Analyzing activated sludge process

Slide#13 solution)

$$S = \frac{K_s(1+k_d\theta_c)}{\theta_c(\mu_m-k_d)-1}$$

$$10.0\ mg/L = \frac{100\ mg/L\times\left(1+0.050\ day^{-1}\times\theta_c\right)}{\theta_c(2.5-0.050)\ day^{-1}-1}$$

$$10.0\ mg/L \times 2.45\ day^{-1} \times \theta_c - 10\ mg/L = 100\ mg/L + 100\ mg/L \times 0.050\ day^{-1} \times \theta_c$$

$$19.5\ mg/L - day \times \theta_c = 110\ mg/L$$

$$\boldsymbol{\theta_c = 5.6\ days}$$

Analyzing activated sludge process

Slide#14 solution)

$X = \frac{\theta_c Y(S_0 - S)}{t_0(1 + k_d \theta_c)}$

$t_0 = \frac{\theta_c Y(S_0 - S)}{X(1 + k_d \theta_c)} = \frac{5.6\ days \times 0.50 \times (84 - 10)\ mg/L}{2000\ mg/L \times (1 + 0.050\ day^{-1} \times 5.6\ days)} = 0.081\ day$

$t_0 = \frac{Q}{V},\ V = Qt_0 = 0.150\ m^3/s \times 86400\ s/day \times 0.081\ day = \mathbf{1050\ m^3}$