In its ongoing efforts to improve our catalyst product, the Johnson Matthey R&D team continues to explore ways to reduce catalyst cost, while maintaining performance and durability.

**Johnson Matthey Analytical Testing Capability**

The Johnson Matthey laboratories are well equipped to perform catalyst activity testing under fresh and accelerated aging conditions to predict catalyst durability and longevity. We have complete analytical capability for analysis of fresh and field aged catalysts, to determine catalyst performance and condition.

**Look to the Leader**

For a full line of industrial catalysts and emission control systems, turn to the most reliable leader in the business: Johnson Matthey SEC. We have an extensive database of applications knowledge, extensive catalyst testing facilities, full-service customer service package, international locations, state-of-the-art manufacturing facilities and unsurpassed technical capabilities. All in all, there’s no better choice than Johnson Matthey for catalytic emissions control solutions.

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Halocat® SC24 is an advanced precious metal catalyst that delivers outstanding emission control performance for all PTA processes.

Johnson Matthey’s Stationary Emissions Control (SEC) group’s highly efficient Halocat® SC24 low-loaded precious metal catalyst gives PTA manufacturing plants a proven option for destroying exhaust stream pollutants, including VOCs and toxic organic compounds.

The benefits of Halocat SC24 catalyst are its low operating temperature, high temperature durability, and proven field performance.

Oxidation of PTA Exhaust Gas Components

<table>
<thead>
<tr>
<th>Oxidation of PTA Exhaust Gas Components</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>CO, H2O</td>
<td>HCL, VOC, CO</td>
</tr>
</tbody>
</table>

Johnson Matthey understands that controlling PTA (purified terephthalic acid) plant stack emissions requires a thorough knowledge of the plants process streams, seamless integration of control devices into the existing process and extensive experience with emission control technologies.

We are a pioneer in the development of PGM-based oxidation catalysts and have decades of experience in developing, manufacturing, installing and servicing dozens of systems at PTA facilities throughout the world.

The Global Leader in Emissions Control Catalyst

Johnson Matthey is the worldwide leader in catalyst technology to reduce emissions from industrial processes, continuously innovating to develop catalysts to help our customers comply with tighter environmental regulations.

Johnson Matthey SEC carries a complete range of oxidation catalysts in a variety of formulations and configurations on metallic or ceramic supports to suit specific applications.

We have provided catalysts to reduce VOC emissions from manufacturing plants since the 1960s, reducing tons of toxic VOC and halogenated VOC, as well as CO, NOx and other air pollutants. Our PTA catalysts reduce methyl bromide, benzene, CO and other VOC emitted from PTA plants.

A History of PTA Catalyst Innovation

Johnson Matthey’s first PTA oxidation catalyst was Halocat AH-400, a high-loaded platinum group metal (PGM) catalyst developed in the 1990s. It remains in operation at many PTA plants operating in the U.S., Asia, Europe and South America.

The Johnson Matthey research and development team continued to improve and introduce subsequent PTA oxidation catalysts, including our standard medium-loaded PGM LMB catalyst with a base-metal catalyst promoter, and our low-loaded PGM Halocat SC24 catalyst with a base-metal promoter and advanced mixed-metal oxide support.

We strive to develop catalysts that are compatible with PTA processes in use today. Our range of PTA catalysts has proven high performance at low temperatures, while remaining durable at high temperatures. They are custom fabricated to fit the reactor and are installed at more than half the PTA plants throughout the world, including those using Compress, Invista, BP and GTC Technology processes.

Development of Halocat SC24 Catalyst

PTA plants emit CO and a variety of VOCs, such as methyl bromide, benzene, acetates, xylenes, acetic acid and methanol. Together they cause smog; methyl bromide is also a stratospheric ozone depleter. Table 1 shows a list of organic contaminants that can be converted with SC24 catalyst.

Table 1: Contaminants Removed by Halocat® SC24 Catalyst

<table>
<thead>
<tr>
<th>Carbon Monoxide</th>
<th>Alcohols</th>
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<tbody>
<tr>
<td>Methyl Bromide</td>
<td>Acetates</td>
</tr>
<tr>
<td>Acetic Acid</td>
<td>Formates</td>
</tr>
<tr>
<td>Benzene</td>
<td>Xylenes</td>
</tr>
<tr>
<td>Toluene</td>
<td>Other VOCs</td>
</tr>
</tbody>
</table>

Our catalytic oxidation process for PTA plants offers a safe and environmentally friendly abatement of VOCs and toxic organic compounds from off-gasses in a very cost-efficient operation.