

The operation of full-scale MBR systems are typically done with MLSS concentrations in the range of 8 to 18 g/L (Drews 2010). Among the two common practices in the operation of the MBR systems, one is to keep the MLSS concentration fixed more or less around a certain value which, however, needs frequent removal of excess sludge or activated sludge from the mixed liquor to avoid any instability in the operation of treatment such as to avoid the rapid rise of TMP. In the continuously operated MBR systems without sludge removal, the concentration of MLSS often increases steadily in most of the MBR systems depending on the feed characteristics and microbes present in the sludge (Hernandez et al., 2015). From the operational point of view, the latter practice of the MBR operation may offer advantages, for example it may promote more nitrification process due to the development of nitrifying bacterial community in the increased MLSS concentration (Kornboonraksha and Lee, 2009). Nevertheless, the excess activated sludge may need to be withdrawn in the continuously operated MBR systems to maintain its operation for longer term or to avoid any sudden instability in its operation. In a study of an MBR system for treating domestic wastewater, Hasar et al. (2002) had to withdraw sludge in two stages to sustain stability in the operation of the system as the MLSS steadily increased to much higher value resulting in rapid rise of TMP. A continuously operated MBR was studied in this research but a small portion of sludge was withdrawn after 32 days of operation to avoid rapid rise in TMP.