

Exercise 2

Target MCRT Calculation

Use the attached worksheet to calculate the target aerobic MCRT for the following conditions:

Temperature = 20° C

Average Effluent NH_4^+ - N = 1 mg/L

Average Aeration Tank DO = 3 mg/L

Assume Tank is a Complete Mix System

Calculation of Target Mean Cell Residence Time for Nitrification

Required Input Data

- (1) Average Temperature in Aeration Tank, T _____ °C
- (2) Average Effluent Ammonia Concentration _____ mg/L (as N)
- (3) Average Aeration Tank Dissolved Oxygen Concentration _____ mg/L

Determine Maximum Specific Growth Rate Corrected For Temperature ($\mu_{\max, T}$)

(4) $\mu_{\max, T} = (0.65) * (1.055)^{(T - 25)}$

(5) $\mu_{\max, _} = (0.65) * (1.055)^{(_ - 25)} = _ \text{ day}^{-1}$

Enter temperature in °C from line (1)

Determine Decay Rate Corrected For Temperature (k_d)

(6) $k_d = (0.05) * (1.055)^{(T - 25)}$

(7) $k_d = (0.05) * (1.055)^{(_ - 25)} = _ \text{ day}^{-1}$

Enter temperature in °C from line (1)

Determine Growth Rate Correction Factor For Ammonia Concentration

$$(8) \quad CF_{NH_4^+} = \frac{NH_4^+-N}{K_N + NH_4^+-N}$$

$$(9) \quad K_N = (1.0) * (1.055)^{(T - 25)}$$

$$(10) \quad K_N = (1.0) * (1.055)^{(\underline{\quad} - 25)} = \underline{\quad} \text{ mg/L}$$

Enter temperature in °C from line (1)

$$(11) \quad CF_{NH_4^+} = \frac{\underline{\quad}}{\underline{\quad} + \underline{\quad}} = \underline{\quad}$$

Enter K_N from line (10) Enter effluent ammonia from line (2)

Determine Growth Rate Correction Factor For Dissolved Oxygen Concentration

$$(12) \quad CF_{DO} = \frac{DO}{1 + DO}$$

$$(13) \quad CF_{DO} = \frac{\underline{\quad}}{1 + \underline{\quad}} = \underline{\quad}$$

Enter DO from line (3)

