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Filtration of aerosols

C.N. Davies

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Abstract

Filters for aerosols and for particles in liquids work by three similar mechanical processes but, in each, the range of particle size over which the mechanism is effective differs from air to liquid; there are also substantial differences in the ways in which electrical forces act. The design of air filters has followed various routes dictated by practical needs. Apart from cleaning air there are other situations in which an understanding of particle deposition is essential, not on filter elements but in machinery, on aircraft, on water droplets in nature and in industrial situations, on plants and vegetation and in the respiratory tract. The basic processes are the same as those operating in filters but fluid mechanical factors are often very different. Particle transport, which is a generalization of filter penetration by aerosols, is of wide significance on a global scale.

Filtering efficiency model that includes the statistical randomness of non-woven fiber layers in facemasks

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Soy protein isolate/bacterial cellulose composite membranes for high efficiency particulate air filtration

2017, Composites Science and Technology

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>
> ...Particulate air filters are made of porous fibrous membranes that only target solid particle pollutants. The filtration function is mainly realized via four simple and physical capturing mechanisms including sieving, inertial impaction, interception, and diffusion [11]. The sieving mechanism is based on the particle size being larger than the pore size of the material to filter the large particles....

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Permeability and compression of fibrous porous media generated from dilute suspensions of fiberglass debris during a loss of coolant accident

2015, Nuclear Engineering and Design

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>
> ...The Kozeny constant was calculated in Fig. 19 using the parameters previously obtained at U = 0.31 cm/s and U = 0.52 cm/s (1.7 < Rem < 2.8). The Kozeny constants were compared to the empirical models of Davies (1983), Ingmanson et al. (1959), and Lord (1955) and to theoretical models of Happel (1959) and Kuwabara (1959). The experimental results from both strainers followed the model proposed by Lee et al. (2014a,b), which was developed for NUKON fibrous debris prepared using the shredder method....

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A review based on a paper presented at Euromech 161. “Coalescence and Deposition of Aerosol Particles”, University College London, 27–29 September 1982.

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