

# EFFECTS OF FIBER AND LAYER ORIENTATION ON COALESCENCE FILTRATION

*R. Bharadwaj and G.G. Chase\**

Microscale Physiochemical Engineering Center

Department of Chemical and Biomolecular Engineering

The University of Akron, OH 44325-3906

\*Corresponding Author

Tel: 330-972-7943

Fax: 330-972-5856

[gchase@uakron.edu](mailto:gchase@uakron.edu)

<http://www.engineering.uakron.edu/%7Echem/fclty/chase/chase.html>

## **Abstract**

Experimental observations show fiber orientation and layer orientation in filter media effect the permeability and the separation efficiency of coalescing filters. The effects of fiber orientation have been studied by various industries including polymer, Paper and textiles, to enhance their product lines. This has also been proven beneficial to the filtration industry because orientation of fibers can lead to lower pressure drop. The main objective of this work is to study the effects of Layer orientations and test its performance. This technique is an alternative to using electric field for making oriented fiber media. It incorporates stacking micro fiber sheets at different angles (0,30,45,60 and 90). For capture of liquid droplets the decrease in pressure drop obtained is offset by the decrease in capture efficiency, resulting in nearly constant quality factor regardless of fiber orientation. However, in coalescing filter media the improvement in liquid drainage from the filter can improve the quality factor from 20 to 60%. Stacking media at different angles to the flow changes the average fiber angle of the media, which can be measured by the fiber mapping method. In coalescing filter media the fiber orientation can have an added benefit of reducing the liquid saturation in the filter media, which leads to an improved quality factor for the filter media. The stacking sheets can be extended to a pleating structure, which would be relatively easier to construct from an industrial point of view.