

ASSIGNMENT 4: Due Thursday, Feb. 28

- 1. Develop formulas for the minimum $\Theta_{\min}$ for COD oxidizing biomass and for nitrifying biomass using the parameters given in the example.**
- 2. Calculate these values and compare with the spreadsheet.**
- 3. Specify the CSTR volume and solids retention time (Θ) you would choose for this example and justify your answer.**
- 4. Show the effect of decreasing the Y_H to 0.4 on $\tau_{\min}$ with nitrification.**
- 5. Calculate the viable heterotrophic and nitrifying biomass at the design Θ and τ .**
- 6. What would be the advantages of operating this CSTR-biomass recycle process at lower than maximum oxygen supply rate?**
- 7. Evaluate the sensitivity of the model predictions for COD and ammonia removal and minimum hydraulic residence time ($\tau_{\min}$) to the variation in the decay coefficient, b , and the maximum specific growth rates for heterotrophic and autotrophic bacteria, $\hat{\mu}_H$ and $\hat{\mu}_A$. The range of variation in the growth and decay parameters should be $\pm 50\%$. Show the effects graphically: e.g. effluent COD vs b , X_T vs $\hat{\mu}_H$, etc.**