



Specialty Chemicals

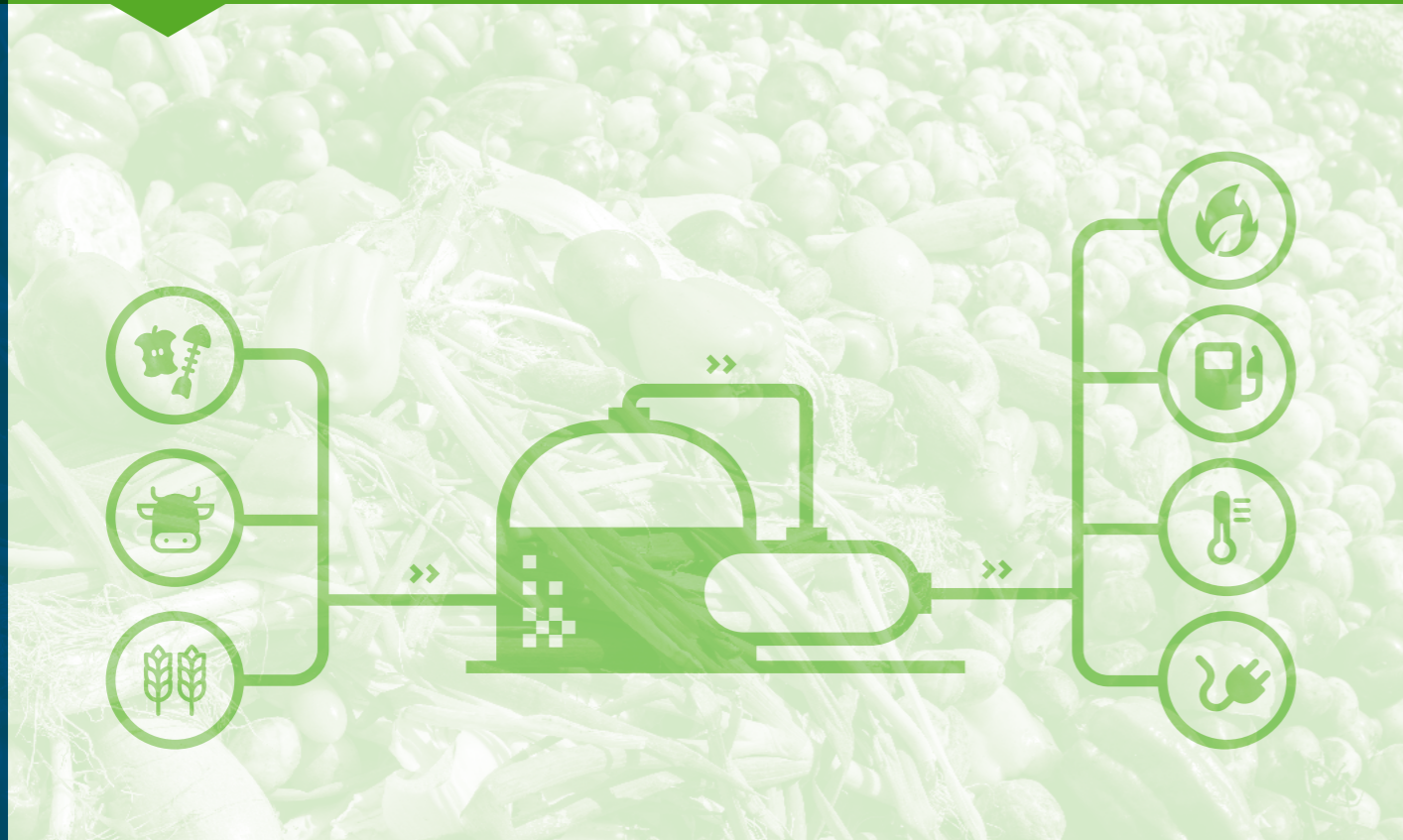
For stable processes and optimal results in biogas plants

Defoamers, Scale preventers,
Corrosion inhibitors, and Cleaners



Biogas technology as a component for sustainable industrial processes

KEBO – Customized solutions for biogas plants



The industrial use of biogas plants is becoming increasingly important. Especially for industries that generate large quantities of organic residual materials, biogas technology offers a means of utilizing waste products efficiently and reclaiming energy.

In the sugar and ethanol industries, by-products such as sugar beet pulp and molasses as well as lignocellulosic residues such as barley straw or sugarcane bagasse can be converted into valuable biogas. The biogas produced can directly be used as an energy source on site, which significantly increases the plants' energy autonomy and resource efficiency.

Other industries are benefiting from this technology as well. In the food and beverage industry, many production steps generate waste such as fruit and vegetable residues, peels or marc. By converting to biogas, manufacturing facilities can meet a portion of their energy needs from their own production and reduce waste disposal costs.

Even in the paper industry, where organic sludge is generated during pulp processing, these residual materials can be utilized through biogas processes. Biogas technology is also used in municipal waste treatment plants to generate energy from sewage sludge to meet the plant's energy needs. The many utilization options show how biogas plants can support the recycling economy while contributing to a stable energy supply.

KEBO has been a reliable partner to the process industry for over 100 years, developing tailor-made chemical solutions that promote efficiency and sustainability. KEBO defoamers, scale preventers, cleaners, and corrosion inhibitors ensure stable processes and optimal results, especially in the food industry, where sugar, salt, starch, ethanol production, and fermentation are important. The same applies, of course, to industrial biogas plants. Ongoing research provides solutions to specific biogas process challenges such as foaming formation, deposits, and corrosion. This increases both operational safety and plant productivity.

Biogas plants that process organic waste especially benefit from KEBO's product lines:

DEFOAMERS (e.g., KEBOSPUM BWS)
eliminate unwanted foam layers and ensure uniform gas production.

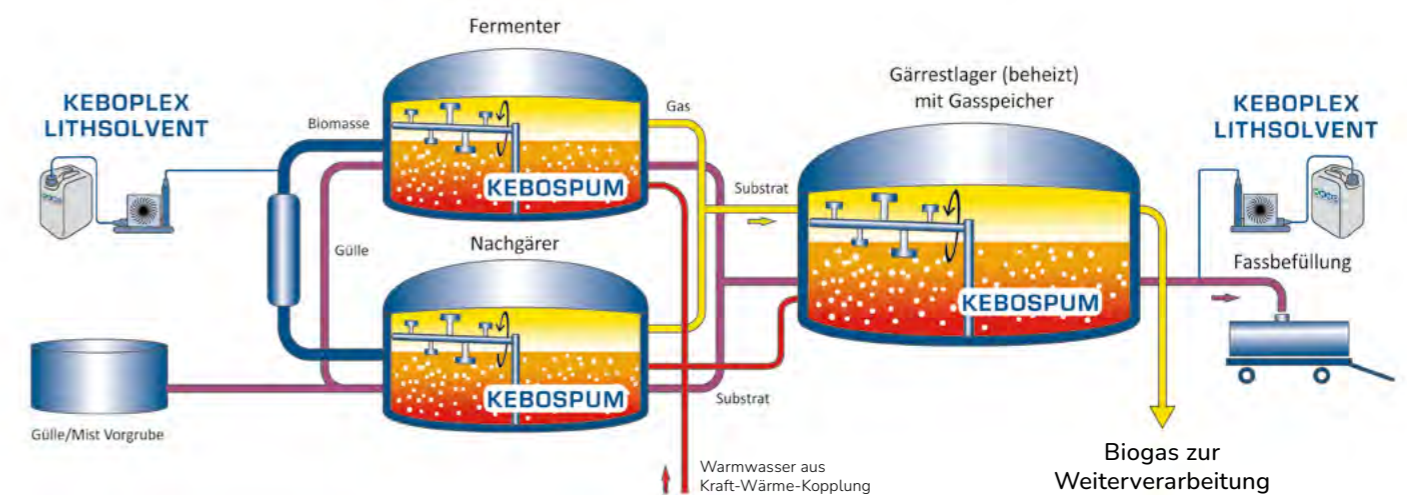
SCALE PREVENTERS (e.g., KEBOPLEX 138)
prevent lime deposits in evaporators and heat exchangers and minimize cleaning.

CORROSION INHIBITORS (e.g., LITHSOLVENT CL4)
protect metal components from hydrogen sulfide corrosion.

CLEANERS (e.g., LITHSOLVENT Cleaner 721)
cleaners maintain plant efficiency by effectively removing deposits.

KEBO actively supports biogas plant operators in strengthening the recycling economy and ensuring environmentally friendly energy production.

KEBO products used in a two-stage biogas plant



Chemicals and additives to maximize the biogas process.

Increasing efficiency, avoiding deposits, and stopping corrosion

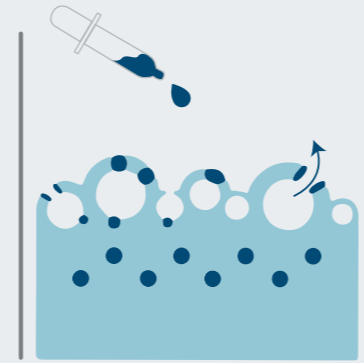
DEFOAMERS:

Application: In biogas plants as well as in municipal facilities such as those in the food and beverage industry, decomposition of organic substrates and high microbial activity can cause unwanted foaming, especially in fermenters and digesters. This foam can affect the efficiency of the biogas process by interfering with gas production and circulation.

The KEBOSPUM series with the specially formulated **KEBOSPUM BWS** is designed to effectively prevent foam formation and dissolve existing foam accumulation without disturbing the biological activity in the fermenter.

Application format: **KEBOSPUM BWS** is added in small amounts directly to the fermenter or substrate system. The product acts quickly and prevents the formation of a stable foam layer. Continuous operation ensures that biogas production is not compromised and provides a stable process.

Foam control for production process optimization



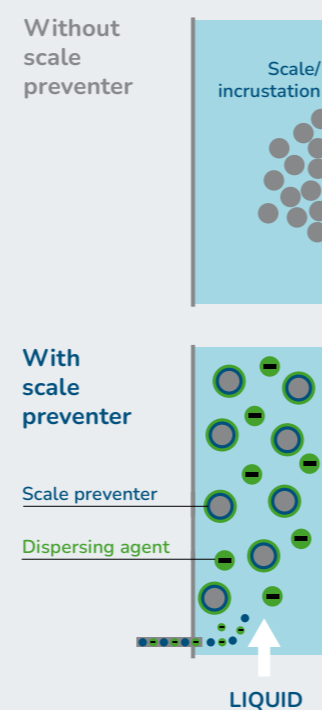
The foam layer is destroyed and the gas trapped in the foam bubbles is released.

SCALE PREVENTERS

Application: Deposits and incrustation in evaporators, piping and heat exchangers, which affect the efficiency of the biogas process, are a frequent problem in biogas plants. The scale preventer is used to prevent the formation of such deposits in the first place.

KEBOPLEX 138, for example, contains a special mixture of modified polyacrylic and phosphonic acids. These acids have a stabilizing and dispersing effect. Even at low doses, the product effectively prevents calcium deposits and specifically binds to seed crystals to prevent the growth of deposit-forming crystals.

Application format: **KEBOPLEX 138** is added using a dosing system in areas of high turbulence, such as upstream of pumps, in order to ensure good distribution in the system.

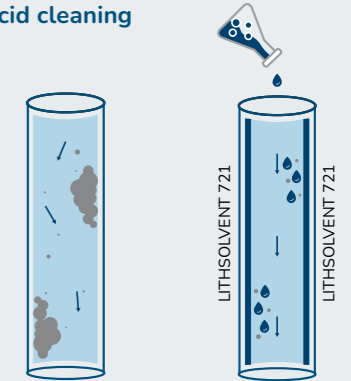


CLEANERS

Application: Despite scale preventers such as KEBOPLEX 138, stubborn deposits may form over time in biogas plants that require thorough cleaning. KEBO's **LITHSOLVENT cleaners** are specially formulated to directly remove inorganic deposits and mineral incrustations. LITHSOLVENT cleaners ensure the thorough removal and restoration of the system efficiency, especially in heat exchangers, piping, and evaporators.

Application format: **LITHSOLVENT cleaners** are circulated as cleaning solutions during maintenance intervals to dissolve deposits and restore the cleanliness of the plant components. This ensures the heat exchanger and evaporator functionality, reduces energy loss, and lowers operating costs.

Corrosion from acid cleaning



"Dirty" pipe without LITHSOLVENT

Clean pipe with LITHSOLVENT

CORROSION INHIBITORS

Corrosion inhibitors help extend the service life of the plant components. This is very important, particularly for the sugar and ethanol industry, where residual materials with high sulfate content are used.

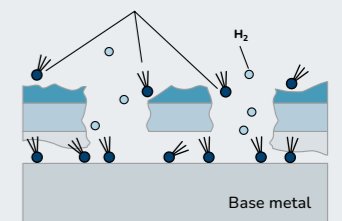
Application: The hydrogen sulfide gas (H_2S) produced in biogas plants can significantly corrode components, especially when using sulfate-containing substrates.

Application format: The **LITHSOLVENT corrosion inhibitors** series includes special inhibitors designed to reduce the wear and corrosion of metallic plant components such as piping and heat exchangers. This increases plant integrity and service life, which is especially important in the sugar industry and municipal plants with highly contaminated substrates.

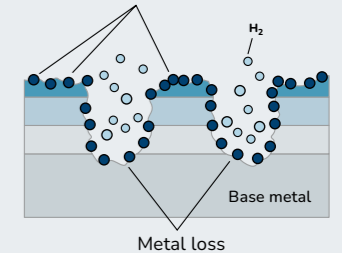
Our **LITHSOLVENT** series of corrosion inhibitors contains other corrosion inhibitors, depending on the cleaner's application.

Protected by KEBO inhibitors

Base metal is not attacked



Without protection Corrosive attack



Industrial biogas plants use different chemical products and additives to maximize the efficiency and stability of the biogas process. They are used in a wide range of applications because the chemical requirements vary greatly depending on the industry and the type of substances used.

Our chemists will assist you on site to help you find the best solution for your biogas plant. Contact us!

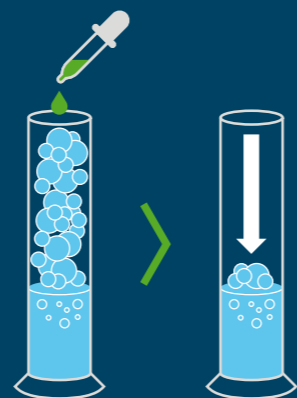
Optimal foam control with the high-performance defoamers from KEBO

Benefits when using KEBOSPUM: early prevention, fast foam destruction, and effective control.

Our highly effective defoamers are specially developed to either remove foam immediately as a defoamer (spontaneous effect) or to prevent it from forming in the first place as an antifoam. In both cases, the long-term effect is to suppress (repeat) foaming. Foaming agents include saponins, proteins, oligosaccharides from plants containing sugar and starch, metabolites from wastewater treatment, and surfactants.

Our defoamers meet a wide range of requirements and can be used in various applications. They not only support process stability but also optimize the quality of the end product by preventing contamination and other negative effects, thereby ensuring smooth production.

We always find the perfect defoamer for your production requirements. Contact us!



- Effective foam control, reduction, or elimination for the sustainable optimization of your production processes
- Good process compatibility without compromising product quality or equipment
- High stability to ensure consistent foam control
- Impressive dosing efficiency and low dosing rates for a high level of economy

Foam control in biogas plants

Foaming in biogas plants is a common challenge and often indicates a fault in the fermentation process.

It can be caused by a variety of biological and physical factors, often the result of an imbalance of the substrate composition or faulty process management. In addition to rapid substrate changes, protein-rich materials such as grain and inadequately ensiled feed, mechanical causes such as improper stirring or temperature fluctuations also play a role. These factors contribute to foam formation and stabilization, which interferes with fermentation and can reduce gas production.

Our KEBOSPUM products offer a specific solution by effectively removing foam without affecting the activity of the microorganisms. They provide uniform gas circulation and optimize fermentation, especially in critical areas such as fermenters and substrate lines. Because of their versatility, our products can be customized to meet a variety of requirements, such as different temperature ranges or industry-specific applications – for example, for the food or agricultural industries.

Our recommendation: KEBOSPUM BWS in biogas production

- **Formulated on plant base:** The defoamer is based on natural plant oils, making it an environmentally friendly solution.
- **Effective foam control:** Fights foam caused by foam-forming substances such as saponins, proteins, and extracellular oligosaccharides (especially in beets).
- **Quick foam control:** Foaming surfactants immediately reduce surface tension and destabilize the foam.
- **Optimal surface effect:** The high oil content ensures that the defoamer always remains on the surface, where it develops its maximum effect.
- **Safeguarding microbial activity:** The high oil content prevents the product from entering the cells. As a result, the growth and productivity of microorganisms is not affected.
- **Cost efficiency:** The use of KEBOSPUM BWS optimizes resource utilization and reduces the need for additional process agents. This lowers the operating costs and improves product quality.

Efficient foam control in fermentation processes

Fermentation is a biological process in which microorganisms such as bacteria, yeast, or fungi convert organic matter into other chemical compounds.

This process is used in many industries, including the food and beverage, biotechnology, and chemical industries. Foaming can occur during fermentation in different applications and can affect the efficiency of the process.

Examples include beer and wine production and the fermentation of dairy products such as yogurt and cheese. In all of these processes, foam can affect the quality and efficiency of the fermentation.

Foam formation is caused by various factors, including foam-active substances, escaping gases, and turbulences in the fermenter. Sugar, starch, proteins, other substrate ingredients processed during fermentation, and amino acids and proteins produced by the microorganisms significantly contribute to foaming.

Designed specifically for the fermentation industry, our **KEBOSPUM FES** defoamer is a reliable solution for foam control. Thanks to its silicone-free composition based on fatty acid esters and alkoxyates, it ensures effective foam removal with minimal impairment of oxygen transfer. This makes it ideal for bioethanol production, yeast propagation, and fermentation applications.

Scale preventers – reducing energy consumption and operating cost

Versatile protection for biogas plants, service water, and recooling systems

Ideal for biogas plants where high levels of calcium oxide in the process often cause stubborn deposits. The special formula of modified polyacrylic and phosphonic acids provides stabilizing and dispersing properties that specifically prevent calcium carbonate and calcium sulfate deposits. **KEBOPLEX 138** ensures stable and efficient processes.

- **Highly effective:**
KEBOPLEX 138 prevents calcium carbonate and calcium sulfate scaling.
- **Flexibility:** KEBOPLEX 138 adapts to changing conditions thanks to its effectiveness in different pH ranges.
- **Low consumption:**
Sub-stoichiometric dosages lower the chemical consumption (threshold effect).
- **High dispersing power:**
KEBOPLEX 138 remains stable and effective even under high turbidity conditions.
- **Specific crystal binding:**
The ingredients attach to submicroscopic seed crystals and prevent their growth.
- **Efficient dosing:**
10–20 ppm is sufficient to prevent deposits effectively.

These properties make **KEBOPLEX 138** a suitable solution for the specific challenges in biogas plants, especially for preventing incrustation and deposits in pipes and other plant components.



Cleaning concentrate with a unique property profile



Inhibited cleaning solution with a good environmental profile for a safe industry.

While continuous and thorough cleaning is essential in industrial processes, it often presents environmental and safety challenges.

In biogas plants, for example, mineral deposits can form in the pipes, heat exchangers, and other components that can affect the operation of the plant. Our **LITHSOLVENT cleaner 721** is an innovative solution.

The inhibited cleaning concentrate is based on environmentally friendly methanesulfonic acid (MSA).

- **High cleaning power**
- **Readily biodegradable, colorless, and odorless**
- **Stable up to 90 °C and free from nitrogen and halogen compounds**

Methanesulfonic acid is much safer than traditional cleaning acids

Because of these properties, MSA is also known as a “green” acid, as a true alternative to conventional, often difficult acids.

We provide our customers with a high-quality cleaner with maximum efficiency and improved worker safety. This is a solution that is not only powerful but also environmentally friendly.



The best protection against aggressive media

Acids play an important role in many industries

Hydrochloric acid is one of the major inorganic acids. It is used in ore processing or for pickling and etching in metal processing. Another important basic chemical in industry is sulfuric acid. It is used to manufacture products such as fertilizers, dyes, and detergents. The food industry also uses various acids, such as malic acid and citric acid, to preserve products.

Acids are also used for cleaning – to remove mineral scale such as lime or rust. On the one hand, scales must be removed completely and, on the other hand, the metal surfaces must be adequately protected. Therefore, special inhibitors are added to the acids for material protection.

Corrosion inhibitors as material protection

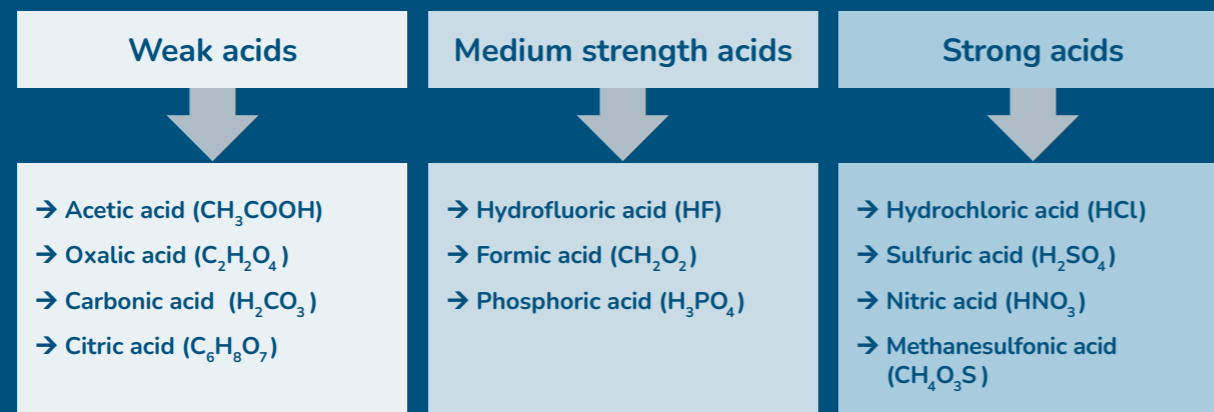
The chemical reaction between the acid and the scales often leads to the formation of corrosive substances or aggressive chemicals that attack the material. As a result, the material becomes thinner and thinner and may even develop cracks or pitting.

Corrosion inhibitors are used to prevent this corrosion. They work by slowing or preventing the chemical reactions between the acid and the evaporator material. This extends the service life of the plant.

KEBO LITHSOLVENT inhibitors for use with existing acids

KEBO LITHSOLVENT types help the acid to infiltrate the deposits due to the surfactants they contain. The reaction of the acid with the metals produces hydrogen gas, which blasts the scales from the substrate. Once the metal surface is exposed, the inhibitor protects it from further attack by the acid. At the same time, detached dirt particles are dispersed.

The most important acids at a glance:



Highly effective corrosion inhibitor for addition to acids

KEBO LITHSOLVENT inhibitors for optimum material protection

Number of acid cleaning actions	After 5 cleaning actions	After 20 cleaning actions	After 27 cleaning actions	After 28 cleaning actions
Protected by KEBO inhibitors				
Without protection				

LITHSOLVENT CL 4 – Efficient cleaning solutions for biogas plants

LITHSOLVENT CL 4 is a formaldehyde-free, highly effective corrosion inhibitor specially formulated to protect metallic materials in acidic environments, especially where sulfuric acid is present. Its properties make it an optimal choice for the cleaning and maintenance of components (tank lines, supply and discharge lines) in biogas plants where deposits and corrosion protection are critical.

Benefits for biogas plants:

- **Temperature-stable up to 90°C:**
Ideal for use in cleaning systems that operate at higher temperatures, such as heat exchangers or piping
- **Protects all common materials:**
Inhibits the corrosion of steels and copper alloys commonly used in biogas plants
- **Maintains the functionality:**
Does not interfere with dissolving deposits such as lime from biofilm that may be generated by the fermentation process
- **Efficient wetting and surface protection:**
The immediate wetting of the surface allows for the effective removal of stubborn residues. The surfactants they contain reduce surface tension and help distribute the cleaning fluid evenly.
- **Facilitates subsequent rinsing:**
Emulsifies oily contaminants and disperses dirt for more efficient rinsing

AREAS OF APPLICATION:

- LITHSOLVENT CL 4 is ideal for chemically cleaning the following:
- **Heat exchangers and piping:**
Removes deposits and protects against corrosion
 - **Fermenters:**
Dissolves substrate residue and foaming agents
 - **Gas lines and separators:**
Assists in the removal of incrustation caused by the biogas process

Chemistry is our passion



An effective answer to every need: not only chemical but also on a personal level.

We are a globally active company in the specialty chemicals industry. With nearly 100 years of tradition, we stand for quality, service, reliability, and innovation.

When it comes to operating your production facilities, KEBO products and services ensure clean processes. Whether for the sugar industry, the production of ethanol, starch, yeast, or the steel industry, we meet all of the challenges of chemical cleaning processes, water treatment, and corrosion protection. We see ourselves as a partner to our customers, and we share our knowledge on an equal footing. Our guiding principles in dealing with colleagues, customers, and nature are trust, responsibility, and respect.

Our services for you:

- Advice from our chemists and engineers in application technology and, of course, in the design of the necessary apparatus and equipment.
- A worldwide network of expert sales partners who can provide on-site analysis, planning, and implementation support.



[Visit our website](#)



Specialty Chemicals

Keller & Bohacek GmbH & Co. KG
Liliencronstraße 64
D-40472 Düsseldorf
Phone: +49 211 9653 0
info@kebo.de

KEBO FRANCE s.a.r.l.
21, rue François de Tesson
F- 77330 – Ozoir la Ferrière
Phone: +33 (0)1 60 02 76 00
contact@kebo-france.com

KEBO-Polska sp. z o.o.
ul. Skłodowskiej-Curie 65
87-100 Toruń
Phone: +48 797 960 042
info@kebo-polska.pl

KEBO do Brasil
Av. Vereador José Diniz, 3720
Cj. 305 - 04604-007
SÃO PAULO - SP
Phone: +55 11 3628 8473

www.kebo-chemicals.com