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Novel multi-frame flat sheet membrane contactor module for chromium (VI) removal

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Newly designed, a multi-frame flat sheet membrane contactor (MF-FSMC) was successfully used for chromium (VI) removal from aqueous solution which consist on ten parallel frames alternating aqueous and organic phases. As a result, five chambers were filled by the aqueous phase and the others five was filled by the organic phase. Aliquat-336 was used as a carrier using polypropylene flat sheet membrane for chromium (VI) removal. From the results, we observed that the extraction was more efficient by increasing the inlet chromium concentration and the number of frames but was not affected by the increasing of the thickness of frames (volume of chambers). To determine the interaction between different parameters, a full factorial design of experiment was used. The results show that the concentration of Aliquat-336 was the most important parameter which decreases the efficiency of the system by increasing its concentration. Moreover, the temperature and the surface membrane exchange have a positive effect on the extraction efficiency. However, no interaction effects were found in the considered interval. Hence, a mathematical modal established seems represent correctly the experiences represented by the following equation:

E=94.2585+ 0.028 S+ 0.248 T–3.330 C+ 0.110 S*T– 0.283 S*C– 0.702 T*C 0.450 S*T*C.

As a result, the optimal values of different parameters are 10% of Aliquat-336 concentration, 59.5 cm2 membrane contact area and 40°C for the temperature.

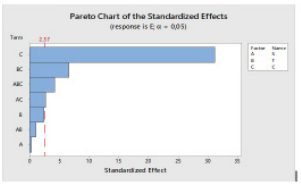

Figure 1: Pareto chart of the effects for the yield of extraction of Cr(VI) as response

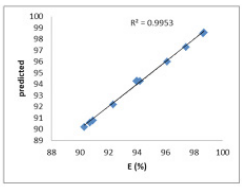

Figure 2: Predicted value vs experimental value of Cr (VI) extraction

Biography

Said Bey has completed his PhD from Bejaia University. He is a Senior Lecturer. He has published papers in reputed journals in the field of membranes technology for waste water treatment and he is developing new configurations of module for membrane contactors such as multiframe flat sheet membrane contactor module, spiral hollow fiber membrane contactor and cross flow hollow fiber membrane contactors tower.

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