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Modeling the filtration ability of stockpiled filtering facepiece. DANA R. ROTTACH, National Personal Protective Technology Laboratory, NIOSH, CDC — Filtering facepiece respirators (FFR) are often stockpiled for use during public health emergencies such as an infectious disease outbreak or pandemic. While many stockpile administrators are aware of shelf life limitations, environmental conditions can lead to premature degradation. Filtration performance of a set of FFR retrieved from a storage room with failed environmental controls was measured. Though within the expected shelf life, the filtration ability of several respirators was degraded, allowing twice the penetration of fresh samples. The traditional picture of small particle capture by fibrous filter media qualitatively separates the effect of inertial impaction, interception from the streamline, diffusion, settling, and electrostatic attraction. Most of these mechanisms depend upon stable conformational properties. However, common FFR rely on electrets to achieve their high performance, and over time heat and humidity can cause the electrostatic media to degrade. An extension of the Langevin model with correlations to classical filtration concepts will be presented. The new computational model will be used to predict the change in filter effectiveness as the filter media changes with time.

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