Safety

Every project at Shepherd is subject to rigorous safety testing and review. Prior to initiating any work we review the hazards of each raw material, and prior to scale-up we perform all appropriate ignition, flammability and reactivity tests as well as a complete process hazard analysis. These are examples of Shepherd's overall commitment to the safety and welfare of its employees and the community. Shepherd's complete safety program includes many components such as process safety, required training programs, voluntary training programs, audits, metrics and reporting.

Regulatory Approach

Our team will help evaluate the regulatory requirements necessary as part of successful commercialization. Our approach encompasses development of the required DOT documentation and classifications to ship the materials, TSCA evaluations, REACH evaluations, as well as a review of applicable OSHA/EPA reporting requirements. Shepherd has been in the business of developing and scaling up new compounds since its beginning and understands the importance of a complete and accurate assessment with respect to regulatory obligations.

Shepherd

The Shepherd Chemical Company

Shepherd Middletown, USA
Shepherd Widnes, England
Shepherd Mirecourt, France
Shepherd Tokyo, Japan
Shepherd Chemical China, Inc.

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Responsible Care®
Good Chemistry At Work

ENHANCING LIVES

Character, Quality, Custom Metal Chemistry

Shepherd

The Shepherd Chemical Company

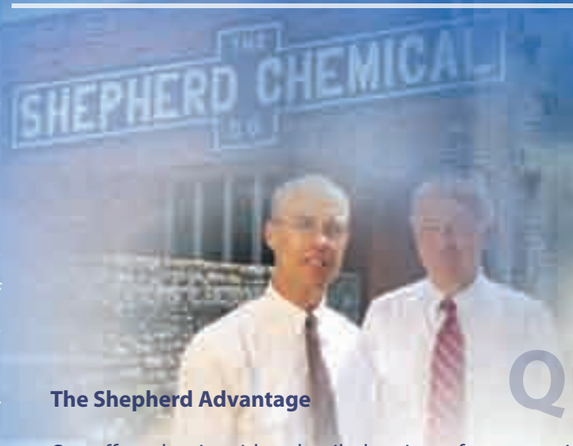
Multi-Step Organic Synthesis

Custom Chemical Synthesis and Manufacturing

Broad Metal Chemistries

The Shepherd Multipurpose Plant is capable of carrying out unit operations under a wide range of conditions. This capability allows us to develop the most chemically efficient route to your target compound.

Shepherd Chemical has been manufacturing metal based compounds fo r over 90 years. During that time we have developed a wide range of compounds based on our core metals and have been involved in a number of markets. Now Shepherd is embarking on a new and exciting area of chemistry to further our ability to deliver value added compounds to the marketplace. We invite you to review this brochure. Please contact us to learn more about ways we can use our expertise to help you achieve your business goals.



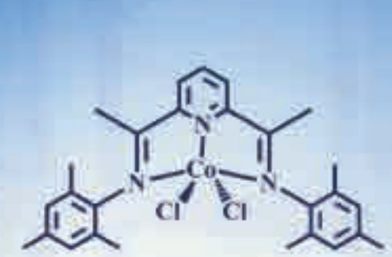
Quality

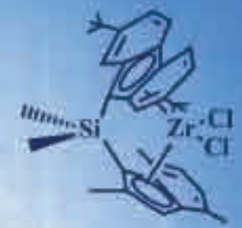
The Shepherd Advantage

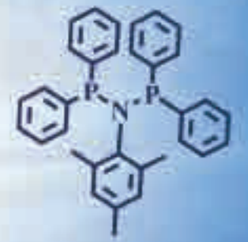
Our efforts begin with a detailed review of your requirements. One of our PhD chemists will be responsible for the development of samples meeting the stated targets. During this development work, our other professionals are reviewing important aspects of your project including raw material sourcing, raw material handling, regulatory requirements, and process development. This way the lead chemist assigned to your project is able to stay focused on the most efficient route to your target compound from the lab phase to the scale-up phase. Learning and collaboration from the lab is carried directly into the pilot step.

As a private, stable chemical company, Shepherd offers a high degree of IP confidentiality. Our customized approach has served us well since 1916 and will continue to be a central theme in our business model. We invite and encourage site visits by our customers to foster greater involvement and learning within the relationship.

Character







Custom Ligand Design

Capabilities

Low temperature (-30 C)
High temperature (250 C)
Low pressure (0.1 torr)
Pressure capability (150 psig)
Anhydrous processing
Inert atmosphere processing
Calorimetry

Chemistries

Metalation chemistries
Metallocene synthesis
Single site catalyst synthesis
Alkylation
Amination
Organolithium Chemistry
Grignard reactions
Phosphine derivatives
Boron compounds
Suzuki coupling
Organotransition metal compounds
Kumada coupling

Equipment

- 100 gallon reaction vessels
- Range of metallurgies including 316L SS and Hastelloy C-276
- Fractional distillation column
- Solvent recovery and reflux systems
- Temperature controlled pressure filtration
- Solid – liquid solvent extraction vessel
- Drying
- Distributed Control System

Characterization

Composition Determination
Particle Physical Properties
Variable Temperature and Inert Atmosphere Powder X-ray Diffraction
Scanning Electron Microscopy and Electron Spectrometry
TGA / DTA in air or N_2
ATR-FTIR
GC-MS
Zeta Potentiometry and Isoelectric Point Determination
Multinuclear and Solid-state NMR
XRF

Environment, Health, and Safety

Shepherd has always operated under the highest standards of EHS. Our commitment to the welfare of our employees, community, and the environment is demonstrated in our participation in voluntary programs such as Responsible Care® and RCMS®.

For more information visit www.shepchem.com

Compounds

Shepherd Chemical is capable of developing a wide range of ligands for use in coordination compounds. This development capability coupled with our knowledge and abilities in metal precursors provides for a robust approach to the development and commercial manufacture of custom coordination compounds. Examples of ligands we have worked with are shown above. Shepherd is able to synthesize a range of organometallic compounds including metallocenes. Contact us to learn more about our capabilities in this area.