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# Nanoparticles remotion using fibrous filters

J. Steffens(1)*, J. R. Coury(1), and C. Steffens(2)

(1) Chemical Engineering Department – Universidade Federal de São Carlos, Rodovia Washington Luís, km 235 – CP: 676 – CEP: 13560-970, São Carlos – SP – Brazil, e-mail: julianasteffens@yahoo.com.br

(2) (1) Alan G. MacDiarmid Institute for Innovation and Business and National Nanotechnology Laboratory for Agribusiness (LNNA), Embrapa Instrumentação Agropecuária, P. O. Box 741, 13560-970, São Carlos, SP, Brazil.

* Corresponding author

**Abstract** – In this work have used cellulose fibrous filter (HEPA), and polyester filter, to retained nanometer particles of NaCl, generated from a particle generator.The efficiency of the filter was obtained by counting of particles before and after the filter, using a particle counter. The collection mechanism that predominated was the diffusion due the particles to be of very small size. The calculated values of efficiency from the existing correlations had been minors who those gotten experimentally, in both filters.

One of the more frequently used devices for the removal of particulate matter in gaseous media is the fiber filter, which is known to have high removal efficiency in a large particle size range [1,2].The filter consists of a non-woven bed of cellulose fibers of different diameters (ranging typically from 20 to 0.5 microns), with porosities in the range of 90%. Due to its ability for efficient removal of small particles, these filters are extensively used in special applications as clean rooms and controlled ambient, and their operation performance in the removal of micron-sized particles has been extensively studied, both theoretically and experimentally. The same cannot be said about its behavior concerning nano-size particle removal. In this size range, the number of experimental results available is scarce [3, 4, 5] and the theoretical treatment of the filter performance is poor. Nevertheless, the evidences so far indicate that the fiber filters maintain their performance in the nano-size range [6].

In this work have used cellulose fibrous filter (HEPA), and polyester filter, to retained nanometer particles of NaCl, generated from a particle generator (Fig. 1a). The particles had presented sizes varying 9 and 93 nm. The efficiency of the filter was obtained by counting of particles before and after the filter, using a particle counter. The tests had been carried in the velocities of 3.0 until 25.0 cm/s. The experimental results had shown that the cellulose filter presents efficiency above of 0,9999 (Fig. 1b). On the other hand the polyester filter provides lesser efficiencies that filter HEPA, or either efficiency of 0,510, had homogeneous fibrous to be of bigger size. The experimental results had been compared with correlations of literature (Fig. 1c for HEPA filter). The collection mechanism that predominated was the diffusion due the particles to be of very small size. The calculated values of efficiency from the existing correlations had been minors who those gotten experimentally, in both filters.

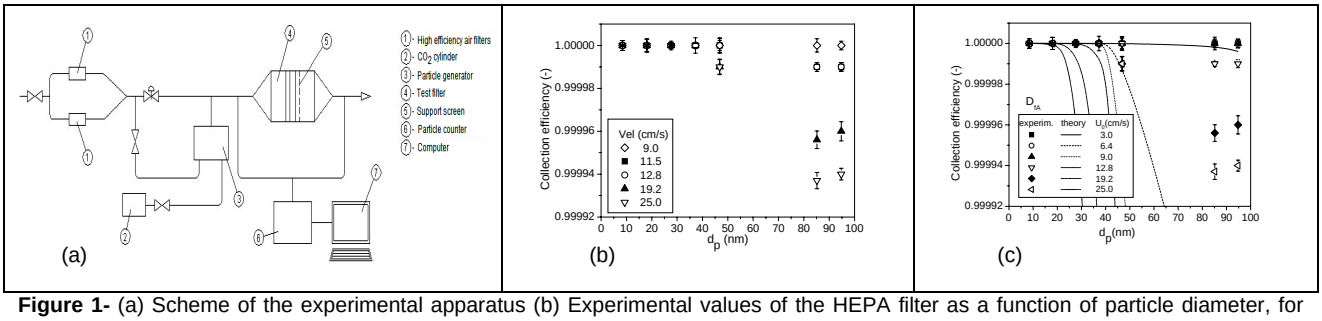


**Figure 1-** (a) Scheme of the experimental apparatus (b) Experimental values of the HEPA filter as a function of particle diameter, for gas velocities from 9.0 to 25.0 cm/s (c) Experimental efficiency and the respective theoretical predictions calculated utilizing the Literature equations.

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