

K-UTEC, YOUR PARTNER IN

LITHIUM

FROM RESOURCE EXPLORATION
TO RAW MATERIAL PROCESSING AND
BATTERY-GRADE LITHIUM PRODUCTS

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K-UTEC



K-UTEC AG SALT TECHNOLOGIES

More than 70 years of experience in Mineral and Salt Processing …



The One-Stop Service Provider for Your Lithium Activities

… stand for Continuity, Competence, and Highest Quality Standards.

K-UTEC is a globally recognized provider of planning, design, engineering, and construction management for lithium and potassium salt mining and processing projects.

With 75 years of experience, we support clients through every project phase - from exploration and engineering to financing, equipment supply, and commissioning.

Our services extend to geomechanical monitoring, environmental oversight, recycling, and industrial waste disposal. Backed by cutting-edge piloting capabilities and a “customer-first” mindset, we deliver innovative, reliable solutions that ensure economic success and long-term project viability.



LITHIUM RESOURCES

Making the Invisible Visible …

… is the goal of our experts in geophysical exploration. Non-intrusive geophysical surveys offer a cost-effective way to gather initial information on the geological, hydrogeological, and petrophysical characteristics of salt or brine deposits.

Using seismic, geoelectric, EM, or radar-based methods, qualified experts collect the data needed for early-stage exploration. This makes hidden structures visible - on the surface, in the shallow subsurface, in boreholes, or through model-based simulations of stratigraphic horizons.

If the results are promising, drilling follows to validate the findings, define the deposit more precisely, and obtain further data for feasibility assessment and mine concept development.

K-UTEC has various Qualified Persons (NI 43-101, JORC) can thus prepare and underwrite reports throughout the exploration phase, from Scoping to Bankable Feasibility Studies.

Examples of how our knowledge can be used.

- Deposit exploration, modeling and evaluation
- Hydrogeological and geohydraulic investigation and modeling
- Investigation of layer boundaries and geological structures
- Cavity investigation
- Petrophysical parameter exploration
- Infrastructure surveillance
- Preliminary route survey
- Quality control



LITHIUM BRINE PROCESSING

From Salt Flats and Geothermal or Oilfield Brines to Battery Grade Products

The processing of lithium-bearing brines is a complex task. Each „salar“ or geothermal brine has a unique fingerprint of impurities, requiring an adaptive approach to purification. These variations present significant challenges in producing battery-grade lithium carbonate or lithium hydroxide.

At K-UTEC, we have dedicated countless hours to purifying brines into high-quality lithium products and have gathered valuable experience. But our expertise extends beyond applying throughput theoretical understanding and experience to brine processing.

We also operate an experimental setup to simulate the evaporation process itself, allowing us to study and model the chemical reactions that occur during the slow evaporation in the salares.

Did you know some of our Major Achievements in Brine Processing?

- We increased a customer’s lithium recovery rate from below 50% to up to 80% in a solar evaporation pond system - without increasing freshwater usage.
- We hold a patent for a direct lithium chloride extraction process from brine, specifically designed for high-magnesium brines, delivering high recovery rates.
- We developed proprietary technology based on electrodialysis for the direct precipitation of lithium hydroxide from lithium chloride.
- For over twenty years, we have regularly analyzed and converted lithium solutions (brines and other sources) into lithium carbonate and lithium hydroxide in our piloting facilities.
- From the early stages of each project, we focus on optimizing both OPEX and CAPEX.



DIRECT LITHIUM EXTRACTION (DLE)

New Opportunities and Challenges

In recent years, a new approach to lithium extraction has gained significant attention: Direct Lithium Extraction (DLE). This method includes various technological techniques such as adsorption, ion exchange, and solvent extraction.

Each DLE technology comes with its own set of advantages and challenges. A comprehensive understanding of DLE and the entire production process enables K-UTEC to choose and integrate the most suitable solution for our clients.

To validate theoretical predictions, K-UTEC is able to integrate DLE technologies from established suppliers into complete production processes at K-UTEC‘s test center to conduct tests at both bench and pilot scales.

Others talk, we test the complete production process…

Integrating new proecess technologies into overall production processes in our piloting facility allows us to test the overall process, delivering the insights necessary for effective process optimization and validation.

Utilizing different technologies is a demanding task, as each one must be seamlessly integrated into the planned process to ensure smooth and reliable operation.



LITHIUM HARDROCK CONVERSION

Our Tailormade Approach

The extraction of lithium from spodumene concentrate and other lithium-bearing hard rocks is a well-established process. However, the conventional processing methods face challenges related to CO^2 footprint, environmental impact. Additionally, the conversion process can be particularly demanding when dealing with low-grade lithium ores, highlighting the need for continuous innovation and improvement.

At K-UTEC, we are committed to addressing these issues through efficient and tailormade extraction processes and a quality-driven approach to processing the leach brine into battery-grade products. We also emphasize the reuse of waste materials and strive to create high-value by-products.

Our methodology incorporates advanced technologies to optimize and decouple process steps as sign demonstrating our dedication to innovation and sustainable solutions.

The Best for Your Unique Ressource

- We select advanced processes to achieve the best possible results for our customers - such as fractional crystallization for achieving the highest purities, or advanced conversion of lithium carbonate to lithium hydroxide monohydrate.
- We also have experience in applying roasting processes with minimized material loss.
- Direct Lithium Extraction (DLE) isn‘t limited to brines - hard rock processing also offers promising applications, allowing for a broader range of feedstock qualities.
- When it comes to hard rock conversion, by-products and waste management are key. We have experience in upgrading sodium sulfate into a valuable product, turning waste into opportunity.



BATTERY RECYCLING

Developing a Circular Economy

With the ongoing electrification of mobility, the rise of off-grid battery storage, and the global push toward low-carbon energy, batteries play a fundamental role in the energy transition.

Once they reach end-of-life, the valuable materials contained within can be recovered and reintroduced into industrial processes or repurposed for other applications.

In recent years, K-UTEC has worked intensively with partners and customers to convert black mass - generated from spent batteries - into a range of valuable products.

We have the experience and capabilities to recycle various cathode chemistries, whether NMC or LFP, always maintaining a focus on cost efficiency and process stability.

We can Support From Design to Pilot Implementation

Our services range from simple scoping studies to the design and piloting of complete processes - starting with black mass and progressing to MHP, various lithium solutions, or metal intermediates - tailored to meet each customer‘s unique needs.

From our own experience, we know that black mass can vary significantly. Beyond differences in cathode chemistry, we’ve encountered various production routes and pretreatment methods. The use of different binders, separators, and conductive additives presents additional challenges in black mass recycling.

As supply chains for emerging recycling projects are often not yet fully established, we place a strong emphasis on process stability to support you in discussions with suppliers.



PILOTING

Beyond Benchscale

One of K-UTEC‘s core strengths is the ability to test processes in-house at our dedicated piloting facility.

Processes developed for our customers are first validated at the bench scale before being scaled up through pilot plant trials. Based on the results, we refine and finalize your process design using tested, scalable equipment.

K-UTEC is highly flexible in adapting to customer needs and offers a wide range of equipment to realize your process at the pilot level. What we don’t have in-house can be sourced by our experienced team through our extensive vendor network and partners - and if it’s not available, we know who can help bridge the gap.

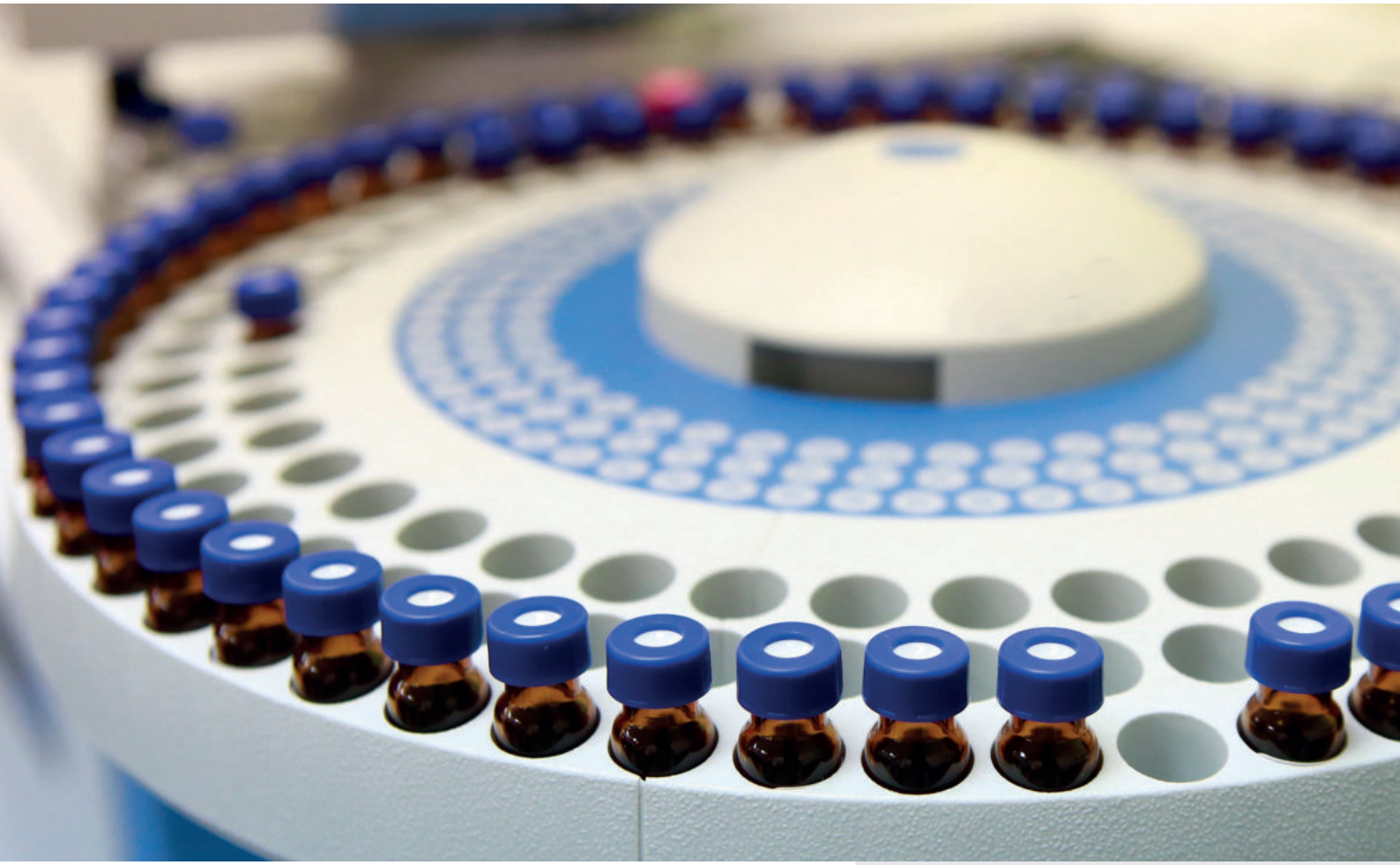
We believe that pilot trials lead to better project execution and help prevent costly delays and design errors caused by incorrect equipment selection, ultimately reducing CAPEX risks.



Equipped for the Unexpected

We continuously expand our equipment portfolio to address both emerging and established application areas. One of our latest additions is a titanium MVR crystallizer, which enables the crystallization of lithium chloride, lithium hydroxide, and lithium carbonate.



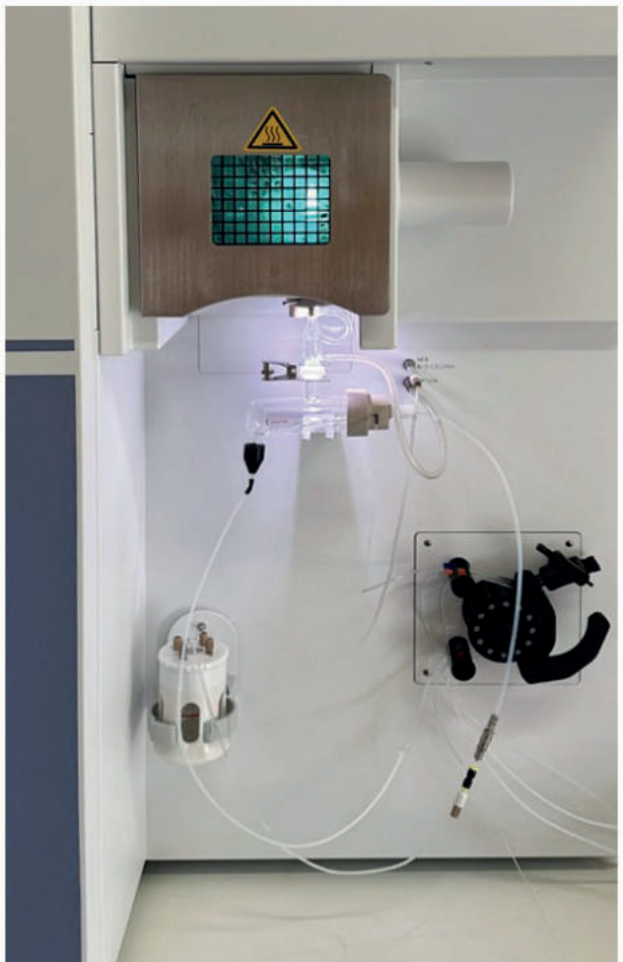


PROCESS ANALYTICS AND CONSULTING

Experienced and accredited

One of K-UTEC's core strengths stems from its experienced in-house analytics department. Salts and minerals of all kinds have been analyzed for more than three decades as part of deposit explorations or process monitoring.

On top of analytical services, K-UTEC provides clients with comprehensive consulting in establishing analytical measurement procedures, setting up laboratories and implementing in-process online analytics.





… equipped for versatility

With state-of-the-art analytical tools and certification according to DIN EN ISO/IEC 17025:2018, we ensure precise analysis of liquid, solid and gaseous samples every day

- ICP-OES, AAS
- XRF, XRD, Polarized light microscopy
- TOC, TNb, Elemental analyzer
- IC, GC, UV-Vis, IR, ISE
- Sample preparation, Acid digestions

… supplier-independent consulting

With proven analytical expertise, we support our clients solving challenges in both laboratory settings and online process monitoring at industrial plants

- Design of (process) analytical concepts
- Selection of measurement equipment
- Customized method development
- Implementation, Commissioning
- Training courses, Quality assurance





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