| | | | | | |
|---|---|---|---|---|---|
| Initial concentration | $C_{in}$ | 5 | 25 | 125 | mg/L |
| Particle size | $d_P$ | 0.1 | 1 | 10 | μm |
| Particle size | $d_P$ | 1.00E-07 | 1.00E-06 | 1.00E-05 | meters |
| Collector size | $d_C$ | 0.5 | 0.5 | 0.5 | mm |
| Collector size | $d_C$ | 5.00E-04 | 5.00E-04 | 5.00E-04 | meters |
| Temperature | T | 25 | 25 | 25 | degrees C |
| Temperature | T | 298 | 298 | 298 | degrees K |
| Particle density | $\rho_P$ | 1.05 | 1.05 | 1.05 | $g/cm^3$ |
| Particle density | $\rho_P$ | 1050 | 1050 | 1050 | $kg/m^3$ |
| Water density | $\rho_W$ | 0.978 | 0.978 | 0.978 | $g/cm^3$ from Viessman and Hammer, Table A.8, p. 852 |
| Water density | $\rho_W$ | 978 | 978 | 978 | $kg/m^3$ |
| Bed depth | L | 6.00E-01 | 6.00E-01 | 6.00E-01 | meter |
| Bed porosity | n | 0.4 | 0.4 | 0.4 | |
| Overflow rate | $V_f$ | 15 | 15 | 15 | m/hr |
| Overflow rate | $V_f$ | 0.004166667 | 0.004166667 | 0.004166667 | m/sec |
| Dynamic viscosity of water | μ | 8.90E-04 | 8.90E-04 | 8.90E-04 | kg/(m-s) from Viessman and Hammer, Table A.8, p. 852 |
| Boltzmann constant | κ | 1.38E-23 | 1.38E-23 | 1.38E-23 | $m^2$ kg / (s K) |
| Interception efficiency | $\eta_I = 3/2\ (d_P/d_C)^2$ | 6.00E-08 | 6.00E-06 | 6.00E-04 | |
| Sedimentation efficiency | $\eta_G = (\rho_P-\rho_W)\ g\ d_P^2 / (18\ \mu\ V_f)$ | 1.06E-07 | 1.06E-05 | 1.06E-03 | |
| Diffusion efficiency | $\eta_D = 0.9\ (\kappa T/(\mu\ d_P\ d_C\ V_f))^{2/3}$ | 7.11E-04 | 1.53E-04 | 3.30E-05 | |
| Overall efficiency | $\eta = \eta_I + \eta_G + \eta_D$ | 7.11E-04 | 1.70E-04 | 1.69E-03 | |
| Attachment efficiency | α | 0.2 | 0.2 | 0.2 | |
| Outflow concentration | $C_{out} = C_{in} * \exp(-3\ (1-n)\ \eta\ \alpha\ L/(2\ d_C))$ | 4.29 | 24.10 | 86.77 | mg/L |
| Treatment efficiency | $= 1 - C_{out}/C_{in}$ | 14% | 4% | 31% | |
| Attachment efficiency | α | 1 | 1 | 1 | |
| Outflow concentration | $C_{out} = C_{in} * \exp(-3\ (1-n)\ \eta\ \alpha\ L/(2\ d_C))$ | 2.32 | 20.81 | 20.15 | mg/L |
| Treatment efficiency | $= 1 - C_{out}/C_{in}$ | 99% | 93% | 93% | |