water for softness and hardness

Classification	mg/L as CaCO ₃ *	mg/L as CaCO ₃ +
Soft	0 – 75	0 – 60
Moderately hard	75 – 150	61 – 120
Hard	150 – 300	121 – 180
Very hard	Over 300	Over 180

Source: Adopted from Sawyer 1960 and Briggs and Ficke 1977.

*Per Sawyer (1960)

+Per Briggs and Ficke (1977).

Patoka Water's Hardness is approximately 95 mg/L as CaCO₃.