

Is There Such a Thing as Surface Filtration?

Ken Sutherland, Northdoe Limited

It is often said that the range of filtration processes is divided into four classes, with one developing further into a fifth class. These are differentiated firstly according to the fundamental separation mechanism: straining or filtration. Straining is a matter of particle size alone, with the particle either larger or smaller than the pore through which it is attempting to pass. Filtration, strictly, relies on one or more physical processes other than size by itself that occur as the suspended particle passes through the pore.

The other differentiating factor is whether the separation occurs entirely at the surface of the filter medium, or below that surface, somewhere in the depth of the medium. These factors lead to the nominal existence of four separation classes under the general heading of filtration:

surface straining	depth straining
surface filtration	depth filtration

In fact, the only mechanism that can occur at the surface of a filter medium is straining – the capture by the surface of a particle bigger than any hole in it. Filtration, as defined above, needs a finite length of pore within which it can occur, and that length is not available in a very thin surface.

Depth mechanisms assume a definite medium thickness, and hence a finite length of pores through it, within which the capture process, either straining or filtration, can occur.

It is, of course, true that a hole in a surface can be bridged by a group of particles individually smaller than the pore diameter, such that particles arriving once the bridge is formed are captured by the bridge, and not by the filter medium surface. This is the start of cake filtration, in which the separation takes place within the increasing thickness of the cake.

Strictly speaking, therefore, there is no such mechanism as surface filtration, only surface straining, usually followed by cake filtration.

Ken Sutherland

[Ken Sutherland is a chemical engineer with strong interests in both the technical and marketing aspects of filtration and related separation processes. He has managed his process engineering and marketing research consultancy, Northdoe Limited, for over 30 years. He has been Chairman of the (UK) Filtration Society, and has written or co-authored four books on different aspects of separation processes, with a fifth due out soon. Most recently he has written Elsevier's *A to Z of Filtration*, and the fifth edition of Elsevier's *Filters & Filtration Handbook*. He



is a regular contributor to *Filtration Industry Analyst* and to *Filtration & Separation*. He can be contacted at: Tel: +44 (0)1737 218868, or by e-mail at: ken.suth@ntlworld.com.]

Keywords

Filter and Filtration Processes

Filtration Media

Liquid Filtration