



SESSION 6

HOMEWORK

OPTIMIZING RETURN RATE EXERCISE

This equation,

$$Q_{\text{RASmin}} = \frac{Q \times \text{SSV}_{30}}{1,000 - \text{SSV}_{30}}$$

Can be rearranged to:

$$\frac{Q_{\text{RASmin}}}{Q} = \frac{\text{SSV}_{30}}{1,000 - \text{SSV}_{30}}$$

The factor below and on the left hand side of the equals sign, as calculated (times 100 to get %) is the minimum RAS flow percentage:

$$\frac{Q_{\text{RASmin}}}{Q}$$

Calculate the minimum RAS flow percentage for SSV_{30} s of 125, 150, 175, 200, 250, 300, 400, 500, and 600 mL/L. Comment on the impact that sludge compaction has on the potential for lowering RAS pumping costs.

SSV₃₀, mL/L	RAS flow, % (Q_{RASmin}/Q)
125	
150	
175	
200	
250	
300	
400	
500	
600	

SRT EXERCISE

$$Q_{\text{WAS}} = \left(\frac{V_a}{\text{SRT}_{\text{target}}} \times \frac{\text{MLSS}}{\text{TSS}_{\text{WAS}}} \right) - \left(Q \times \frac{\text{TSS}_{\text{EFF}}}{\text{TSS}_{\text{WAS}}} \right)$$

From experience the process control engineer knows that an SRT target (aerobic) of 7 days will meet the effluent NH₃ requirements during the winter. However, because the supernatant in the modified settleometer test has been turbid, she wants to increase the SRT target to 7.5 days.

From the following recent data, calculate the new WAS flow rate (gal/hr):

$$Q = 2.6 \text{ Mgal/d}$$

$$\text{MLSS} = 2,550 \text{ mg/L}$$

$$V_a = 0.65 \text{ Mgal (aerobic)}$$

$$\text{TSS}_{\text{EFF}} = 16 \text{ mg/L}$$

$$\text{TSS}_{\text{WAS}} = 7,700 \text{ mg/L}$$

$$\text{WAS} = \quad \text{gal/hr}$$