Global Operations

For close to a century, we have helped our customers to meet their needs with a broad portfolio of products and solutions. We are proud of our history, and look forward to helping our customers meet future performance, safety and compliance requirements by refining and redefining our portfolio with new and improved products that maximize sustainability. Great Lakes Solutions is dedicated to providing products that are innovative, reliable and also minimize the impact on our environment and human health without sacrificing performance or quality. We are committed to Responsible Care® practices and Product Stewardship for our products. As a leading Bromine and Intermediates producer, we are proud to be our customers’ best partner for a sustainable and secure global supply.

Innovative Solutions

Our expertise in Bromine and Bromine based chemicals, both in the lab and in full scale production, is built on a foundation of over 60 years of innovation and continuous improvement. Our state-of-the-art, dedicated technology centers in the United States are staffed by a growing team of highly experienced scientists skilled in a wide array of synthetic methods and chemical manufacturing processes.

We operate multi-purpose, flexible pilot facilities in the United States which enables us to readily scale up new products and processes from grams to tonnes before the commitment to full scale production. While primarily focused on providing the highest quality and most reliable Bromine and brominated intermediate products, our technology team also provides custom synthesis and process development services to customers seeking to advance their project with an experienced and reliable partner.

Global Leader In Bromine and Intermediates

Innovative. Reliable. Sustainable.

Bromine and Intermediates

Great Lakes Solutions is one of the world’s leading manufacturers of Bromine and brominated Intermediates. With access to the world’s two main sources of Bromine and significant ongoing investment in our Bromine ISO tank fleet and maintenance capacity, Great Lakes Solutions is truly a leading global supplier.

Bromine and brominated Intermediates serve as building blocks for developing and engineering highly complex organic molecules that meet specific performance, environmental and quality requirements. Bromine and its Intermediates are utilized in many applications including flame retardants, agrochemicals, pharmaceuticals, fine chemicals, high performance rubber, polymers and biocides.

Additionally, inorganic bromides are important chemicals for the energy sector. Clear brine fluids are used in oil and natural gas production and the GeoBrom® product line of Bromine derivatives is a part of the solution for mercury emission control in coal fired power stations and industrial boilers.

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# Bromine & Intermediates Product Range

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>CAS No.</th>
<th>Applications</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Bromine &amp; Hydrobromic Acid</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bromine</td>
<td>7726-95-6</td>
<td>Flame Retardants, Agrochemicals, Fine Chemicals, Dyes, Pharmaceuticals, High Performance Rubbers and Biocides</td>
</tr>
<tr>
<td>Hydrobromic Acid Solutions</td>
<td>10035-10-6</td>
<td>Agrochemicals, Fine Chemicals, Dyes, Pharmaceuticals, PTA, Biocides and Mercury Control</td>
</tr>
<tr>
<td>Anhydrous Hydrogen Bromide</td>
<td>10035-10-6</td>
<td>Fine Chemicals, Pharmaceuticals and Plasma Etching</td>
</tr>
</tbody>
</table>

| **Alkyl Bromides**             |          |                                                                             |
| Cetyl bromide                  | 112-82-3 | Surface Active Agents, Biocides, Specialty Intermediates and Viscosity Modifiers |
| Dibromomethane                 | 74-95-3  | Fine Chemicals, Agrochemicals and Biocides                                  |
| Ethyl bromide                  | 74-96-4  | Fine Chemicals, Solvents and Pharmaceuticals                                |
| Ethylene dibromide             | 106-93-4 | Fine Chemicals, Agrochemicals, Pharmaceuticals and scavenger for lead in gasoline |
| Lauryl Bromide                 | 143-15-7 | Specialty Intermediates and Viscosity Modifiers                            |
| Methyl Bromide Industrial      | 74-83-9  | Fine Chemicals, Pharmaceuticals and Agrochemicals                           |
| n-Butyl bromide                | 109-65-9 | Pharmaceuticals and Agrochemicals                                           |
| n-Propyl bromide               | 105-94-5 | Pharmaceuticals, Agrochemicals and Solvents                                 |

| **Inorganic Bromides**         |          |                                                                             |
| Calcium Bromide (dry or solution) | 7789-41-5| Photography, Food Preservation, Road Treatment and Freezing Mixtures         |
| Sodium Bromide (dry or solution)| 7647-15-6| Photography, High Performance Rubber and Fine Chemicals                      |

Please contact your Great Lakes Solutions representative if you require products not currently listed.

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# Structures

## Bromine & Hydrobromic Acid
- **Bromine** : $\text{Br}_2$
- **Hydrobromic Acid** : H–Br

## Alkyl Bromides
- **Cetyl bromide**
- **Dibromomethane** : $\text{CH}_2\text{Br}_2$
- **Ethyl bromide**
- **Ethylene dibromide**
- **Methyl Bromide Industrial**
- **n-Butyl bromide**
- **n-Propyl bromide**

## Inorganic Bromides
- **Calcium Bromide***: $\text{CaBr}_2$  
- **Sodium Bromide***: $\text{NaBr}$  
  *dry or solution
Our Bromine and Intermediates division manufactures and distributes products primarily used as "building block" chemicals which are handled in industrial settings. We utilize our business management systems, questionnaires and in many cases onsite safety assessments to evaluate our customers' abilities to handle our products in an appropriately safe manner. As opportunities and needs merit, we then further educate our customers on the chemical they receive through safety data sheets, direct interaction, and where appropriate, supplemental information we have developed.

Great Lakes Solutions is dedicated to Responsible Care® practices and continuous improvement and is willing to work with our customers in ways that further enhance the safe and responsible distribution, handling and disposal of our Bromine and Intermediates products. Please contact your Great Lakes Solutions representative if you have questions regarding safety and handling of our Bromine and Intermediate products.

Example of an ISO Tank Offloading Facility

Working with customers to enhance their Bromine handling capabilities when offloading an ISO tank is a key aspect of our product stewardship program.

We are committed to strong performance - for ourselves and for our customers - and to providing for the safety of our employees, our customers and their customers, as well as meeting industry and environmental sustainability standards and goals. The areas of performance, safety and sustainability permeate our organization and are closely related to make Great Lakes Solutions the business it is today.
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The information contained herein is correct to the best of our knowledge. Your attention is directed to the pertinent Material Safety Data Sheets for the products mentioned herein.

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Chemtura is dedicated to Responsible Care®, the chemical industry’s initiative to protect the environment; ensure the safety and security of our operations; and safeguard the health and safety of our employees and neighboring communities. Our goal is to make continuous progress toward the vision of no accidents, injuries or harm to the environment. As active and responsible members of the communities in which we operate, Chemtura is committed to open communication with our employees and neighbors. We monitor the safe production, transportation and use of our products. Our employees are comprehensively trained to do their jobs safely and with minimum impact on the environment. We care about the future — for all of us. If you have any questions, or would like to comment on our Responsible Care program, please send an email to RCMS@chemtura.com.

Printed in USA. Bromine and Intermediates Product Guide GLS/PG/3037/12September2016

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