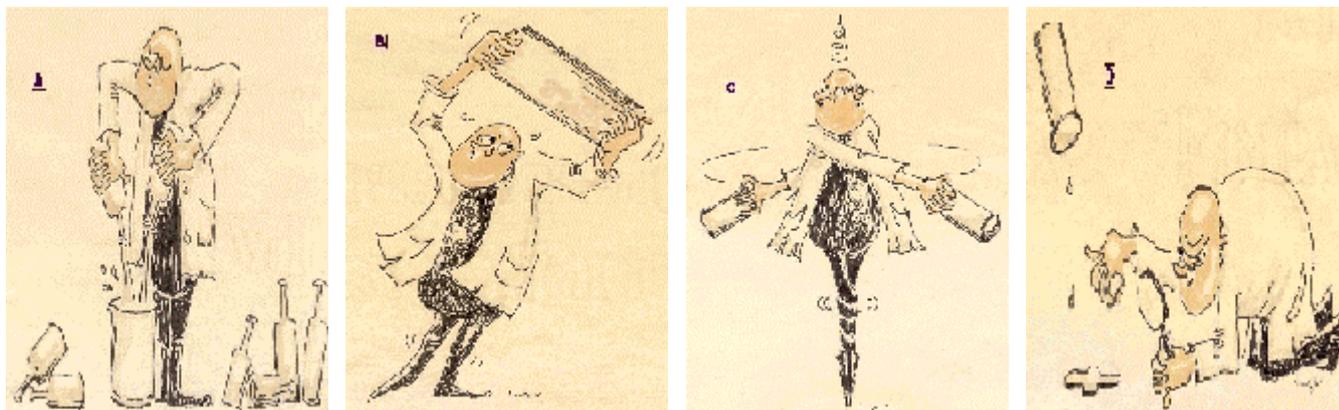


Process Research and Development



MEAB Chemie Technik GmbH (a company in the MEAB Group) was founded in 1999 in Aachen in order to complete the research and development activities of our customers. In the border triangle of Germany, Belgium and Holland we are situated in very short distances to most European industrial centres. Our proposition as advisers and planners is to develop competitive-enabled solutions and implement them. The focus is in the fields of hydrometallurgy and environmental engineering.

In Aachen we have access to a complete chemical laboratory, including a pilot plant area. Our initial work starts with orientating investigations (chemical performance tests) in an appropriate chemical laboratory at FA Aachen. All these initial tests are performed in funnel experiments. Necessary analyses are carried out by us in the laboratory or bought from specialized institution.

For continuous studies and process optimization, pilot plant equipment is used in such

a way that the entire process can be demonstrated.

Our main interest is hydrometallurgy and we have special experience in the field of solvent extraction, a separation technique that has become an important separation procedure in modern process technology. It is increasingly used in processes where traditional methods are not feasible or only with great effort can be environmentally acceptable.

The special properties of solvent extraction methods and their advantages over traditional methods can mainly be observed in the following applications:

- Processing and cleaning of raw materials
- Processing of secondary raw materials from scrap, slag, ash and neutralisations sludge
- Separation and recovery of precious metals from material that also contain non-noble metals

MEAB Metallextraktion AB, Datavägen 51, SE-43632 ASKIM, Sweden

☎ +46 31 685414.

Fax +46 31 685474.

contact@meab-mx.se

www.meab-mx.se

MEAB ChemieTechnik GmbH, Dennewartstrasse 25, D-52068 AACHEN, Germany

☎ +49 241 9631180.

Fax +49 241 9631185.

contact@meab-mx.com

www.meab-mx.com

- Cleaning of leach and electrolyte solutions
- Treatment of pickling and etching solutions
- Wastewater, process water and water disposal

MEAB offer its customers an assessment and advice in the form of the following services:

- Selection of extraction chemicals, diluents and solubilizers
- Determination of the conditions for extraction, scrubbing, stripping and washing, including distribution coefficients and curves

- Measuring the physical conditions of phase separation
- Determination of yields and selectivities
- Development of the process flow sheets
- Design and execution experiments on pilot plant scale
- Optimisation of operating parameters

To verify the laboratory results of ongoing investigations, a complete set of mini-pilot equipment is available. Mixer-settler equipment (MSU) arrangements or sieve plate pulsed columns in our pilot plant laboratory can be utilized.

Proposal for a Basic Chemical Evaluation

Content

- Main objective of the work – Definition of the client and his problem – Scope of investigation – Definition of raw materials.
- General description of the suggested process and the needed investigation (offer).
- Analyzed feed solution from client (or representative solid sample). Define.
- Pre-preparation and leaching (solid raw material)
- Pre-preparation (crushing and milling). Leaching conditions (time, temperature, RedOx and pressure profiles). Metal transfer rates (leaching yields). Impurity concentrations. Solid/liquid separation.
- Solvent extraction experiments to verify and define the suggested process with achieved (produced) leach solution.
- Extraction, scrubbing, stripping and washing. Definition of aqueous and organic solutions. Equilibrium data. McCabe-Thiele constructions to estimate number of stages. Settling characteristics and surface loading. Determination of reagent capacity and the transfer rates (extraction yields).
- Definition of products (e.g. samples)
- Auxiliary steps (milling, evaporation)
- Documentation – Description of resulting process alternative. Block diagram
- Appendix – Necessary chemical analysis – Analytical equipment and methods – Procedures and laboratory facilities

Tell us your demands and we will be pleased to give you an offer.