MEMBRANE DISTILLATION -A TECHNOLOGY FOR RESOURCE RECOVERY IN COMMUNAL WASTE WATER TREATMENT

J. Buchmaier , AEE – INTEC Dep. Industrial Processes and Energy Systems, Austria
j.buchmaier@aee.at;
C. Brunner, AEE – INTEC Dep. Industrial Processes and Energy Systems, Austria
C. Platzer, AEE – INTEC Dep. Industrial Processes and Energy Systems, Austria

In the past years lots of research in the area of membrane distillation (MD) has been conducted, especially in the fields of desalination. Nevertheless there are many new fields with possible applications of MD. With this paper the role of MD in communal wastewater treatment is presented. During the aerobic sewage treatment of a conventional Waste Water Treatment Plant (WWTP) resources such as nitrogen and carbon are destroyed.

For this reason membrane distillation was applied for the separation of ammonia. An overall system integration concept could direct the WWTP from being a consumer into a producer – cleaning water while providing resources in form of valuable products. Along with population growth the demand for water, resources and energy will be drastically increased within the next decades.

In this study the general stability of a poly tetra fluor ethylene (PTFE) membrane was tested by conducting liquid entry pressure (LEP) tests such as contact angle (CA) measurements with membranes that have been exposed to the waste water before. A spiral wound module was custom-made and a pilot plant (20`- Container, (6058 x 2438 mm)) was designed and constructed. Tests were carried out on-site of a waste water treatment plant for a few month of period. The suitability of the MD configuration for ammonia recovery was proven. Different test- and cleaning conditions were studied in order to evaluate the best-achievable separation factors. The dissociation equilibrium of ammonia-ammonium was taken into account, in terms of temperature and pH value, when conducting the ammonia separation experiments.

The paper will present results from field tests at the waste water treatment plant. In the scope of this paper a concept for the integration of the membrane distillation facility into the WWTP will be presented and the potential for the integration of waste heat or solar thermal energy will be pointed out. An essential part is also the calculation of the economic feasibility of this new technology.

The result will include detailed knowledge about the operation parameters such as flow rates, temperatures, energy consumption etc.