Improved removal of persistent organic compounds by exploiting biofilms on membrane surfaces in industrial MBR systems

Dipl.-Ing. Alicja Yogendran, Dr-Ing. Maike Beier, Prof. Dr.-Ing. Stephan Köster

Leibniz Universität Hannover, Hannover, Germany

Background: For many years water reuse has become an important measure in industrial production sites especially in regions facing limited water resources.

Numerous industrial branches, such as chemical and paper industry, have to cope with highly complex wastewaters and, in this regard, also with large shares of hardly degradable organic compounds. When these wastewaters are treated by conventional biological methods (e.g. activated sludge tanks) the removal efficiency of the persistent organic compounds is quite unsatisfactory. Thus, the effluent quality is often not in line with the industries' demands for water reuse. Applying further treatment steps for the downstream removal of these compounds results in considerably higher investment and operation costs. Nowadays, low pressure membrane filtration techniques offer new perspectives to better cope with hardly degradable organic compounds which might be found in industrial wastewaters. Especially, the biofilm layers on the membrane surfaces notably enhance the performance of the bioreactor system (Drensla, 2015).

Approach/Contribution: This contribution shows the results of the comprehensive screening of representative industrial wastewaters with special regard to relevant COD fractions. In addition, a promising approach for an online measurement of COD fractions will be introduced. Furthermore, first results from the lab-scale MBR systems will serve to derive important biofilm characteristics considering degradation mechanisms and influencing factors such as membrane type/ material, biofilm thickness and different modes of operation.

References

DRENSLA, K. (2015): Chemische Reinigung von getauchten Niederdruck-Hohlfasermembranen auf großtechnischen kommunalen MBR-Anlagen; Kassel University Press GmbH. Band-Nr.: 37