Slide#7

Average settling velocity, m/h (A)	# particles/L x 10^{-5} (B)	Fraction removed (C)	# particles removed/L x 10^{-5} (D)
0.0-0.5	30	0.125	3.75
0.5-1.0	50	0.375	18.75
1.0-1.5	90	0.625	56.25
1.5-2.0	110	0.875	96.25
2.0-2.5	100	1.000	100
2.5-3.0	70	1.000	70
3.0-3.5	30	1.000	30
3.5-4.0	20	1.000	23
total	500	1.000	395.00

(C) = (A) / v_o if (A) < v_o, (C) = 1.000 if (A) ≥ v_o

(D) = (C) x (B)

Slide#7

$$Total\ fraction\ removed = \frac{Total\ \#\ of\ particles\ removed}{Total\ \#\ of\ particles\ in\ the\ influent} \times 100\ (\%)$$

$$= \frac{500 \times 10^5/L}{395 \times 10^5/L} \times 100\ (\%) = 79\%$$

Slide#29

This is the case of absorption of gas in a batch reactor, so use:

$$\frac{C_s - C_t}{C_s - C_o} = e^{-(K_L a)t}$$

$$t = -\frac{1}{K_L a} \cdot ln \frac{C_s - C_t}{C_s - C_o}$$

$$a = \frac{A}{V} = \frac{1}{H} = 0.033\ m^{-1}$$

$$t = -\frac{1}{(0.03\ mhr) \cdot (0.33\ m^{-1})} \cdot ln \frac{9.09 - 8.5}{9.09 - 1.5} = 258\ hr = 10.8\ d$$

You see it takes a long time for surface reaeration from the atmosphere in the absence of mechanical agitation!