

shown in fig. VIII - 8. A perforated central pipe is located in the center of the module through which the feed solution enters. In this concept the fibers are arranged in a loop and are potted on one side, the permeate side. One of the disadvantages of the 'outside-in' type is that channelling may occur. This means that the feed has a tendency to flow along a fixed path thus reducing the effective membrane surface area. With a central pipe, the feed solution is more uniformly distributed throughout the module so that the whole surface area is more effectively used.

The hollow fiber module is used when the feed stream is relatively clean, as in gas separation and pervaporation. Hollow fiber modules have also been used in the case of seawater desalination, another relatively clean feed stream. The module construction given in figure VIII - 8 (left figure) is that of a typical hyperfiltration module. In gas separation the module will be of the 'outside-in' type to avoid high pressure losses inside

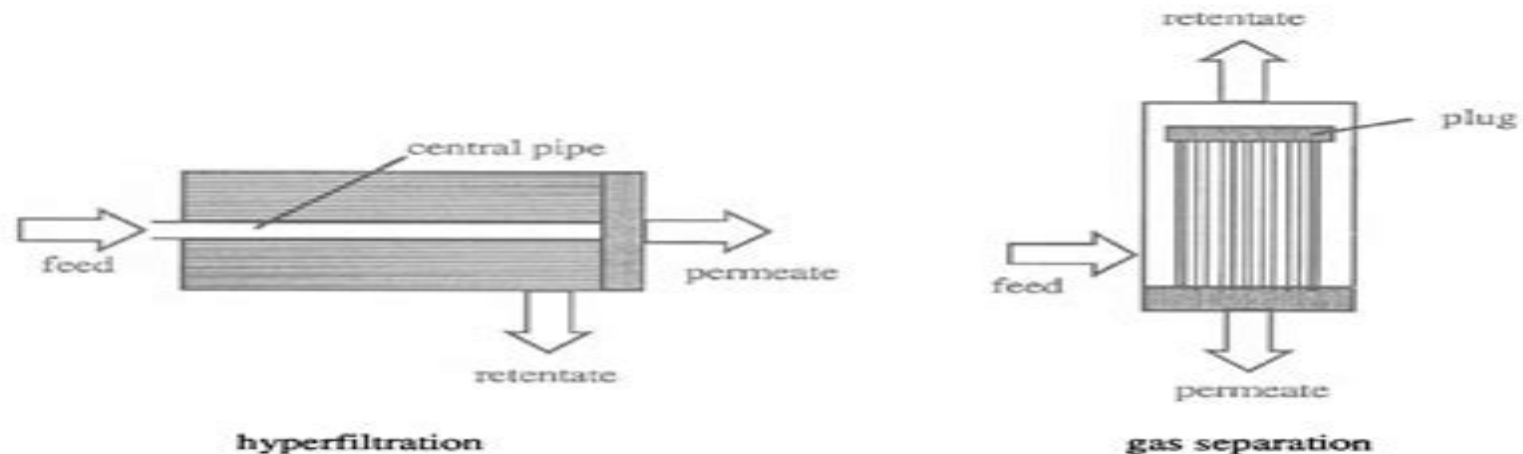


Figure VIII - 8. Special hollow fiber construction for hyperfiltration (left) and gas separation (right).

the fiber (see figure VIII - 8, right figure), whereas in pervaporation it is more advantageous to use the 'inside-out' type to avoid increase in permeate pressure within the fibers. (The 'outside-in' concept can also be used with short capillary fibers for pervaporation). Another advantage of the inside-out concept is that the very thin selective top layer is better protected, whereas a higher membrane area can be achieved with the outside-in concept.

VIII . 7 Comparison of module configurations

The choice of the module is mainly determined by economic considerations. This does not

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Basic Principles of Membrane Technology J. Mulder, 2013-04-18 Membranes play a central role in our daily life or as indicated by one of my foreign colleagues Richard Bowen If you are tired of membranes you are tired of life Biological membranes are hardly used in industrial applications but separations with synthetic membranes have become increasingly important Today membrane processes are used in a wide range of applications and their numbers will certainly increase Therefore there is a need for well educated and qualified engineers chemists scientists and technicians who have been taught the basic principles of membrane technology However despite the growing importance of membrane processes there are only a few universities that include membrane technology in their regular curricula One of the reasons for this may be the lack of a comprehensive textbook For me this was one of the driving forces for writing a textbook on the basic principles of membrane technology which provides a broad view on the various aspects of membrane technology I realise that membrane technology covers a broad field but nevertheless I have tried to describe the basic principles of the various disciplines Although the book was written with the student in mind it can also serve as a first introduction for engineers chemists and technicians in all kind of industries who wish to learn the basics of membrane technology **Basic Principles Of**

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