Supplementary Appendix

A letter to reconsider the conditions for testing decontaminated N95 respirators for emergency reuse to address shortage

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Equations used in calculating efficiency as a function of face velocity

Note: We considered ambient conditions during calculations.

We calculated the single-fiber efficiency, E_Σ, by summing the individual efficiencies from diffusion, E_D, interception, E_R, and inertial impaction, E_I:

$$E_\Sigma = E_D + E_R + E_I \text{ (Eq. 1)}$$

$$E_T = 1 - e^{\left(\frac{-4E_\Sigma \alpha L}{\pi d_f}\right)} \text{ (Eq. 2)}$$

where E_T is the total efficiency of a filter composed of many fibers in a mat, α is the solidity or packing density of the filter, L is the filter thickness, and d_f is a fiber of diameter.

$$Pe = \frac{d_f U}{D} \text{ (Eq. 3)}$$

where Pe is the Péclet number, U is the face velocity at the filter surface, and D is the diffusion coefficient of the particle.

$$D = \frac{kTC_c}{3\pi\eta d_p} \text{ (Eq. 4)}$$

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in which k is the Boltzmann constant, T is the absolute temperature, η is the air viscosity, d_p is the particle diameter, and C_C is the Cunningham slip correction.

$$C_c = 1 + \frac{\lambda}{d_p}\left[2.33 + 0.966e^{-0.499\frac{d_p}{\lambda}}\right] \text{(Eq. 5)}$$

where λ is the mean free path of the gas molecules.

$$E_D = 2.9\ Ku^{-1/3}Pe^{-2/3} \text{ (Eq. 6)}$$

Ku is the hydrodynamic factor, or Kuwabara number:

$$Ku = -0.5\ln\alpha - 0.75 + \alpha - 0.25\alpha \qquad \text{(Eq. 7)}$$

$$E_R = \frac{1+R}{2Ku}\left[2\ln(1+R) - 1 + \alpha + \left(\frac{1}{1+R}\right)^2 \times \left(1 - \frac{\alpha}{2}\right) - \frac{\alpha}{2}(1+R)^2\right] \text{(Eq. 8)}$$

in which R is the interception effect:

$$R = \frac{d_p}{d_f} \text{ (Eq. 9)}$$

The dimensionless Stokes number, *Stk*, is:

$$Stk = \frac{\rho_p {d_p}^2 C_c U}{18\eta d_f} \text{ (Eq. 10)}$$

where ρ_p is the density of the particle.

$$E_I = \frac{Stk}{(2\ Ku)^2}\left[(29.6 - 28\alpha^{0.62})R^2 - 27.5R^{2.8}\right] \text{(Eq. 11)}$$