

DIFFUSION DIALYSIS

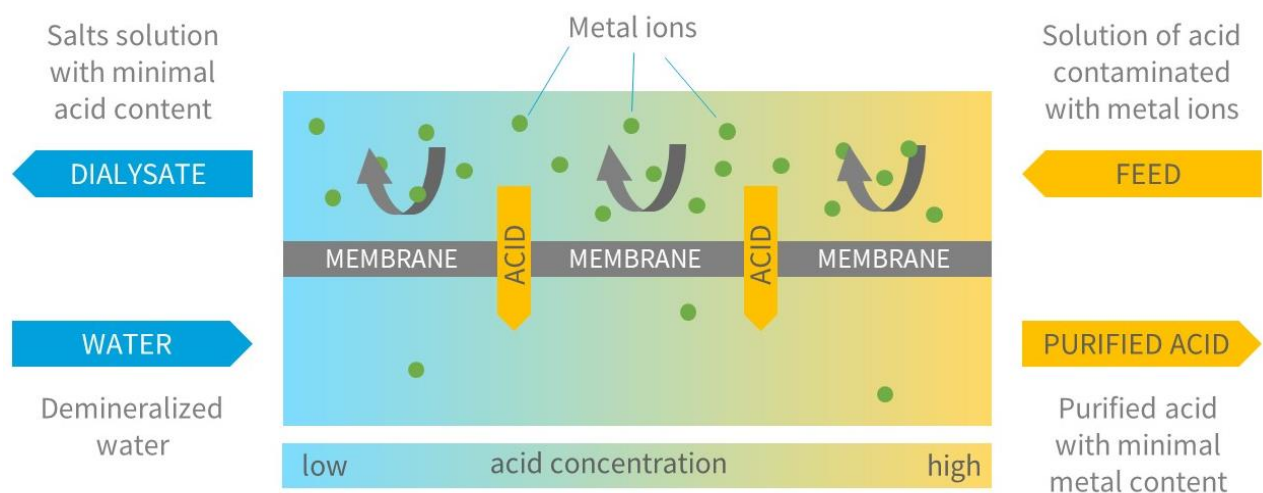
PROGRESSIVE TECHNOLOGY FOR ACID RECOVERY

TECHNOLOGY UTILIZATION

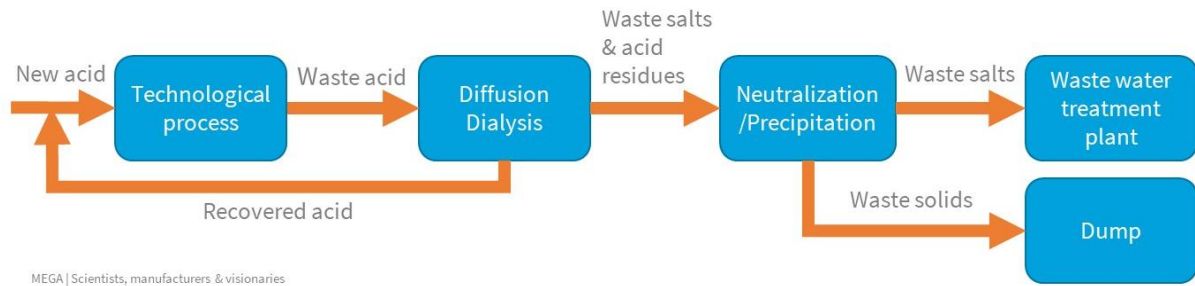
- Technology for free acid recovery and salt separation from an acid bath.
- The technology can process inorganic acids contaminated with their salts, i.e. H_2SO_4 up to 30%, HCl up to 15%, HNO_3 up to 15% (more concentrated solutions or other acids should be tested), a mixture of HNO_3 (up to 20%) and HF (up to 5%).
- Problematic are organic substances (oils, surfactants, silicone oils) → pre-treatment is required.

DIFFUSION DIALYSIS PROCESS PRINCIPLES

- Two streams enter the diffusion dialysis module equipped with anion-exchange membrane:
 1. FEED = solution of acid contaminated with metal ions (e.g. waste solution after surface treatment)
 2. DEMINERALIZED WATER
- Anions (SO_4^{2-} , Cl^- , NO_3^-) are preferably transferred through the anion-exchange membrane together with H^+ ions (because of their very high mobility). Cations (Na^+ , Zn^{2+} , Ca^{2+} , Cu^{2+} , Al^{3+}) are repulsed by the positively charged anion-exchange membrane and they are kept in the dialysate.
- Two streams leave the module:
 1. DIFFUSATE = purified acid with minimal metal ions content
 2. DIALYSATE = salts solution with minimal acid content



REGENERATION OF THE ACID BY DIFFUSION DIALYSIS



PROCESS PARAMETERS

- Free acid recovery of ca. 90%, ca. 10% of acid remains in the dialysate.
- Ions rejection: ca. 95% of multivalent (e.g. Zn^{2+} , Ca^{2+} , Cu^{2+} , Al^{3+}) ions remain in waste, ca. 5% are transferred into product, ca. 80% of monovalent ions (e.g. Na^+) remain in waste, ca. 20% are transferred into product.
- 200-400x salt concentration reduction is possible with the two-stage process.

MAIN ADVANTAGES OF THE TECHNOLOGY

The technology is robust and economically and environmentally beneficial due to:

- Cost reduction of new acid and neutralization agent purchase
- Cost reduction due to lower salt emissions into the wastewater
- Reduction of the negative environmental impact of the production
- Continuous or batch feed processing possible
- No additional chemicals except water
- Very low electrical energy demands
- Simple scale-up of the technology

MEGA OFFERS

- The first spiral wound membrane module for commercial use in the world (Company SPIRALTEC GmbH).
- Developed hollow fibre membrane module for HNO_3 and HF mixture.
- Full service for industrial application: Laboratory tests in MemBrain, pilot tests in MemBrain or at customers facility, engineering and production, transport and installation, start-up & training, warranty and post-warranty service.