

S1.4.3 Integrated UF and RO Application in Challenging Coal to Chemical Wastewater Reuse

Cheng Yang, Bin He, Jiang Sheng Liu, Jiang Liang Wang, Tina Arrowood, Andrea Lima
Dow Chemical

Wastewater reuse demand is increasing rapidly in the recent years to relieve the industrial development and environmental stress, especially in the coal to chemical industry that is concentrated in the water scarce region in China. Ultrafiltration and reverse osmosis are the key technologies used to purify the wastewater and supply back to chemical processing for reuse. However, the presence of biologically and non-biologically assimilable organics common in industrial wastewater leads to system fouling and threatens system stability. The coal to chemical wastewater is recognized to be one of the most challenging wastewater due to its high salinity, high chemical oxygen demand (COD), and a significant portion of refractory chemical compounds contributing to the COD. In this paper, the organic wastewater from a coal to methanol, olefin, polyformaldehyde, dimethyl ether industrial complex is collected and treated by coagulation, sedimentation, and biological chemical method as pretreatment steps. Then piloting was conducted on-site with integrated UF and RO technology to evaluate the long term performance. Both UF and RO pilots utilized industrial scale modules for the on-site testing, and the operation parameters are designed to simulate a full scale commercial system. Through over 120 days continuous operation, both UF and RO pilot shows stable performance with satisfactory product flow and quality. Further, the side by side UF and RO comparison successfully demonstrates the low trans-membrane pressure (TMP) advantage of UF module and the low differential pressure (Dp) advantage of RO element, respectively.