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ABSTRACT

AMERICAN FILTRATION SOCIETY CONFERENCE SESSIONS: LAB-SCALE TESTING

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Process Intensification and Scale-up of Liquid / Liquid Centrifuges for Separation and Extraction Processes

Liquid / liquid separations and extractions are complex processes and several parameters determine the type of equipment to be used. Centrifugal contactors are one of the technologies employed for liquid / liquid separation and liquid / liquid extraction processes. Every liquid / liquid system has its own specific characteristics and in order to successfully predict behavior, testing must be performed with small scale equipment to predict industrial conditions. Parameters such as surface tension, viscosity, temperature, mutual solubility, selectivity, and liquid densities are a few of the factors which influence the performance of a liquid / liquid centrifuge.

Process intensification studies can be performed using laboratory scale centrifugal contactors to evaluate these parameters. One of the goals of process intensification is to make large changes in operating conditions on a laboratory scale. By imparting large changes on a small scale, the robustness of the equipment can be determined. If the centrifugal contactor can tolerate the large change on a small scale, confidence in scale-up to larger scale equipment is increased. The different mixing configurations of centrifugal contactors influence equipment performance, and the characteristics of a liquid / liquid system determine the importance of equipment design.

Pilot scale testing is performed with larger equipment to perform more thorough and specific testing. At this point, the process is "fine-tuned" by evaluating conditions such as the phase flow rate ratio, the maximum throughputs that can be attained, and range of acceptable rotational speeds, for example to accurately predict industrial throughputs and maximize product recovery.