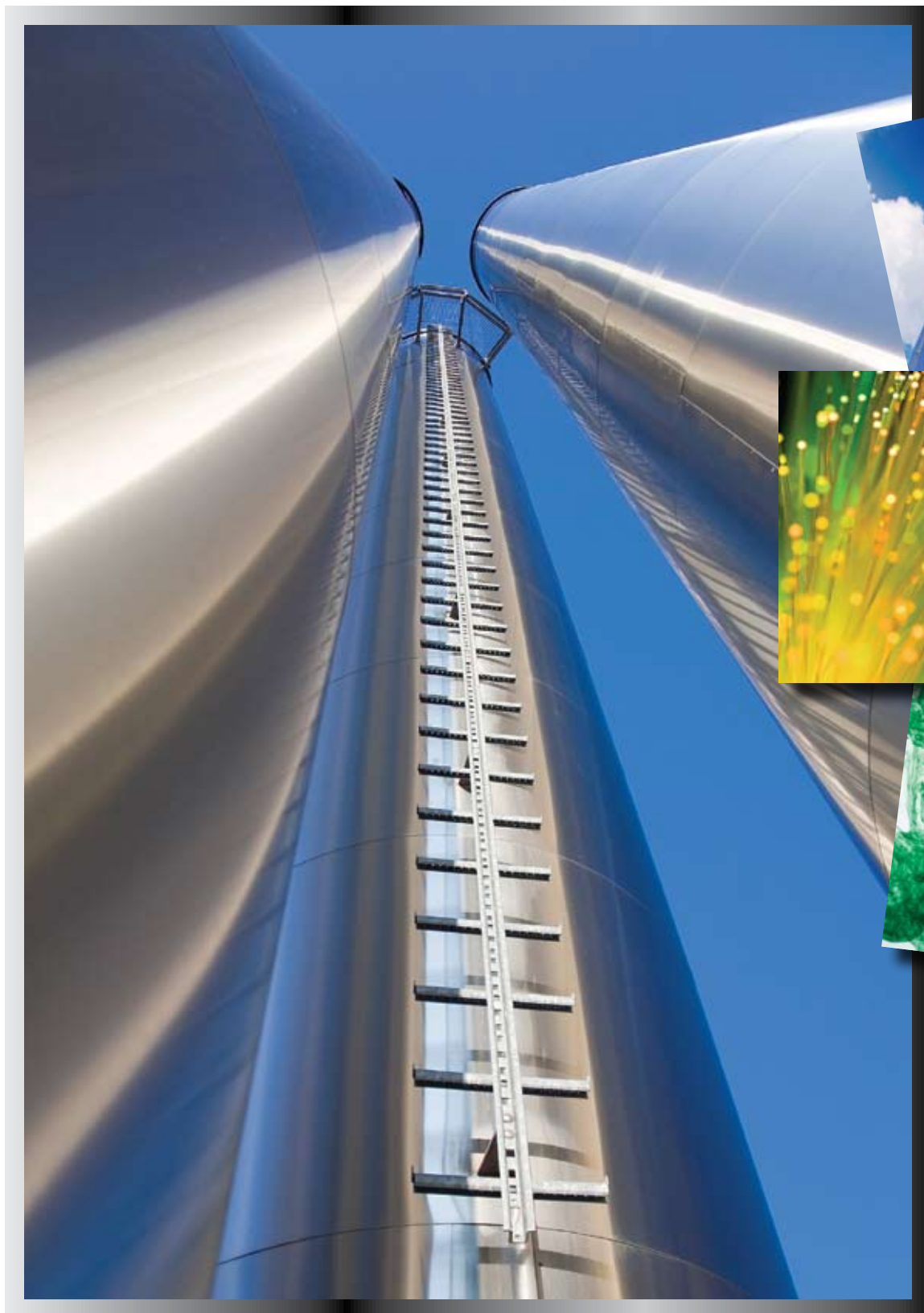


# Innovation and Commercialization through Chemistry



## **INORGANIC CHEMISTRY**

- Acid Distillation
- High Purity Inorganic Salts
- Iodates and Periodates
- Lithium Chemistry
- Perchlorate Chemistry
- Rare Earth Chemistry
- Specialty Solutions



GFS is a world leader in the manufacture of perchloric acids and salts

For more than 80 years, our clients have relied on GFS Chemicals to meet exacting standards in inorganic chemistry for a variety of R&D and industrial applications.

We produce inorganics to meet customer specifications with consistency from small bottles to multi-ton lots. That's why our customers count on us when they need consistent purity and quality throughout the product development cycle, from R&D and prototyping to full production scale.

Our inorganic chemicals are used in processes across many different industries.

- Aerospace
- Battery Production
- Fuel Cells and Energy
- Catalysts
- Electronics
- Mining
- Pharmaceutical
- Semiconductors



At GFS, we pride ourselves on delivering the product you want, with the consistency you need, in the packaging and quantities you require. We work with you to make sure you have exactly what you asked for, exactly when you need it.

- **Consistent quality:** We don't operate on a lot-selection basis. We manufacture to your specifications to ensure consistent quality each time you order, no matter the quantity.
- **Reliable delivery:** We are a U.S. supplier with our operating and manufacturing headquarters in Ohio. Our domestic supply chain ensures reliable delivery with minimal risk of interruptions due to overseas instability.
- **Expert guidance:** Our PhD and master-degreed chemists have the experience and education to answer your questions and solve your problems. We put our deep experience in inorganics to work for you to meet some of the most difficult technical challenges in the industry.
- **Superior service:** We make it easy for you to order. We'll work within your inventory requirements, ensure that all certificates are in place, and ship materials in the quantities and packaging that you require.





## CORE INORGANIC MANUFACTURING CAPABILITIES

### Acid Distillation

Through proprietary technology developed over fifty years, GFS has perfected the distillation process to produce high purity acids distilled to part per billion and part per trillion levels with virtually no trace level contaminants.

- Highest quality acids available, including Nitric, Hydrochloric, Perchloric, and Sulfuric Acid, and many additional trace metal grade acids
- ACS superior grade with certified PPB trace amounts of 20+ metals, plus boron, silicon, phosphorus, and sulfur
- PPB grade acid packed in fluorinated HDPE (High Density Polyethylene) to prevent the absorption of elements such as boron and silicon for environmental and water testing

### High Purity Inorganic Salts

GFS produces inorganic salts with low parts per million trace metal impurities for use in applications such as semi-conductors, electronics, pharmaceutical and power storage applications. Our expertise includes Nitrates, Chlorides, Carbonates, Perchlorates, Periodates, and more from ACS reagent grade to ultra high purity.

- Vertical integration in high purity acid distillation allows tight controls on crystallization technologies
- Many catalog products maintained in stock for timely delivery from small quantities to bulk
- Trace metal results listed on your certificate of analysis



**Consistent yet flexible batch production for process manufacturing or batch manufacturing consistency from lot-to-lot and year-to-year**

### Iodates and Periodates

Our Iodides, Iodates, and Periodates have earned a worldwide reputation for their high quality and high purity. GFS products have been used in everything from weather modification to organic catalysts to analytical chemistry applications.

- Strong, mature Iodine and Bromine feedstock supply chains ensure competitive pricing and availability
- Vertical integration in Iodic and Periodic Acid production allows tight quality controls in the production consistency of the associated salts
- Capabilities include Iodine (Iodonium) Cations and Organobromine chemicals used as precursor and intermediate materials

### Lithium Chemistry

GFS can supply many high purity Lithium compounds, including Nitrates, Carbonates, Iodates, and Perchlorates.

- Produced from virgin Lithium Hydroxide — not from low cost, low quality lithium raw material residues
- Purity levels for some GFS products can exceed 99.99 percent
- Economical depleted Lithium salts also available

### Perchlorate Chemistry

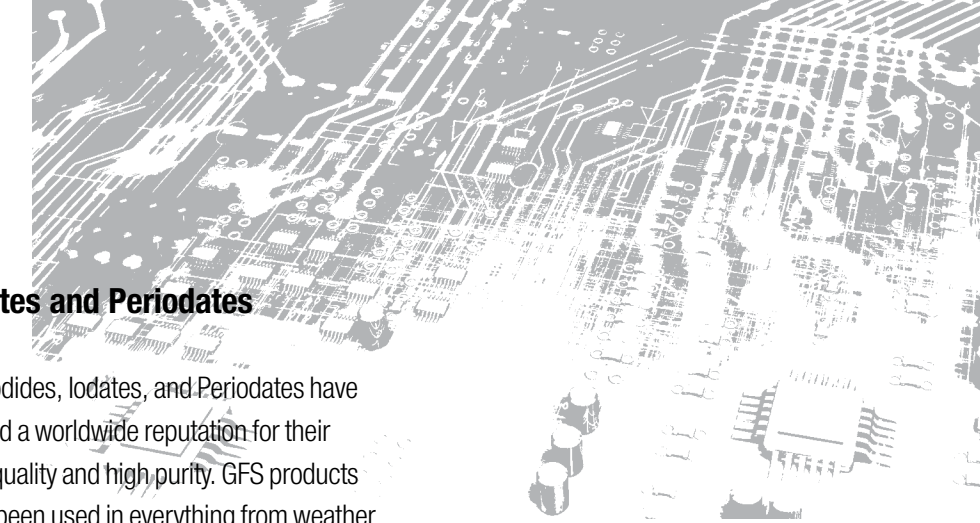
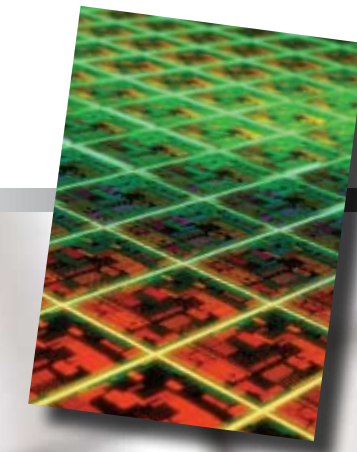
GFS is the world's largest producer of Perchloric Acid and specialty Perchlorate salts, and is a renowned resource on the safety and manufacture of these materials.

- Highest quality standards
- Special expertise with Perchloric Acid
- Additional high-purity Perchlorate salts such as Magnesium Perchlorate, Lithium Perchlorate, Sodium Perchlorate, and Potassium Perchlorate
- Reduced-moisture Perchlorates available for special applications

### Rare Earth Chemistry

GFS has extensive experience manufacturing and sourcing a wide range of rare earth starting materials for production operations or laboratory use.

- Highest quality materials from ACS reagent grade through 99.99+% purity (ultra dry and ultra pure)
- Specialized expertise with Cerium III and Cerium IV
- Capacity and experience across the majority of the Lanthanide series





## YOUR TRUSTED SUPPLIER FROM DEVELOPMENT TO PRODUCTION

At GFS, our specialty is delivering materials with consistent quality every time you order. That's why so many companies count on us for total lifecycle product solutions as they scale up new processes from R&D to full production.

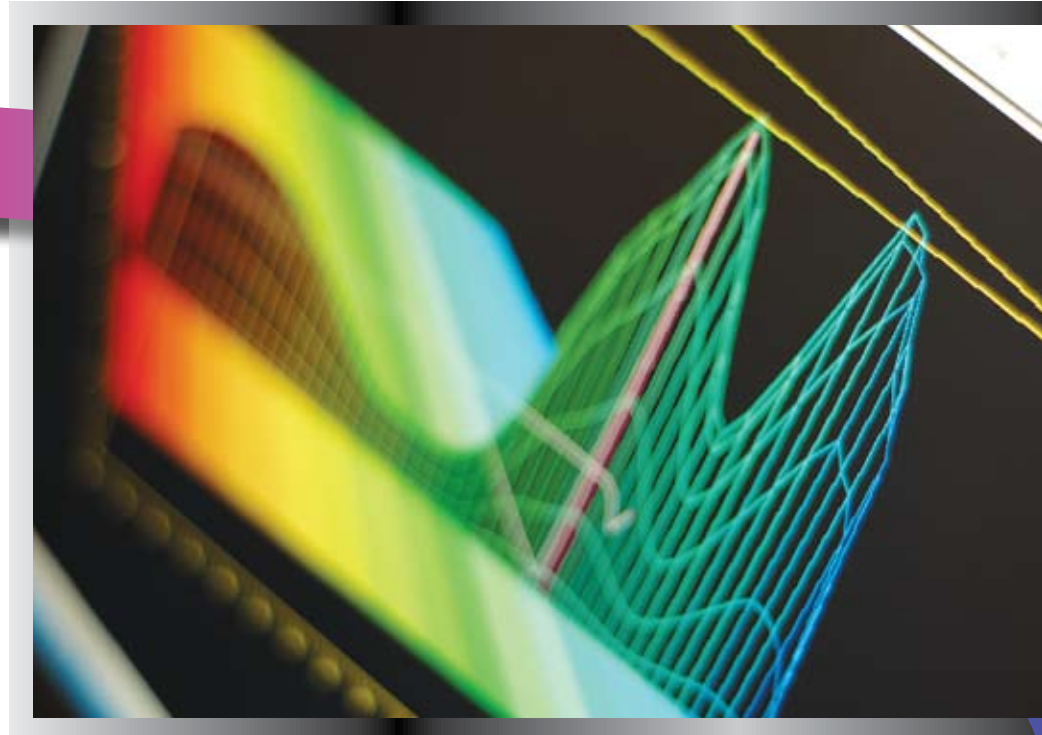
### Research and Development

- Analyze and evaluate desired specifications
- Develop samples and refine processes
- Test for repeatability and scalability
- Produce small quantities for R&D purposes



### Evaluation

- Monitor and evaluate needs throughout product lifecycle
- Develop specifications for new product needs



### Pilot

- Verify repeatability at larger batch sizes
- Verify product consistency with R&D samples
- Produce quantities needed for pilot purposes

### Production

- Translate processes to large-scale manufacturing quantities
- Verify product consistency with R&D/pilot samples
- Leverage economies of scale to produce quantities needed for production



We supply bulk quantities from multi-kilograms to ton lots with special emphasis on one to ten metric tons. For scale up projects, we can supply many materials up to multi-metric ton lots through efficient batch production. Our onsite quality control team ensures that you will receive product consistency from lot to lot. And since we manufacture the materials, we can provide excellent technical support.





**Meeting the high demands of  
Fortune 500 companies around  
the globe**

**For complete catalog information, visit us at [www.gfschemicals.com](http://www.gfschemicals.com).**

Email: [Inorganicdevelopment@gfschemicals.com](mailto:Inorganicdevelopment@gfschemicals.com)

Contact the inorganic development team at 1-800-349-3336 extension 323  
to discuss your project requirements or needs.

