

## Unveiling the Barrier: A Simulation Study on Face Mask Filtration

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In recent years, there has been significant discussion surrounding fibrous filters, particularly in relation to respiratory masks. Manufacturing fibrous filters involves paying close attention to the sticking coefficient of fibers and ensuring its stability under different climatic conditions. This paper presents an optimal range of filter characteristics that maximize filtration efficiency, considering factors such as sticking coefficient, inter-fiber distance, and fiber diameter. The findings were obtained through computational modeling of aerosol diffusion within fibrous filters. The identified optimal region demonstrates that achieving nearly maximum filtration efficiency does not require indiscriminately increasing the sticking coefficient; surpassing a marginal value of 0.5 is sufficient. This outcome can prevent unnecessary overdesign and contribute to reducing production costs.

**Keywords:** Aerosol filtration, Fibrous filters, Face masks, Computer modelling, Sticking coefficient.