

Estimating Chlorine Dosage, Feed Rate, and Residual:

Chlorine is a useful disinfectant for wastewater treatment and can be introduced in liquid, gas, or solid form. The required chlorine dosage for wastewater treatment depends on a variety of factors including the chlorine demand of the wastewater, the availability of de-chlorination, detention time, and regulatory limits for chlorine residuals in a systems wastewater discharge. To calculate the chlorine demand of your system, a system needs to record their feed rates of chlorine and analyze the residual chlorine in their system after chlorine treatment. The chlorine residual (mg/L) is subtracted from the chlorine dosage (mg/L) to determine the chlorine demand (mg/L). Chlorine residuals can be measured utilizing a simple colorimetry test. De-chlorination is typically required when using chlorine for disinfection due to the hazard chlorine presents to wildlife and public health.

Dechlorination is accomplished through a variety of processes, including aeration and sulfur dioxide, which is often favorable, because a 1:1 ratio is often sufficient for dechlorination. A chlorine residual of 0.1 mg/L can be hazardous to fish, and a chlorine residual of 0.3 mg/L can be fatal to fish. Wastewater operators typically determine their required chlorine dosage/ feed rate by continuously testing their chlorine residual using a colorimetry test and adjusting their feed rate as needed. The SWEFC has created a spreadsheet to assist operators in estimating their required feed rate, required chlorine dosage, and likely chlorine residual.

Equation 1:

Input your average flow rate in millions of gallons per day (MGD) and desired chlorine dosage (mg/L) to calculate your needed chlorine feed rate (lbs/day), which is highlighted in purple.

Equation 2:

Input your average flow rate (MGD), desired chlorine residual (mg/L), and typical chlorine demand (mg/L), to calculate your required chlorine dosage (mg/L) and required chlorine feed rate (lbs/day), which are highlighted in purple. The chlorine residual will be determined by your NPDES permit or other regulatory requirements. The typical chlorine demand is determined by troubleshooting as described above and usually ranges between 5-20 mg/L for wastewater after biological treatment.

Equation 3:

Input your average flow rate (MGD), chlorine feed rate (lbs/day), and typical chlorine demand (mg/L), to calculate your corresponding chlorine dosage (mg/L) and required chlorine residual (lbs/day), which is highlighted in purple. The typical chlorine demand is determined by troubleshooting as described above and usually ranges between 5-20 mg/L for wastewater after biological treatment.