

Mineral Processing Portfolio





Safety and Environmental **Excellence**

As part of our commitment to the Responsible Care* program, Solenis has set a global goal of operating with zero incidents. We believe no job is so important that it cannot be done safely and without adverse environmental impact.

Our dedication to achieve safety and environmental excellence starts with our corporate culture. We embrace the value of our people and the environment. This influences our safety and environmental decision-making; how we interact with each other; how safety and environmental issues are prioritized and how our achievements in these areas are driven. We continue to drive our vision for excellence in

EH&S performance through our focus on clear communication of safety expectations; learning from incidents through root-cause analysis; improving our tools, management systems and the condition of our facilities; employee training and development and promoting a culture that maintains EH&S as a core value.

This culture is extended into every facility in which our employees operate. Our sales and service personnel are expected to actively partner with our mineral processing customers, participate in their safety programs and to assume a leadership position in aspects of industry safety programs specifically designed for our products.

At Solenis, we provide a workplace where a focus on safety, security and reduced environmental impact is our way of doing things.



Leverage Our Expertise to Gain a **Competitive Edge**

For nearly five decades, Solenis has been dedicated to helping the mineral processing industry operate more efficiently and profitably. Achieving these goals requires innovative chemistries and technologies. Additionally, it requires extensive knowledge and expertise, not only of mineral processing but also of the individual needs of your mine and operating environment.

Working side by side with your plant personnel, your Solenis technical representative becomes familiar with your operation and applies this knowledge to design a total system approach tailored to your specific needs. Supporting your technical representative is a dedicated team of applications specialists who are experts in chemistry, metallurgy, engineering, microbiology, and water treatment. They help troubleshoot problems and recommend best practice solutions.

Armed with the right products and a broad understanding of your process, Solenis technical representatives and applications specialists are uniquely positioned to help you establish new benchmarks for your mineral processing operation. Whether your objective is to improve throughput or recovery, to reduce costs, or to comply with a regulatory requirement, you can count on our dedicated team to provide cost-effective solutions that exceed your expectations.



Mineral Processing Aids

Antiscalants and Deposit Control Agents

Organic deposits and inorganic scales can lead to any number of problems, including lost production, increased maintenance and energy costs and unscheduled downtime. Solenis offers a complete portfolio of products for controlling the deposition of virtually any type of scale. In addition, Solenis has a full range of cleaning products for removing existing deposits and scales.

- Antiscalants
- Corrosion Inhibitors
- Scale Dispersants
- Scale Removers
- Surface Passivators
- Surfactants

Solenis' applications expertise and experience with various industrial processes, coupled with a complete line of proven chemical treatments, ensure customers receive a totally customized solution to their deposit control needs.

Flocculants & Coagulants

Solenis' portfolio of solid/liquid separation solutions enables significant improvement in process efficiency. Effective thickening of process slurry and dewatering of tailings are critical to maintaining desired levels of production and water reuse. Solenis' extensive product line, feed and control equipment, and the knowledge to use these products effectively can dramatically improve thickener performance.

- Anionic Polyacrylamide Powders, Emulsions and Solutions
- Cationic Polyacrylamide Powders Emulsions and Solutions
- Flocculant Make-down Systems

Flotation Reagents

Improving recovery from complex ores is key to meeting production targets. Equipment design and operating conditions affect separation performance, but chemistry selection is critical. Solenis offers a variety of frothers, collectors, and depressants that effectively provide the selectivity and flexibility required to maintain excellent separation efficiency.

- Depressants
- Frothers and Collectors
- Sulfide Ore Frothers and Collectors

Defoamers

Entrained air and surface foam can cause production and environmental problems. A full range of specially formulated products that minimize the detrimental effects of entrained air, surface foam and surfactant-stabilized foam is available from Solenis.

- Hydrocarbon Oil-based Defoamers
- Silicone-based Defoamers
- Vegetable Oil-based Defoamers
- Water-based Defoamers

Grinding Aids

Improving throughput in the milling operation can have a dramatic impact on total metal production without the need for a large capital investment. Grinding aids reduce ore stickiness, and slurry viscosity and reduce ore particle size, which allows grinding of hard-to-grind ores, increases in slurry solids, helps metal recovery downstream, and stabilization of the rheological properties of the output slurry. Significant energy savings can also be realized through the use of grinding aids.

- Natural and Synthetic Products
- Polymer Blends
- Polymer Solutions



Dust Control

Dust generated during mineral processing can be detrimental to production, worker health and safety, the environment, equipment and community relations. Solenis has developed products for roadway, tailings, transfer point, stockpile, crusher rail transport and underground dust control. Our dust control researchers can provide pre-trial laboratory screening of products to tailor solutions for encrusting, permeability, wind erosion, and water erosion. Solenis field experts can design customized application methods and provide automated dust monitoring, in order to develop a cost-effective solution.

- Natural and Synthetic Products
- Polymer Emulsions
- Polymer Latex

Viscosity Modifiers

Processing and pumping higher slurry solids to maintain or increase production without expensive capital expenditure can be a daunting challenge. However, Solenis has developed treatment programs combining a standard flocculant with novel chemistries that reduces the forces needed to pump high volumes of higher solids slurries in transfer or tailings disposal pipelines or in thickener underflow circuits. Solenis has the broad mineralogical, chemical, and process knowledge required to maximize slurry flow through the recovery circuit.

- Natural and Synthetic Products
- Novel Dual-function Products
- Polymer Blends

Monitoring and Control Equipment

Impurities in water and process systems can deposit onto pipes and equipment surfaces. These deposits can damage equipment and impact performance. Our broad portfolio of proprietary analyzers, controllers and online monitoring and data management services provides complete assurance that your water treatment or process system is performing optimally 24/7, 365 days per year.

- OnGuard™ 3S Analyzer for Scale
- OnGuard™ AF Control System for Foam
- OnGuard™ *i* Controller
- OnGuard™ Tracker Analyzer
- Solenis™ Cloud

Utility Chemistries

Whether the objective is to improve production, to extend equipment life, or to protect plant assets, customers can count on Solenis to deliver a properly designed and administered chemical program that ensures the reliability of their utility systems.

Influent Treatments

Whether used in a mineral processing process or for drinking, water is a vital resource. In a manufacturing process, it is the lifeblood that flows through every process stream. How raw water is treated affects the quality of the process as well as the reliability of the utility system.

Because the quality of raw water varies greatly, Solenis' influent treatment programs are custom designed to meet each customer's specific requirements. These programs use organic or inorganic chemistries in a liquid, powder or emulsion product to deliver optimum clarification performance and a reliable supply of water that meets required quality standards.

- Biocides
- Coagulants and Coagulant Blends
- Flocculants
- Polyaluminum Chloride (PAC)

Wastewater Treatments

As environmental regulations become more restrictive, improving the performance of a wastewater system becomes even more critical. To help customers achieve their environmental and operational objectives, Solenis offers one of the most advanced and comprehensive product lines for wastewater treatment along with a wide range of customer-focused services that help ensure the optimum performance of wastewater operations.

Whether the goal is to remove pollutants, to minimize sludge handling and disposal costs, to recycle or reuse effluent or to improve wastewater quality, Solenis has the products and expertise to provide a cost-effective solution.

- Bacterial Nutrients
- Bioaugmentation Technologies
- Coagulants
- Defoamers
- Foam Monitoring and Control Systems
- Odor Inhibitors, Neutralizers and Scavengers
- Scale Inhibitors
- Sludge Dewatering Polymers

Cooling Water Treatments

When corrosion, deposition and microbiological growth occur in a cooling water system, they can lead to flow restrictions, reduced operating efficiency, higher maintenance costs and unscheduled outages. To help maintain the reliability and performance of cooling systems, Solenis offers a full line of chemical treatments that work across a wide pH range and with different water chemistries.

- Biocides
- Biofilm Monitoring and Control Systems
- Corrosion Inhibitors
- Defoamers
- Deposit Control Agents
- Scale Inhibitors
- Scale Monitoring and Control Systems

Boiler Water Treatments

To ensure the optimum performance and safety of steam-generating systems, it is imperative that corrosion, deposition and boiler water carryover be addressed proactively. Solenis' boiler treatment programs combine application expertise with state-of-the-art chemicals to manage these issues and the multitude of problems they can cause.

- Corrosion Inhibitors
- Defoamers
- Deposit Control Agents
- Fuel Oil Additives
- Metal Passivators
- Oxygen Scavengers
- Reverse Osmosis Membrane Treatments

Research and Development

In recent years, R&D at Solenis has been transformed with the addition of a number of world-class scientists working together with our seasoned veterans in a collaborative global network. Today, Solenis has over 400 highly qualified professionals focused on developing new chemistries, market-changing technologies and customer-driven solutions at key centers in the Americas, Europe and the Asia Pacific region.

Solenis is developing solutions in a broad variety of application areas. Close collaboration with leaders in the industries we serve helps Solenis to identify the challenges most critical to our customers and to develop technologies to address these challenges.

Open Innovation Effort

Solenis recognizes that excellent technical work on new ingredient chemistries and advanced applications is being conducted daily in a variety of institutions around the world. We also know that the best way to meet a market need may be through use of a new technology being developed by someone other than our own scientists. Our understanding of the end markets and applications enables us to develop products using a wide variety of chemistries and technologies, and we are actively partnering with external R&D organizations to bring valuable new product and technologies to market.

Solenis R&D

The focus of the Solenis R&D Group is to develop and support new and existing chemistries for use in the industries Solenis serves. Many of these products are based on specialty chemistry technologies developed in recent years. Our R&D professionals are drawn from a broad range of scientific disciplines and they participate in all aspects of the product commercialization process. This participation allows researchers to clearly understand customer needs and accelerates the development of critical products, equipment and process monitoring methods.

Analytical Science

The Analytical Science group at Solenis is the heart of the company's effort to turn breakthroughs in chemical and biological science into products that can be commercialized for the marketplace.

Applications Development

Our Applications Development group is the critical connection to customer markets for which our innovation efforts are fine-tuned to deliver maximum value. Experts drawn from our customer industries help develop technical packages for new product offerings and transfer technology from one market to another. Solenis has applications development personnel at regional laboratory facilities around the world to assist with local requirements for product formulations.

Customer Analytical Laboratories

Rapid response to customer needs is an important part of the overall value provided by Solenis. Regional laboratories have been established to provide timely customer water analysis and product screening to continually improve our customers' processes. Customer Laboratories are also able to develop testing procedures to provide customized product, equipment, or process recommendations.





Advanced solutions for your toughest challenges.

Solenis is a global leader in specialty chemicals for water-intensive industries. With an average of 20 years expertise, our team is the industry's most knowledgeable. That's how we solve your toughest operational and sustainability challenges—whether you're in the pulp, paper, upstream energy, petroleum refining, chemical processing, mineral processing, biorefining, power or municipal market. Combining the right people, the right experience and the right technology, we're built to deliver value.



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