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Assessing the need for neutralizing KCl filter testing aerosol

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Abstract

Tests for particle capture by fibrous filters should mimic the charge conditions of natural aerosols. These normally exist in approximate Boltzmann equilibrium, where equal numbers of positive and negative charges are distributed on the aerosol particles, and those numbers are small. To mimic this condition in a generated test aerosol, experimenters have employed aerosol neutralizers, chiefly those using radioactivity and those using bipolar corona discharges. Corona neutralizers can handle larger aerosol flows, and avoid licensing problems. Neutralizers are designed to flood the aerosol with equal numbers of positive and negative ions. Accomplishing this by using bipolar corona neutralizers is a sensitive control problem. A simple instrument - the Faraday cage aerosol charge detector - can measure the net charge on an aerosol cloud continuously. If the distribution of particle diameters and total particle count are also measured, one can determine the degree to which the charge on the aerosol deviates from the theoretically calculated Boltzmann Equilibrium. We report such measurements made on DEHS and KCl aerosols generated by some filter test procedures, to determine whether neutralization is actually needed for these aerosols. The loss of particles in various types of feed tubing is also reported.

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