

Catalysis and Chiral Technologies

Solutions for the Synthesis of Pharmaceuticals and Fine Chemicals



Johnson Matthey
Catalysts



Meeting Challenges. Exceeding Expectations.

The Catalysis and Chiral Technologies (CCT) business unit of Johnson Matthey Catalysts offers superior catalytic solutions to the pharmaceutical, fine chemical, agrochemical and nutraceutical markets.

Our overriding commitment is to provide our customers with innovative products and technologies for designing and optimizing their catalytic solutions.

As a strategic catalysis partner; you gain the valuable competitive advantages associated with:

- The resources for building optimal catalytic solutions based on leading edge technology
- A team of outstanding scientists who have decades of catalysis expertise
- One of the most diverse portfolios of catalyst products in the industry

Catalytic Screening Services

Johnson Matthey Catalysts customers rely on our catalytic services as a competitive edge when it comes to developing the most efficient synthesis route. We invite you to leverage our expertise – in a multitude of areas – through a broad yet flexible program featuring:

- Catalyst screening
- Route development
- Catalysts and process optimization
- Process scale-up

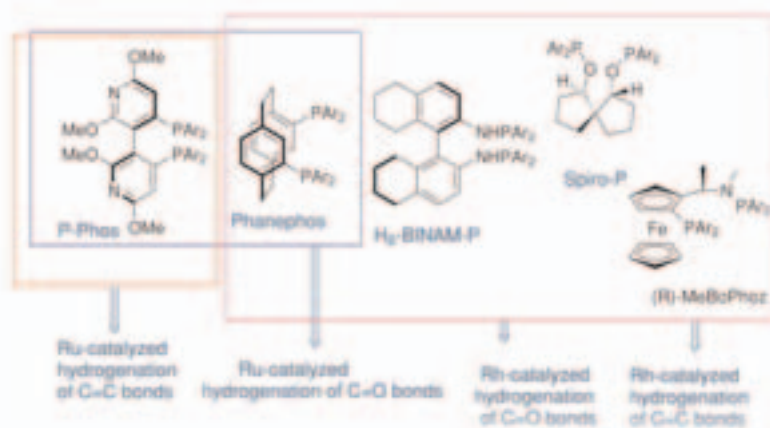
Chiral Technologies

Johnson Matthey Catalysts offers a major chiral platform that includes access to the Nobel Prize winning Noyori's Ru-diamine catalyst technology and a collection of other elite ligands for asymmetric hydrogenation. These scalable technologies have been assembled via in-licensing from academic institutions, industries, and from in-house development. This combined range of technologies covers all applications of rhodium and ruthenium catalyzed asymmetric hydrogenation and transfer hydrogenation.

With this versatile portfolio of ligands and our deep-rooted history in precious metal catalysts, we provide a vertically integrated solution for your chiral catalysis needs.

Asymmetric Hydrogenation

Johnson Matthey Catalysts has assembled a range of technologies covering all known applications of asymmetric hydrogenation (C=C, C=O and C=N bonds).



Product Purification with Smopex® Metal Scavengers

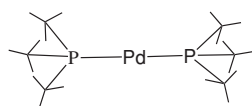
Developed for the recovery and removal of metal impurities from both product and waste streams, the unique structure of Smopex fibers exhibit faster ion- and ligand-exchange kinetics compared with normal resin beads. This is especially valuable when scavenging precious metals from organic solutions. Additionally, a selection of Smopex fibers has been filed with the FDA for use in product streams using APIs. Smopex fibers' advantages include:

- Excellent mechanical and chemical stability
- High loading capacity
- Compatibility with most solvents
- Utility in both homogenous and heterogeneous reactions

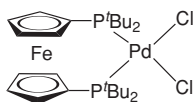


Advanced Coupling Technology

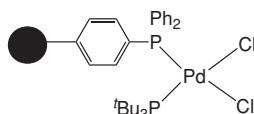
A new line of advanced palladium coupling catalysts has been developed by Johnson Matthey Catalysts. State of the art developments in this area include anchored catalysts (FibreCat®) and ferrocenylphosphine-based catalysts that have shown excellent results in the coupling of aryl halides at very low metal loadings and relatively mild temperatures. The catalysts are designed for challenging C-C coupling reactions, amination, alpha ketone arylation, etc., using sterically hindered substrates, aryl chlorides and electron rich substrates.



$\text{Pd}(\text{t-Bu}_3\text{P})_2$: Pd-116



di-tbpfPdCl_2 : Pd-118



FibreCat 1032

Heterogeneous Catalysts

Whether your need is an immediate lab sample or a fully customized catalyst, Johnson Matthey Catalysts is prepared to deliver by providing:

- Dedication to your success with tailored catalytic solutions that address the unique challenges of each system
- Vast experience of our elite scientific team. An unparalleled resource for catalyst recommendations and assistance in optimizing the performance of your process
- One of the largest, available product ranges of supported platinum group / base metal and sponge nickel catalysts

Our latest developments in heterogeneous catalysts include:

- Ru/SiO₂ catalysts – provide high activity and selectivity for the hydrogenation of aromatic rings in the presence of C=C bonds
- Pd/CaCO₃ – ideal for pharmaceutical applications, this is a non-lead promoted catalyst for selective hydrogenation of alkynes and dienes to olefins
- Pd/C – with our unique catalyst preparation, this new line is especially suitable for the selective hydrogenation of aliphatic nitriles to amines

At Johnson Matthey Catalysts, we answer the real-world requirements of our customers. Our focus begins with cutting edge, new product development and culminates with the commercial supply of superior products.



Kits

Johnson Matthey Catalysts offer a variety of sample kits that provide customers a range of product lines at exceptional value.

Asymmetric Hydrogenation

A collection of the chiral ligands and preformed catalysts

Advanced Coupling

Containing our most active catalysts for challenging reactions

Mini Advanced Coupling

A scaled down version of the Advanced Coupling Kit

Smopex

A selection of fibers for a variety of reaction conditions

Heterogeneous Catalysts

40 of our top catalysts supplied with an application table

Global Network of Resources

Johnson Matthey Catalysts is positioned to provide its customers with an integrated global network of catalysis expertise with:

- Research centers in Royston and Cambridge, UK, and West Deptford, USA
- Manufacturing facilities in the US and UK
- Technical support worldwide

Detailed descriptions of the above technologies are now available in the NEW **Catalyst Technical Handbook**

To receive your complimentary copy, please send your request to schlecx@jmtusa.com or visit us at www.jmccatalysts.com/pharma



Johnson Matthey Catalysts

For further information about our products or to talk to us about your individual requirements, please contact your local sales office or contact us at the addresses below.

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