



Kemira – focus on water quality and quantity management

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Kemivesi AS, Member of Board

17.04.2013

Water is the connection

kemira

Kemira at a glance

- Kemira is a global, over two billion euro water chemistry company serving customers in water-intensive industries.
- Kemira offers water quality and quantity management improving its customers' energy, water, and raw material efficiency.
- Headquartered in Helsinki, Finland.
- Kemira is present in 40 countries, with around 5,000 employees and 71 sites.



Offering

Tailored chemistry

Monitoring, control and dosing support



Key capabilities

Customer intimacy and service

Application expertise and support

Water chemistry technology

Production and logistics efficiency

Key figures 2012

TURNOVER
EUR
2.2
BILLION

 **x 4900**

P E R S O N N E L

EUR 687 MILLION

FOR MUNICIPAL & INDUSTRIAL

GLOBAL NO.1 IN COAGULANTS

GLOBAL NO.3 IN FLOCCULANTS

Our mission

Our mission is the efficient use and reuse of water.

Our vision is to be the leading water chemistry company.

We offer smart and sustainable solutions for water quality and quantity management.



Four values guide our work



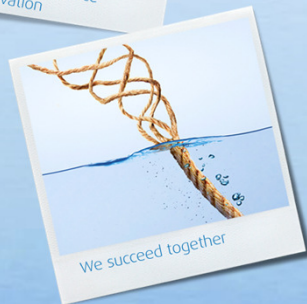
We are dedicated to customer success



We care for people and the environment



We drive performance and innovation



We succeed together

Business segments and revenue breakdown (12/2012)

Paper
Offers chemical products and integrated systems that help customers in the pulp and paper industry.



45%

Municipal & Industrial
Offers water treatment chemicals for municipalities and industrial customers.



31%

ChemSolutions

Offers chemical products to the feed and chemical industries.



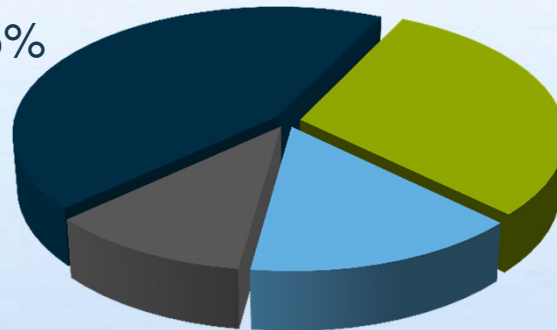
10%

Oil & Mining

Offers a large selection of innovative chemical extraction and process solutions for the oil and mining industries.



14%



Research and Development

- The driving force behind our R&D is to improve profitability and sustainability.
- Four research and development centers in Espoo (Finland), Atlanta (USA), Shanghai (China) and São Paulo (Brazil).
- 350 employed water chemistry experts
- Our R&D expenses in 2012 were EUR 38.1 million.



Kemira in the municipal water process



Potable water treatment

Mexico City

The largest potable water treatment facility in Mexico uses Kemira's extremely pure aluminum coagulant in the treatment of potable water for the Mexico City metropolitan area. Reliable supply of chemicals has strategic importance to guarantee water for millions of users.



Odor and corrosion control

Los Angeles

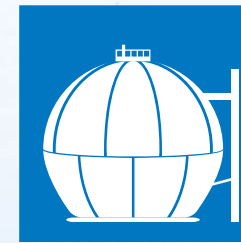
Kemira's iron based chemistry has prevented corrosion and controlled unpleasant odors in the complex sewage system of Los Angeles since the 1980's. This application also improves the process efficiency at the wastewater treatment plants in the LA region.



Wastewater treatment

Sao Paulo State


The wastewater treatment process at Valinhos, Sao Paulo, uses iron coagulants to improve the quality of treated wastewater. Chemically enhanced primary treatment (CEPT) is preferred as a sustainable and cost efficient solution.



Sludge & Biogas


Stockholm

The carbon-containing organic matter in wastewater sludge is digested in an anaerobic process where biogas, mainly methane, is produced. After digestion the sludge is hygienized and dewatered in the Kemira Kemicond process making it safe to use in agriculture.



“...during the rainy season when our consumption is extremely high, Kemira has always supplied us the needed amounts of high quality alum for our plant.”

Francisco Velasco Islas, Director General, CAPAMA, Acapulco, Mexico



“We now have much greater flexibility in the biogas process, as it is far less sensitive to changes and possible upsets.”

Marcus Möller, process engineer, NSR, Helsingborg, Sweden

A blue street sign for Hollywood Blvd, 6200 W, is shown in the background. The sign is slightly tilted and has white text. A dark blue, semi-transparent speech bubble overlay is positioned in the foreground, containing a quote in white text. The background is a blurred outdoor scene with green trees and a clear sky.

Hollywood Blvd
6200 W

“The state of California knows what it takes to manage its water sustainability programs. Projects for water reuse and cost-efficient wastewater management are areas where we can work closely together.”

Roderick Abinet, Applications Manager, Kemira M&I North America



Applications

Dedicated to smart and sustainable water management

Water is the connection **kemira**

Applications

Dedicated to smart and sustainable water management

Raw water treatment

Chemical precipitation

Desalination

Lake restoration

Wastewater treatment

Chemical precipitation

Phosphorus removal

Nitrogen removal

Bulking sludge control

Energy efficiency in wastewater treatment

Odor and corrosion control – H₂SGuard

Scale control -> to sludge & biogas

Water reuse

Membrane applications

Chlorine free disinfection – DesinFix

Sludge & biogas

Sludge dewatering

Sludge conditioning – KemiCond

Biogas enhancement

Other

Sugar & bioethanol

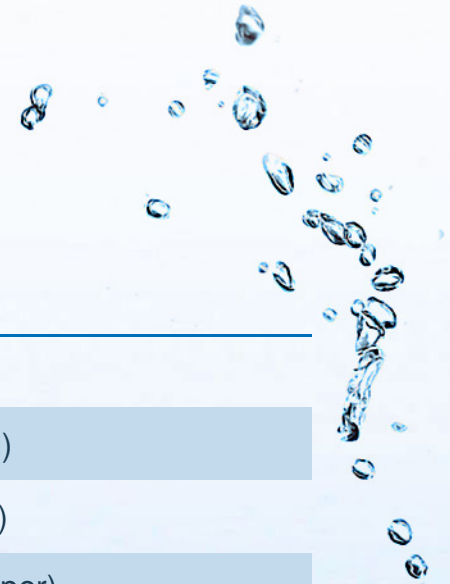
Fermentation

* Application offering may vary by market and region.

** H₂SGuard, DesinFix and KemiCond are trademarks or registered trademarks of Kemira Oyj or its subsidiaries.

Product lines

Dedicated to smart and sustainable water management



Inorganic coagulants

Aluminum sulfates (ALS, ALG, ALK, AVR, AVK, AVL)

Polyaluminum sulfates (PAS, PASS)

Aluminum chlorides (ACL)

Polyaluminum chlorides (PAX, ACH)

Sodium aluminates (SAX)

Iron sulfates (PIX, FERIX)

Iron chlorides (PIX, BDP)

Organic polymers and coagulants

Anionic polyacrylamides (Superfloc)

Non Ionic polyacrylamides (Superfloc)

Cationic polyacrylamides (Superfloc)

Cationic polyamines (Superfloc)

Cationic polyDADMACs (Superfloc)

Specialty chemicals

Antiscalants (KemGuard)

Biocides (Fennocide, Fennosan)

Defoamers (Bevaloid, Callaway)

Dispersants (KemGuard, KemSper)

Disinfection chemicals (DesinFix)

Odor control chemicals (H₂SGuard, OCC)

pH adjustment chemicals

Sugar industry chemicals (KemTalo)

Carbon source chemicals (KemCarbo)

Boiling & cooling water chemicals

Cleaning chemicals (Fennopur, KemClear)

Corrosion inhibitors (KemCorr)

* Product offering may vary by market and region.

** KemGuard, Fennocide, Fennosan, Bevaloid, Callaway, KemSper, DesinFix, H₂SGuard, KemTalo, KemCarbo, Fennopur, KemClear, KemCorr and Superfloc are trademarks or registered trademarks of Kemira Oyj or its subsidiaries.

Raw water treatment

Safe potable water from lakes, rivers, reservoirs and by desalination

Intro

Surface water is known to be colored and contain colloidal, dissolved and suspended impurities; bacteria, viruses, organic decomposition products, algae, sand, clay and pesticides. When raw water contains salts a desalination process based on a membrane application is needed.

All potentially dangerous substances – dissolved or suspended – must be identified and removed before the water is safe to consume. Apart from the aspect of health risks, contaminants can affect the water's taste, odor and visual appearance.

Solutions

Turbidity removal

Suspended solids are removed by chemical precipitation.

Color removal

Color originated from suspended and dissolved material is removed.

Metals removal

Chemical precipitation is adjusted for maximum metals removal.

Improved taste

Chemical precipitation is optimized to prevent algae growth.

Desalination

Applications for RO processes.

Benefits



Thorough analysis to determine the best performing chemistry.



Process know-how to resolve specific water quality problems.



Reliable and continuous supply of treatment chemicals.

Water & time saved due to less frequent filter washes.



Chemical precipitation for potable water

Optimum coagulation and flocculation

Intro

Suspended solids and colloidal particles are separated using coagulation and flocculation in potable water treatment. Surface waters from rivers and lakes high in color and suspended matter become of potable quality when water is treated with coagulants and polymers.

Tailor made coagulants and polymers with unique properties for suspended solids removal can give you exceptionally low residual particle matter. Drinking water that meets the highest quality requirements can be produced from greatly varying raw water qualities.

Products

Aluminum coagulants

Commonly used for potable water treatment all over the world.

Iron coagulants

Improved chemical precipitation that requires good process control.

Organic coagulants

No impact on process pH, often used with inorganic coagulants.

Organic polymers

Coagulation aids optimizing the floc properties and precipitation.

Benefits



Improved water quality with lower turbidity and color.



Safer potable water with certified chemicals



Improved precipitation means less disinfection by-products (e.g. THM).



Less water and time lost in filter washes.



Lake restoration

Cleaning a lake or water reservoir affected by eutrophication

Intro

When a lake's natural balance is shaken, the water can be cleaned and restored to health. Chemical precipitation with coagulants removes the turbidity in water speeding up the nature's own process of sedimentation.

Chemical restoration of lakes and water reservoirs is a lasting solution to eutrophication by binding the phosphorus in the sediments and regulating the excess growth of organic matter in the lake.

Solutions

Lake restoration

Lakes suffering from eutrophication are restored for improved water quality.

Water reservoir restoration

Potable water treatment is improved due to better water quality from raw water reservoirs.

Dredging

Sediment sludge is dewatered chemically using polymers .

Benefits



Cleaner environment for wildlife and recreation.



Increased value of clean environment to tourism industry.



Savings and improved quality for potable water treatment.



Wastewater treatment

Chemical and biological processes are often combined for improved efficiency

Intro

Our chemicals and applications are used widely in municipal and industrial wastewater treatment processes. As a global supplier we have the resources to combine different applications with a clear focus on making the processes of our customers more efficient.

Today our applications combine chemical precipitation with biological processes, control odor and corrosion, secure efficient disinfection, optimize sludge & biogas management and keep the membranes clean in MBR processes.

Solutions

Chemical precipitation
Completing biological processes.

Phosphorus removal
Preventing eutrophication and recycling valuable nutrients.

Bulking sludge control
Supporting biology.

Energy efficiency
Carbon capture for biogas.

Odor and corrosion control
Saving the assets from H₂S.

Scale control
Preventing struvite and other scale.

Benefits



Lower investment needed for more compact treatment plants.



Lower energy consumption and greater biogas production.



Improved treatment capacity of existing processes combining chemistry and biology.



Drier final sludge with lower disposal volumes.



Chemical precipitation

The environmentally friendly wastewater treatment process

Intro

Today chemicals can be used to develop, improve and optimize almost every process area of a wastewater plant no matter if a treatment plant uses mechanical treatment or advanced nutrient removal.

Chemical precipitation is typically at its best the earlier the coagulant is added in the process to reduce the energy consumption of the process. Maximum precipitation of solids and organic matter also improves the carbon capture in the sludge, making it possible to produce more biogas in anaerobic digestion.

Solutions

Direct precipitation (CEPT)
Chemically enhanced primary treatment.

Pre-precipitation
Efficient chemical precipitation reduces the need for biological process.

Simultaneous precipitation
Coagulation takes place during the biological process.

Post-precipitation
Water quality is improved after the biological process.

Benefits



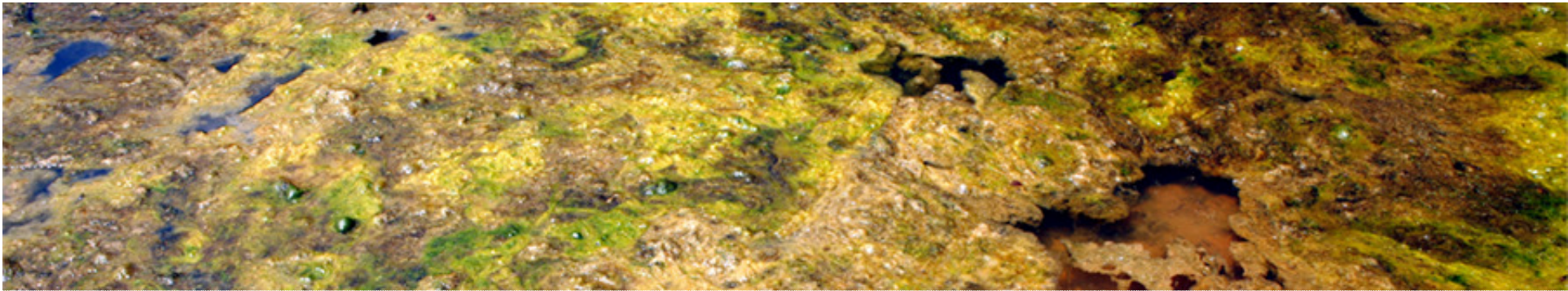
Less energy is used in the treatment process.



Improved treatment capacity of existing processes combining chemistry and biology.
Efficient P-removal.



Reduced capital cost.
Reduced cost for sludge management.
More biogas produced.



Phosphorus removal

Lower discharge of nutrients prevent eutrophication of water bodies

Intro

Phosphorus and nitrogen are the main nutrients encouraging the growth of organic matter and algae which cause eutrophication in water bodies. Water quality is now improving in water bodies all over the world in areas like the Baltic Sea thanks to projects that reduce phosphorus discharge from wastewater treatment plants.

The dominating process for the removal of phosphorus is chemical precipitation. Typically it is done with aluminum and iron coagulants before the biological treatment but phosphorus can also be precipitated in the biological treatment or as the final step of the treatment process.

Solutions

Direct precipitation

Chemically enhanced primary treatment with P-removal.

Pre-precipitation

P-removal before biological process.

Simultaneous precipitation

Coagulation takes place during the biological process.

Post-precipitation

Additional P-removal for improved water quality.

P-recovery

Phosphorus is available for reuse.

Benefits



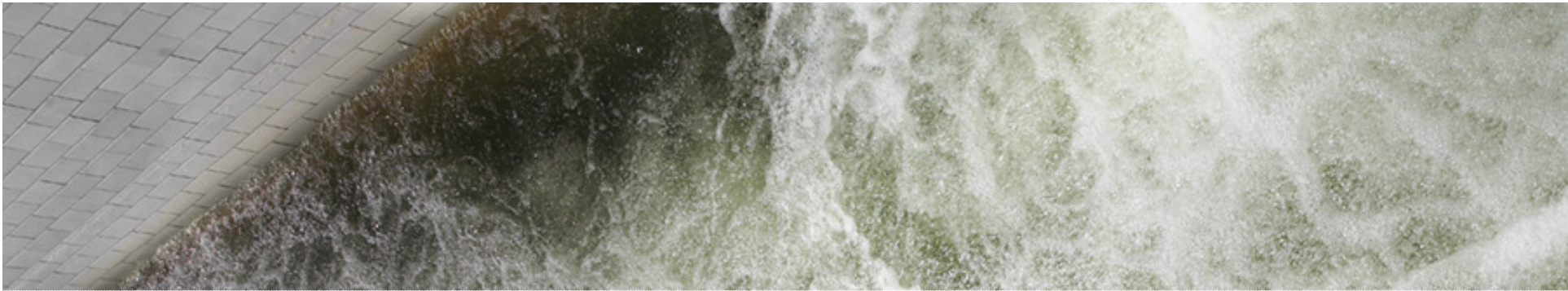
Less energy is used for P-removal in the treatment process.



Efficient P-removal adjusted to the treatment needs.
P is available for reuse in the sludge.



Reduced capital cost.
Reduced cost for sludge management.



Nitrogen removal

Chemical applications for improved biological nitrification and denitrification

Intro

Nitrogen and phosphorus are the main nutrients causing eutrophication in water bodies. Nitrogen is removed from wastewater by biological processes which are energy demanding and highly investment intensive. However, chemical pre-precipitation can reduce the cost and energy demand dramatically.

Ammonia is removed from wastewater in two steps. First ammonia is oxidized to nitrate by air in a process called nitrification. The nitrate is then converted to nitrogen gas by anaerobic bacteria in the denitrification process. These biochemical processes can be accelerated by adding the right carbon source to the wastewater treatment.

Solutions

Pre-precipitation

Removal of suspended nitrogen and organic matter before biological process improves the nitrification speed.

Carbon source

Optimizing the nitrification and denitrification processes with the right biological environment by adding external carbon source.

Benefits



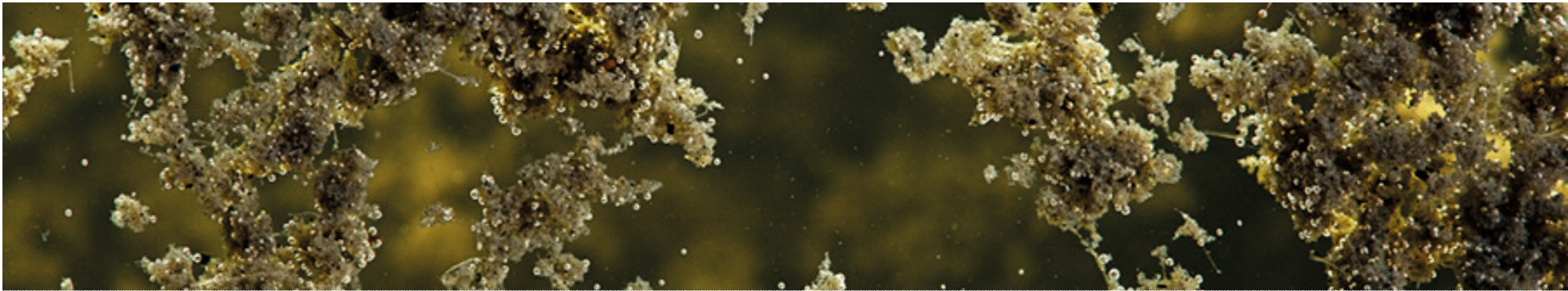
Less energy is used for N-removal in the treatment process.



More nitrogen can be collected for reuse from the sludge reject water.



Reduced capital cost. Savings from lower energy consumption.



Bulking sludge control

Preventing the formation of foam and floating sludge in biological processes

Intro

Bulking sludge and foam are complicated and unpredictable challenges for wastewater treatment plant operators. The sludge will not settle properly, the biological treatment process does not perform correctly and foam can float all over the plant.

Kemira FilamentEx™ concept prevents bulking sludge and foam problems typically caused by filamentous bacteria. At the same time this treatment maintains or improves the performance of the treatment plant. We don't only resolve the existing problem, but also prevents recurrences.

Solutions

Problem analysis

Microbiological cause of the problem is identified.

Bulking sludge control

Sludge properties are improved by chemical conditioning of the biological treatment process.

Foam control

The conditions for foam formation are controlled chemically.

Continuous monitoring

Maintenance program to keep desired sludge properties.

Benefits



Improved efficiency of biological treatment and aeration process.



Better sedimentation of sludge improves treated water quality.



Savings from improved sludge dewatering.



Safe and clean working environment without nuisance of foam.

Energy efficiency in wastewater treatment

Combining processes to generate an excess of energy

Intro

Water, energy and the environment go hand in hand. With smart use of chemicals in wastewater treatment, you can get the double effect of producing more energy from biogas, while at the same time requiring less energy to run your plant. The result is improved economic efficiency of your wastewater treatment plant.

Kemira offers a holistic approach to the energy potential of wastewater and sludge treatment. Energy consumption and the plant's energy production are optimized to create a process that eventually generates an excess of energy.

Solutions

Chemical precipitation

With improved primary treatment less energy is needed for aeration.

More and better sludge

More carbon is captured as primary sludge with higher energy potential.

Improved digestion

Anaerobic digestion is enhanced chemically to produce more biogas.

Sludge treatment

Efficient dewatering of sludge means less volume to transport.

Benefits



Lower energy consumption in the biological process.
Higher biogas yield from sludge digestion.



Savings with improved energy balance and income from biogas.



Reduced volume of final sludge to be disposed.



H2SGuard™

Odor and corrosion control

Intro

When wastewater gets septic in the sewer system, sulfate reducing bacteria forms a toxic and bad smelling gas, hydrogen sulfide (H₂S), which further leads to severe corrosion of concrete pipes.

The Kemira H2S-Guard™ solution is a complete package for odor and corrosion control in sewer systems. The service consists of chemicals, equipment, installation, online access to results, service, maintenance, training and education.

Solutions

Odor control

Unpleasant smell can be eliminated for a specific area or period of time.

Corrosion control

Typically corrosion is prevented throughout the drainage system.

Control & monitoring

Real time results are available online enabling remote control.

Dosing

Based on real time data chemical dosing can be automated.

Benefits



Automated operation and online monitoring of H₂S control.



Odor control for touristic and populated areas.

Safe working environment free of H₂S.



Reduced maintenance work and costs.
Reduced wastewater treatment costs.



Scale control

Preventing mineral scale formation to reduce operational costs

Intro

Anaerobic digestion of wastewater sludge transfers magnesium, ammonium and phosphate from the solid phase into ionic form in the liquid phase. This causes the formation of struvite deposits that usually occur in pipes and on surfaces in post-digestion processes and systems, leading to flow restriction, pipe blocking and production limitations.

The use of metal salts to reduce the phosphate levels is the most common treatment method for struvite problems. Additionally KemGuard antiscalants can be used to control scale of vivianite and calcium carbonate.

Solutions

Struvite control

Iron salts are used to prevent scale formation in post-digestion processes at wastewater treatment plants.

KemGuard antiscalants

Specific mineral scale problems of struvite, vivianite or calcium carbonate are identified and treated chemically with antiscalants.

Benefits



Improved operability with clean pipes and equipment.

Digestion process is improved when dosed ahead in process.



Savings and less time lost for plant maintenance.



Improved heat transfer and lower energy consumption for pumping.



DesinFix®

A powerful and sustainable disinfection solution

Intro

Kemira DesinFix® is a totally chlorine free disinfection technology including chemicals, equipment and related services. The technology is developed by Kemira to meet the increasing demands of wastewater and industrial process water disinfection.

Kemira DesinFix® is a patented technology combining Kemira's application know-how and high performance disinfection concept. It enables you to reach required pathogen levels in the wastewater treatment plant effluent to be used for diverse reuse applications.

Solutions

Irrigation water disinfection

Agricultural and landscape irrigation free of disinfection by-products.

Recreational water use

recreational applications meeting the requirements of the bathing water directive (EU).

Industrial reuse of water

industrial applications such as disinfection of internal service water.

Benefits



Safe storage, handling and dosing of chemicals.



No harmful disinfection by-products are formed.



More disinfected water can be reused for specific purposes.



Sludge & biogas

Managing the quality and quantity of sludge

Intro

We have a great variety of polymers designed for sludge dewatering. Also our coagulants are beneficial to improve the dewatering properties of the sludge. The right chemistry in sludge treatment means reduced emissions of hydrogen sulfide and ammonia.

Sludge from municipalities and some industries is rich in energy and nutrients. It can be conditioned chemically to produce more biogas and energy out of it and the final sludge volumes are reduced to a minimum. Phosphorous removed from wastewater is accumulated in the sludge and can be reused in agriculture or for soil conditioning.

Solutions

Sludge dewatering

Anionic and cationic polymers and iron coagulants for a dryer sludge.

KemiCond

Patented process for very dry and pathogen free sludge.

Biogas enhancement

Chemical conditioning for improved yield of anaerobic digestion.

Phosphorous recycling

Phosphorous in sludge can be recycled back to agriculture.

Benefits



Lower final sludge volume and total cost of sludge management.



Phosphorous recycling back to food chain.



Improved biogas yield from sludge.



Cleaner reject water from sludge dewatering back to the treatment process.



Sludge dewatering

Optimizing the total cost of sludge management

Intro

Sludge dewatering and the disposal of sludge are costly for a wastewater treatment plant. Sludge disposal costs are reduced by keeping the sludge volumes at a minimum and producing sludge with high dry solids content.

Kemira's variety of polymers are designed for sludge dewatering while iron based coagulants can also be beneficial in this process. A combination of a polymer and a coagulant typically gives improved dewatering properties, but can also lead to reduced emissions of hydrogen sulfide and ammonia.

Products

Superfloc organic polymers

Anionic, cationic and non ionic polyacrylamides are available as dry, liquid and emulsion polymers.

Inorganic coagulants

Adding a trivalent inorganic iron or aluminum salt improves the dewatering process of sludge.

KemiCond

Unique patented sludge conditioning process for dewatering, while simultaneously hygienizing the sludge and reducing odor.

Benefits



Reduced sludge volume.
Improved reject water quality.
P-capture in the sludge.



Hygienized sludge.



Reduced total costs.
Lower energy cost.



Kemira biogas program

Your trusted partner for biogas enhancement

Intro

Each biogas process is unique and has different needs depending on substrate composition, digestion technology, digestate treatment and gas utilization. By improving the environment for the microbes, plant capacity and biogas production can be increased. Another important factor for cost efficient biogas process is the viable handling of the digestate.

Kemira biogas program is a combination of application know-how and high performance products for the whole process from biomass feed to nitrogen removal with better process economics and higher biogas yield.

Solutions

Digestion performance enhancement

Kemira BDP technology improves digester performance increasing capacity and biogas yield, providing stabilized operating conditions.

Digestate treatment

Customized offering for both digestate dewatering and reject water treatment.

Scale & foam control

Preventing of foam in the process and scaling problems that may occur after anaerobic treatment.

Benefits



Higher biogas yield to be used as renewable energy.

Improved reject water quality.



Increased dewaterability of sludge.

Stabilized operating conditions.



Cleaner biogas for better energy production.

Thank you!

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