



## Aerosol filtration by fibrous filters—II. experimental ☆

Hsu-Chi Yeh <sup>†</sup>, Benjamin Y.H. Liu <sup>‡</sup>

Show more ▾



Outline



Share



Cite

[https://doi.org/10.1016/0021-8502\(74\)90050-0](https://doi.org/10.1016/0021-8502(74)90050-0)

[Get rights and content](#)

### Abstract

A previously developed theory of aerosol filtration by fibrous filters has been verified using filters of uniform sized fibers and monodisperse aerosols of D1-2-ethylhexyl phthalate (DOP). The filters consisted of dacron fibers of  $11.3\ \mu\text{m}$  dia. and the DOP particles ranged in size from  $0.37$  to  $1.07\ \mu\text{m}$ . Filter fiber volume fraction was varied between  $0.013$  and  $0.085$ , and the filtration pressure from  $0.2$  to  $1\ \text{atm}$ . The experimental results, together with similar results reported by other investigators, were compared with the theoretically predicted values and good agreement was found.



Previous

Next



[Recommended articles](#)

Cited by (29)

[Numerical investigation of coalescence filtration: Multiphase flow through fibrous structures](#)

[Show abstract](#) ✓

## Performance of fabrics for home-made masks against the spread of COVID-19 through droplets: A quantitative mechanistic study

2020, Extreme Mechanics Letters

[Show abstract](#) ✓

## Enhancement of filtration efficiency by electrical charges on nebulized particles

2018, Particuology

### *Citation Excerpt :*

...Original NaCl aerosol and neutralized NaCl aerosol passing through a neutral HEPA filter. Because gravitational settling effects of the particles were calculated to be negligible, the single fiber efficiency was considered in terms of five components, as shown in Eq. (10) (Hinds, 1999):  $E\Sigma = E_D + E_R + E_{DR} + E_I + E_E$ , where  $E_D$  is the single fiber efficiency contribution of the diffusion effect, given by an equation based on the original work of Davies (1950);  $E_R$  is the single fiber efficiency contribution of the interception effect, and is described by an equation based on the original work of Kuwabara (1959);  $E_{DR}$  is the contribution to the single fiber efficiency from the action of diffusion on the interception effect, and its calculation is based on the original work of Davies (1950);  $E_I$  is the contribution to the single fiber efficiency from the impaction effect, and its calculation is based on the original work of Yeh and Liu (1974);  $E_E$  is the contribution to single fiber efficiency from the electrostatic effect. When the tested particles or filters carry extra charge, the filtration efficiency is increased by electrostatic effects....

[Show abstract](#) ✓

## Plasma textiles as fibrous filter media

2017, Fibrous Filter Media

[Show abstract](#) ✓

## Aerosol-mist coalescing filters - A review

2014, Separation and Purification Technology

### *Citation Excerpt :*

...Therefore the capture efficiency of fibrous filters is examined at a simpler (elementary) level; that of the collection of droplets by a single fibre. Utilising this approach, where a single fibre situated perpendicular to the flow direction is considered, a number of authors ([27,109,121], and others) have developed a series of semi-empirical equations that predict the capture efficiency of a single fibre on the basis of individual capture mechanisms. These equations are collectively known as the Single Fibre Efficiency (SFE) theory....

[Show abstract](#) ✓

# A high efficiency particulate air filter based on agglomerated carbon nanotube fluidized bed

2014, Carbon

## Citation Excerpt :

...The removal of small particulates from gas stream is in urgent need. For the filtration of sub-micron particulates, fibrous filters are generally considered due to their relatively high efficiency and reasonable cost [3–10]. However, because of the confined structure of fibrous filters and the formation of dendrites and dust cake with the collection of aerosol particles, fibrous filters tend to be clogged, resulting in a sharp increase of the pressure drop and a short service life [11–13]...

[Show abstract](#) ✓



[View all citing articles on Scopus](#)

- ★ This paper is based on the Ph.D. Thesis of H. C. Yeh for the partial fulfillment of the requirements for the Ph.D. Degree.
- † Present address: Inhalation Toxicology Research Institute, Lovelace Foundation for Medical Education and Research, Albuquerque, New Mexico 87108, U.S.A.

[View full text](#)

Copyright © 1974 Published by Elsevier Ltd.



Copyright © 2022 Elsevier B.V. or its licensors or contributors.  
ScienceDirect® is a registered trademark of Elsevier B.V.

 RELX™