SUPPORTING INFORMATION

The efficiency of direct interception by a single fiber was computed as (12)

\[ E_r = \frac{2E_*\ln E_* - E_* + E_*^{-1}}{\Lambda}, \]  

where

\[ E_* = 1 + \frac{d_P}{d}, \]  

\[ \Lambda = 1 - 2\ln \tau + \frac{\tau^2}{6} - \frac{\tau^4}{144} + \frac{\tau^6}{1080}, \]  

\[ \tau = \pi d\sqrt{W^2 + L^2}/(WL). \]

\( W \) and \( L \) are width and length of the mesh opening, respectively, and \( d \) is the fiber diameter.

Direct interception efficiency reaches 100% when particle size is equal to mesh width. Although the model assumes \( d_P \ll d \), the above expressions are still realistic as validated by several other studies where particles are larger than the mesh diameter (12, 17).

The efficiency of diffusional deposition by a single fiber is (12):

\[ E_d = 3.7\Lambda^{-1/3}Pe^{-2/3} + 0.62Pe^{-1}, \]

where \( Pe = dU/D \) is the Peclet number and \( D \) is the diffusion coefficient of the particles. For colloidal particles or non-motile organisms, diffusion arises from Brownian motion and \( D = kT/(3\pi\nu d_P) \), where \( k = 1.38 \times 10^{-23} \) m² kg s⁻² K⁻¹ is Boltzmann’s constant and \( T \) is temperature.

For motile microorganisms diffusivity results from random motility, increasing with swimming speed, and \( D \) was computed using the semi-empirical results of Visser and Kiorboe \((D = 2.8d_P^{1.71}, D \text{ in cm}^2 \text{ s}^{-1} \text{ and } d_P \text{ in cm, ref. 38}).\)

Finally, the total efficiency of a rectangular filter, which was used in the calculations, is (12)
\[
E = \frac{(E_R + E_D)d}{h_E} \left[ 1 - \frac{(E_R + E_D)d}{W + L} \right],
\]

where \( h_E = \frac{WL}{W+L} \) is the equivalent mesh spacing.