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Membrane Distillation – A Near Future Technology for Sea Water Desalination

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Membrane Distillation (MD) is a known low cost method of producing clean water from saline water using hydrophobic membranes. In this work, cold distilled water and warm saline water are separated by a porous hydrophobic ePTFE membrane that provides barrier for liquid flow but allows water vapor to pass through the membrane. Temperature difference across the membrane causes water vapor pressure gradient, providing the driving force for the membrane distillation process. The objective of this study is to develop understanding of ePTFE structure and its impact on membrane distillation. The membrane was tested in laboratory scale module and further validated in the field study by testing full scale commercial module. The study is to investigate the impact of the membrane structure and the process variables on trans-membrane flux, membrane thickness, temperature difference across the membrane and energy efficiency.

There are many applications of MD where waste heat is readily available to generate clean water from salt water. Since this process is not driven by pumping pressure, the trans-membrane flux does not reduce even at high salt concentrations. Therefore, it can be very cost effective for process industries to increase recovery of water, for example, from RO processes by passing RO concentrate through an additional MD process using waste heat to reduce disposal cost and save energy. MD can also be used as a stand alone process for process feed water. Results have proved that this technology works in both lab environment and pilot plant using cross flow module. With effort in membrane development and membrane module design the high performance MD systems are ready for commercialization

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