



FUTURE FILTRATION

CERAMIC MEMBRANES

INDUSTRIAL APPLICATIONS

THE BETTER ALTERNATIVE FOR YOUR APPLICATION!

Filtration of liquids is taking place everywhere. Silicon Carbide (SiC) is a positive alternative to traditional membrane materials like polymer/ceramic and conventional filter systems like sand filters and cartridge filters. SiC offers UF and MF as standard which is better than cartridge filters and much better than sand filters, which does not have a defined pore size.

CHEMICALLY AND THERMALLY RESISTANT

SiC offers unique possibilities for treating liquids at extreme pH and temperature. This is due to the fact that SiC is not attacked by any chemical typically found in the industry. SiC membranes can be used in the full pH-range (0 to 14) at any temperature, allowing treatment of strong mineral acids and strong bases. SiC also tolerates oxidizers like hypochlorite at any concentration and temperature. Not only can SiC treat solutions at extreme conditions, it can also be cleaned at extreme conditions, e.g. cleaning with steam at high pressure for melting of crude oil.

EXTREME PROCESSES OR CHEMICAL CLEANING DEMAND – NO PROBLEM!

SiC is characterized with a very high pure water flux. When treating liquids with inorganic and organic suspended solids it is mostly possible to achieve a very high product flux. E.g. a flux of several thousand liters per m² per hour at less than 1 bar driving pressure is achieved when removing Fe(OH)₃. Likewise removal of suspended solids from strong acid and alkali can be achieved

Mineral oil in suspension is handled very well by SiC membranes. The membranes are so hydrophilic that oil can hardly foul the membranes and SiC membranes can maintain a high (several hundred liters per m² per hour at less than 0.5 bar driving pressure) and steady flux for extended periods of time.

SiC is insensitive to temperature and to very fast changes of temperature. This allows treatment of products up to 800 °C, e.g. steam filtration. It also allows the use of live steam to clean and to sterilize the complete system or simply to melt high melting products like wax and crude oil.



FILTRATION OF HEAVY METALS

Waste water containing high concentrations of heavy metals is difficult and expensive to dispose. SiC ceramic membranes are applicable in this process as they can withstand both strong acids and bases, as heavy metals precipitate at different pH levels.

FILTRATION AT HIGH PH

The waste water was treated in two steps, first with a pH of approximately 10 and in the second step below pH 7, in order to precipitate specific heavy metals.

The project was performed with a lab scale UF membrane with a membrane area of 0.09 m². The efficiency of back-flush was investigated as seen in the figure below.



Feed (left) – waste water with heavy metals

Permeate (right) – particle free

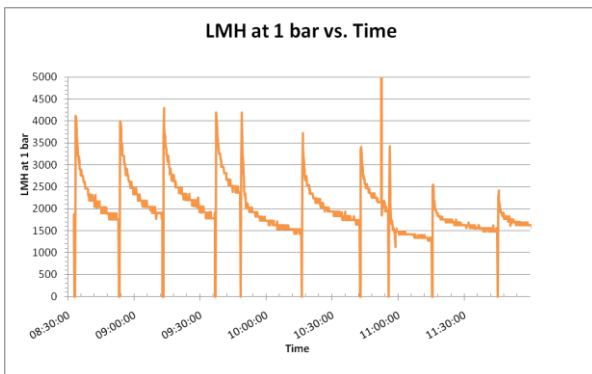


Table 1: Graph showing the flux, represented as LMH at 1 bar, versus time. The membrane element was back-flushed every 15 to 30 minute. The cross flow was kept constant at 2.5 m/s.

VERY HIGH FLUX

- All visible precipitated particles have been removed
- Back-flush was an efficient regeneration method
- Permeate flow rates of **1800 LMH at 1 bar**



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