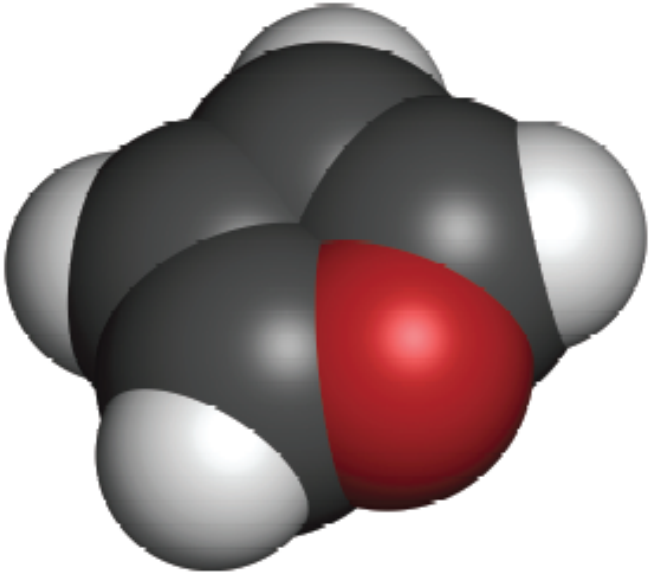
PENNAKEM®

RENEWABLE RESOURCE CHEMISTRY

PENN A KEM, LLC
3324 Chelsea Avenue | Memphis, TN 38108 | USA
Tel: (901) 320-4108 | Fax: (901) 320-4002 | PennUSA@pennakem.com | www.pennakem.com



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ABOUT US

HISTORY

The original production facilities constructed in Memphis, TN in 1943 were built by the US Government and operated by Quaker Oats. Corn cobs were harvested from the surrounding farm lands and used as the feedstock to prepare furfural. Furfural was a key raw material used in rubber and nylon production to support the war effort.

Over the next forty years, Quaker Oats operated the facility, expanding the product line to other furfural-derived products such as furan, furfuryl alcohol, and tetrahydrofurfuryl alcohol. In 1983, Quaker Oats divested the facility to QO Chemicals. Two years later, the facility was sold to Great Lakes Chemical.

Great Lakes Chemical continued to develop the furfural-based product line and built dedicated facilities to produce PolyMEG, a polymer of tetrahydrofuran used in Spandex® fibers. The year 1999, saw Great Lakes sell the facility to a private equity group and formed the company Penn Specialty Chemicals. During this period, the company began to focus on high-value intermediates used in agri, pharma, and other industrial applications. In 2008, the company was sold to its present owner, the Brussels-based Minafin Group.

WHO WE ARE NOW

In 2008, the Memphis, TN facility was purchased by the Minafin Group and became Pennakem. The Minafin Group is a Brussels-based company with five brands located in North America and Europe. The brands include Minakem which focus on API, high potency, and Controlled Substance pharma products.

Minasolve targets cosmetic end markets. Minascent possesses skills in handling highly hazardous chemicals and reactions. Pressure Chemical Company has a unique set of equipment making them an industry leader in high-pressure chemistry and scale-up services.

Pennakem continues to operate as an independent company with an R&D group, Pilot Plant, commercial operations, and with sales and Marketing functions.

"Over 70 years of Innovation in Sustainable Bio-based Chemistry"

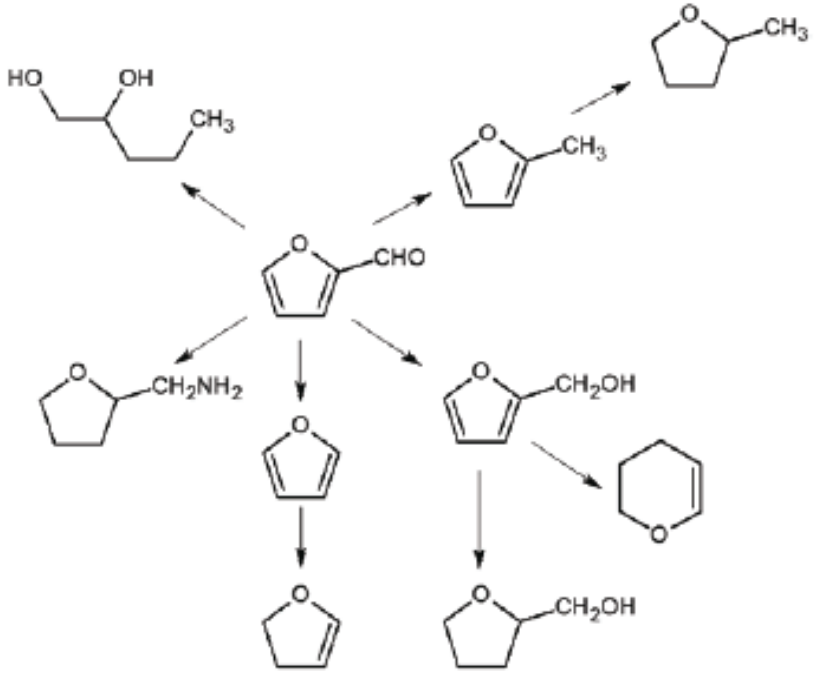
SUSTAINABLE CHEMISTRY

What started as a recovery of Furfural from Agricultural residues from surrounding farmlands has transformed into a broad portfolio of fine chemicals used to enhance our customers products and processes. With the development of this product portfolio came expertise in hydrogenation, fractional distillation, oxidation, reductive amination, and heterocyclic chemistry.

In addition to starting with sustainable building blocks, sustainability is at the forefront of Pennakem's process design. Many of the processes are operated in the absence of solvents. If solvents are required for process efficiency, solvent recovery and recycle is designed into the process. Catalysts in various processes are recovered and reclaimed. Hydrogen is generated on-site on demand.

Pennakem can help you meet your performance and sustainability goals with our broad portfolio of innovative sustainable products and processes.

FURFURAL PRODUCT TREE

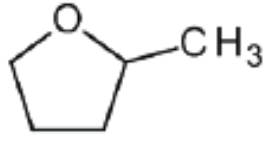


"Enhanced Performance with Value-Added Bio-based Solvents and Fine Chemicals"

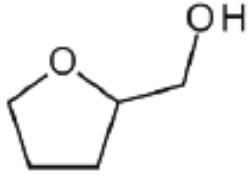
Bio-based Solvents and Fine Chemicals

Pennakem's line of bio-based products provide enhanced performance in our customer's products and processes in a wide range of applications such as solvents, catalysts, modifiers, and industrial intermediates. Viridisol®M has been demonstrated to increase process yields in certain chemical reactions and has low water solubility, eliminating the need for an extraction solvent. Viridisol®M separates cleanly from water, allowing for easy recovery to an anhydrous form for recycle, all of which minimizes production costs and reduces waste. Furfuryl Alcohol derivatives have been reported as key components in smart coatings and shape-memory self-healing polymers.

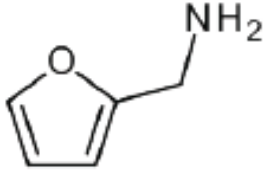
Pennakem's innovative bio-based products provide unique performance benefits including:
Increased yields, improved product quality, lower overall costs and potential use as a scaffold for the development of innovative products. Reach out to Pennakem to discuss how our bio-based products can enhance your products and processes.



Viridisol®M
2-METHF
CAS No. 96-47-9

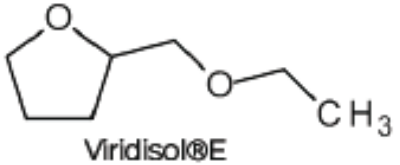


Viridisol®T
THFA
CAS No. 97-99-4



2-Furfurylamine
CAS No. 617-89-0

Furan
CAS No. 110-00-9



Viridisol®E
ETE
CAS No. 62435-71-6

"Delivering superior Results through Core Competencies"

Core Competencies

Throughout our 75 year history in fine chemical manufacturing, Pennakem has developed a unique set of integrated core competencies. These core competencies have been applied in the conversion of both bio- and petro-based feedstocks into value added fine chemicals. We would be pleased to discuss how these competencies can be applied to meet your needs.

Hydrogenation

- Vapor Phase
  - Continuous
  - Temp to 250°F (121°C)
  - 5-10psig (0.7 Bar)
- Liquid Phase
  - Continuous and Batch
  - Temp to 450°F (232° C)
  - Pressure to 600psig (41 Bar)
- Trickle Bed
  - Continuous
  - Temp to 440°F (227°C)
  - Pressure to 1700psig (117 Bar)

Distillation

- Continuous Columns
  - 20-stage
  - Coupled with hydrogenation trains
- Batch Columns
  - 15-stage
  - Rated for full vacuum

Batch Unit Operations

- Acylations
- Alkylations
- Hydroxymethylation
- Reductive Amination
- Thermolytic Rearrangements
- Oxidations

"Achieving Your Ultimate Goal in a Fast, Cost-effective and Reliable Manner"

Concept to Commercialization

Pennakem thrives on applying decades of expertise in our core competencies to meeting your unique needs. Custom designed products/processes can be developed in our dedicated R&D labs through to commercial production in our flexible manufacturing facilities based on your specific requirements.

Pennakem has all the tools in place to develop, scale-up, optimize, and produced economical products to meet your specific needs.

R&D

- Well equipped lab, both synthesis and analytical.
- Experienced PhD's for process development and process optimizations.
- Entrepreneurial, efficient, responsive.

Pilot Plant

- Reactors
  - Glass, Stainless, Hot Tube
- Distillation
  - Flash, Fractional, Falling Film
- Solids Handling
  - Centrifuge, Dryer

Manufacturing

- Small scale drum quantities
- Batch Volumes from 10 MT to 100's MT
- Continuous production to 100's MT

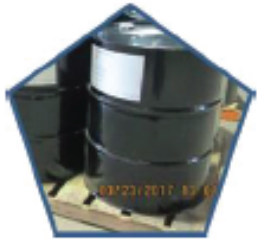
"Service and Reliability Extend far Beyond Manufacturing to Give You Peace of Mind"

Regulatory

- Continued compliance to SOCMA's EHS&S Management System since 2008
- ISO 9001 Certified since 1993
- PSM/RMP Covered Site

Logistics/Support

- Extensive rail capabilities with CSXT Switch
- Experienced/Dedicated logistics, customer service team
- Experienced in customer owned order processing implementation
- Global logistics experience with warehousing in Rotterdam
- Packaging and shipping Pail quantities up to Railcar quantities



Infrastructure

- Onsite hydrogen production from two natural gas reformers
- Onsite nitrogen generator with backup liquid bulk tank
- Dual air compressors
- Dual cooling towers
- Extensive history in custom manufacturing

Quality Control/Analytical Services

- GC – FID
- GC – MS
- HPLC – UV Detection
- Titration
- Coulometric Karl Fisher Titrator
- Analytical Method Development

Partial Product List

Product	CAS #	Availability	Solvent	Specialty Intermediate	Flavors Fragrances	Acids Esters	Monomers	Cyclopropyl
Furfural	98-01-1	S	√		√		√	
Furan	110-00-9	S	√	√			√	
2-Furfuryl Alcohol	98-00-0	S	√				√	
2-Tetrahydrofurfuryl Alcohol	97-99-4	S	√					
2-Methyl Tetrahydrofuran	96-47-9	S	√					
2,5-Dimethyl Tetrahydrofuran	1003-38-9	RD	√					
2,5-Diethyl Tetrahydrofuran	41239-48-9	RD	√					
5-Methyl Furfural	620-02-0	RD	√		√		√	
5-Methyl Furfuryl Alcohol	3857-25-8	M	√				√	
2-Methyl Furan	534-22-5	M	√				√	
2-Tetrahydrofurfuryl Acetate	637-64-9	M	√			√		
Ethyl Tetrahydrofurfuryl Ether	62345-71-6	M	√					
1,2-Pentadiol	5342-93-0	S	√	√				
Ditetrahydrofurfuryl propane	89686-69-1	S	√					
Dihydrofuran	1191-99-7	M		√				
Dihydropyran	110-87-2	M		√				
Cyclopropyl methanol	2516-33-8	M		√				√
2,5-Dimethyl Furan	625-86-5	M	√				√	
2-Acetyl Furan	1192-62-7	M		√				
Cyclopropylmethylene amine	2516-47-4	RD		√				√
Furfuryl Amine	617-89-0	M		√				
2-Furoic Acid	88-14-2	M		√		√		

Availability Key

S Stock M Made to Order

RD R&D Samples C Conceptual

MINAFIN®
GROUP

About Minafin

In July of 2008 most of the assets of Penn Specialty Chemicals were acquired by the Minafin Group and Pennakem was formed. Minafin currently has four chemical manufacturing sites in Europe as well as two in the United States.

Minakem, with two manufacturing sites in France and one in Belgium, is a manufacturer of pharmaceutical API's including high potent and controlled substances for the pharmaceutical market. Minascent is located in Germany and produces specialty Chemicals as well as serving the Food and Drug markets. Minasolve is a supplier of unique ingredients and blends to the cosmetic market. Also involved in specialty chemical manufacturing, Pressure Chemical and Pennakem are located in the United States. Pressure Chemical, located in Pittsburgh, Pennsylvania, has provided process development, piloting, scale up, and manufacturing to the chemical industry for over 50 years.

Our Partnerships with these groups give Pennakem the added resources and capabilities to aid our customers in realizing their goals and objectives from the lab to full scale manufacturing.

Minakem, Dunkirk, France

Minascent, Leuna, Germany

Minakem Beuvry
Lille, France

Minakem
Mont-Saint-Guibert, Belgium

PENNAKEM®
RENEWABLE RESOURCE CHEMISTRY

MINAKEM®
FINE SERVICES FOR LIFE

PRESSURE CHEMICAL®
YOUR SCALE UP PARTNERS

MINASOLVE®
BIO-INGREDIENTS FOR YOUR APPLICATIONS

MINASCENT®
CHALLENGING CHEMISTRY

VP Sales & Marketing
James Kasper

Pennakem LLC
805 McKnight Park Drive
Pittsburgh, PA 15237
Phone: 1.412.366.4566
Cell: 1.412.608.0033
Email: jkasper@pennakem.com

Europe & South America
Norbert Patouillard

Pennakem Europa SAS
224 avenue de la Dordogne
59640 Dunkerque
France
Phone: +33.4.37411376
Cell: +33.6.89713230
Fax: +33.4.37411377
Email: npatouillard@pennakem.com

Buisness Development
Todd Coleman

Pennakem LLC
3324 Chelsea Avenue
Memphis, TN 38108
Phone: 1.901.320.4012
Cell: 1.870.307.2416
Fax: 1.901.320.4001
Email: tcoleman@pennakem.com

North America
Barry Roberts

Pennakem LLC
3324 Chelsea Avenue
Memphis, TN 38108
Phone: 1.901.320.4043
Cell: 1.901.604.9645
Fax: 1.901.320.4002
Email: broberts@pennakem.com

Asia
Allyne Montano

Pennakem LLC
3324 Chelsea Avenue
Memphis, TN 38108
Phone: 1.314.330.2914
Email: amontano@pennakem.com