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Nanoparticle collection efficiency of capillary pore membrane filters.

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Abstract
The surface and overall collection efficiencies of capillary pore membrane filters were measured for sub-micrometer particles. Collection efficiencies were derived from the surface loadings of particles on filters measured by scanning electron microscopy and from airborne particle concentrations measured with a scanning mobility particle sizer. Tests used filters with nominal pore diameters of 0.4 and 0.8 μm and face velocities of 3.7 and 18.4 cm/s. Surface collection efficiencies were below 100% for particles smaller than 316 nm and below 55% for particles smaller than 100 nm. Overall collection efficiencies reached as low as 45% for 70 nm particles. For nanoparticles, collection efficiencies overall were substantially higher than those to the filter surface, indicating that deposition occurs to a large extent inside the filter pores. These results underscore the need to account for surface collection efficiency when deriving airborne concentrations from microscopic analysis of nanoparticles on capillary pore membrane filters.

Keywords: Nanoparticle; Filter; Efficiency; Air sampling