AMSTERDAM INTERNATIONAL WATER WEEK

Abstract Title	title Circular chemical use: producing acid and base with (bipolar) electrodialysis from IEX regenerate
Topic	O Improving water quality O Resilient water systems X Circular solutions: Reuse, Recover and Recycle O Transitions in water, agro/food and energy
Challenges and Solutions	Challenges and solutions Use of water and chemicals should be reduced by closing loops at chemical plants. Production of chemicals on site from waste streams, using EDBM, enables circular use of chemicals.
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Abstract	Ultrapure water is produced using ion exchange columns. These columns need to be regenerated using acid and base, and produce a salt effluent stream. When this effluent is treated by electrodialysis with bipolar membranes (EDBM), the salts are separated and transferred back in their associated acid and base component. These can then be used again to regenerate the IEX columns. This enables the circular use of chemicals and saves water as well. Moreover it will reduce logistics and storage of concentrated chemicals. In this research we have compared two types of membranes (from different manufacturers) for their performance. The electrical efficiency of Weifang membranes was 77% at 200 A/m2 for base production, compared to 65% for Mega membranes using a NaCl brine. Also the effect of other ions present in the IEX regenerate on the electrical efficiency was investigated using a synthetic stream. Experimental results were used to evaluate product (acid and base) quality, recovery efficiency and energy efficiency of the EDBM process. In addition to studying pure NaCl brine

	streams, a stream from a chemical plant (with ions other than NaCl) was evaluated as well. The results of this research enables the circular use of chemicals, leading to a smaller water and chemical footprint in the industry.
Figures/diagrams/illustrations	Up to 2 (in abstract)