

Resource recovery from concentrates generated by industrial water reuse (HighCon)

Gesine Götz, TU Berlin, Berlin, Germany; Malena Kieselbach, TU Berlin, Berlin, Germany; Tobias Hogen, TU Berlin, Berlin, Germany; Sven-Uwe Geißen, TU Berlin, Berlin, Germany

Challenges

The reuse of municipal and industrial wastewater and process fluids is becoming increasingly important worldwide in order to ensure the availability of water economically and ecologically. The reuse processes result in residual streams, highly concentrated brines (concentrates), which constitute up to 40 % referring to the wastewater flow. These concentrates are currently discharged almost exclusively into municipal wastewater treatment plants or in some Third Countries even directly into the environment. They contain salts, non-biodegradable organic compounds and heavy metals. In order to realize the processing of concentrates for the recovery of valuable substances, innovative systems and technical solutions are required. For this purpose, a wide variety of processing methods, but also avoidance or substitution measures must be combined. The challenge for the new technologies is to selectively produce recycled valuable materials of high quality. Therefore, the separation of inorganic substances such as dissolved salts is necessary.

Solution

The aim of the HighCon project is the development of innovative, multi-stage and selective processes for reuse of industrial wastewater with the goal of complete closed loop circulation as well as the treatment and utilization of the concentrate contents. Based on requirements of selected fields of industry innovative technologies such as Membrane Distillation, selective Low Temperature Distillation Crystallization and Electro Dialysis Metathesis are further developed and adapted to specific applications. The main focus lies on the development of innovative process combinations for various separation processes.

Approach

In the first instance, extensive laboratory tests are performed with synthetic and real wastewater and transferred to the pilot plant scale. Afterwards, the technologies and their combinations will be tested under real conditions at selected demonstration

sites of Clariant Produkte (Deutschland) GmbH, DEK Deutsche Extrakt Kaffee GmbH, MEWA Textil-Service AG & Co. Groß Kienitz OHG and L'Oréal Produktion Deutschland GmbH & Co. KG. A simulation tool will be developed and applied to illustrate the complex interrelationships from raw water flows to the utilization of the concentrates, thus optimizing water recycling in a holistic way for the first time. The market analysis in combination with the sustainability analysis (LCA) ensures an optimal economic implementation, which should lead into the preparation of a spin-off company. First results from water and material flow balances as well as the adaptation and development of processes will be presented.

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