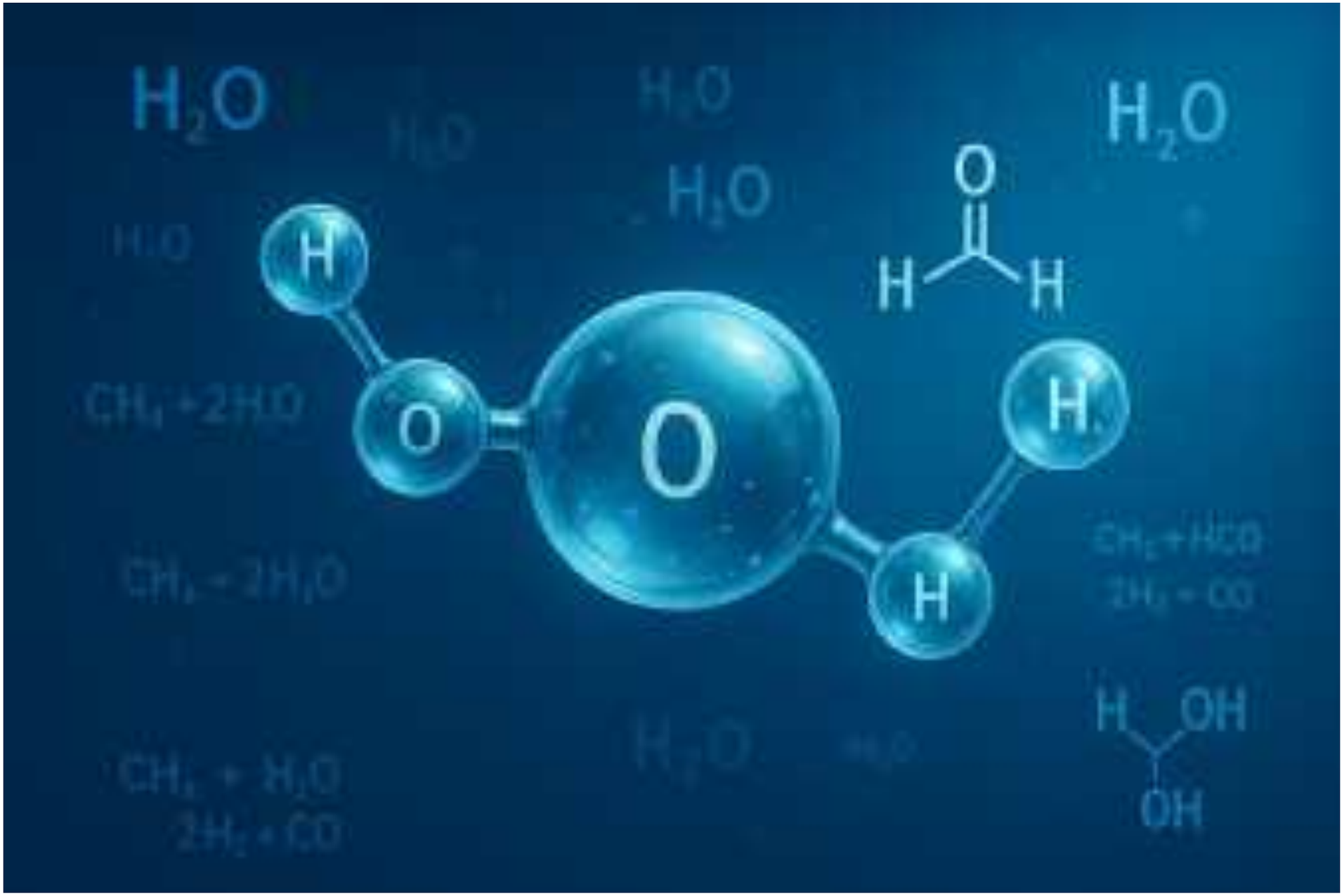


CHEM Group and MEG 2, LLC

Contents

As a commercial toll processor, CHEM Group offers products and services that add value, help conserve the world's natural resources, and extend the limits of modern chemical process technology.

CHEM Group - Evansville, IN

Established in 1995, Hartland Distillations, Inc. specializes in the distillation of heat sensitive and high boiling materials by short path distillation.

Located just 2 miles east of Highway 41 at 2410 Lynch Road, this facility shares a 7.61 acre site with CHEM Group headquarters; located at 2406 Lynch Road. Both facilities are readily accessible by air via Evansville Dress Regional Airport and are within reasonable driving distance from several major urban centers including St. Louis, Missouri; Indianapolis, Indiana; Louisville, Kentucky; Nashville, Tennessee; and Memphis, Tennessee.

This facility features over 30,000 sq. ft. of process area in addition to approximately 7,500 sq. ft. of warehouse space and a total of about 13,000 sq. ft. of office and laboratory space. A total of 496,000 gallons of on site tank storage is available with 256,000 gallons of that located indoors. Ample electricity, natural gas, and city water are available in addition to over 1,400 tons of cooling tower capacity and a 250 HP natural gas fired steam boiler.

Hartland Distillations, Inc. operates around the clock, 365 days a year. The site can ship and receive materials in drums, totes, and by tank truck. Rail-cars can be trans loaded at CHEM Group, Inc. in Troy, Indiana.

Short Path Distillation System I

51.2 sq. ft. Pfaudler style short path evaporator equipped with a 75 sq. ft. internal condenser, dual stage vacuum set, degasser, cryowell style cold trap and dedicated Fulton FT-0240-C natural gas fired hot oil system.

Short Path Distillation System II

51.2 sq. ft. Pfaudler style short path evaporator equipped with a 172 sq. ft. internal condenser, fully hot oil jacketed distillation and residue skids, dual stage vacuum set, degasser, cryowell style cold trap and dedicated Fulton FT-0160-C natural gas fired hot oil system.

Short Path Distillation System III

51.2 sq. ft. Pfaudler style short path evaporator equipped with a 232 sq. ft. internal condenser, fully steam jacketed distillation and residue skids, three stage vacuum set, dual cryowell style cold trap and dedicated Fulton FT-0160-C natural gas fired hot oil system.

Short Path Distillation System IV

51.2 sq. ft. Pfaudler style short path evaporator equipped with a 172 sq. ft. internal condenser, hot oil jacketed residue skids, two stage vacuum set, cryowell style cold trap, integrated flash system and dedicated Fulton FT-0160-C natural gas fired hot oil system.

Short Path Distillation System V

51.2 sq. ft. Pfaudler style short path evaporator equipped with a 150 sq. ft. internal condenser, hot oil jacketed residue skids, one stage vacuum set, cryowell style cold trap, integrated flash system and dedicated Fulton FT-0160-C natural gas fired hot oil system.

Hot Oil Jacketed Kettles

Dual 3,500 gallon hot oil jacketed blend kettles equipped with weigh cells, mechanical agitation, inert purging capabilities and independent temperature control. These 304 SS kettles can be operated separately, in parallel, or in series to perform complex blending and encapsulation operations. Both have a maximum operating temperature of 360°F.

Sandvik Pastillator

A 60’ long Sandvik pastillator with a maximum operating temperature of 518°F for materials with viscosities up to 50,000 cP. This system is equipped with a 15 ton chiller and offers throughputs of up to 6 tons per hour.

Reactor 1 and 2

Two 1500 gallon 304 stainless steel reactors with an operating range from full vacuum to 43 psi at 400°F. These reactors are steam jacketed and equipped with Agitators.

Reactor 3

A 10,000 gallon 316 stainless steel reactor with an operating range from full vacuum to 50 psi at 400°F. This reactor is hot oil jacketed and equipped with a 50 HP drive.

Carbon Filtration

Filtration system consisting of four 10,000 pound activated carbon beds suitable for operation in multiple configurations for batch or continuous operation. Various pretreatment and post filtration polishing operations are also available.

MEG 2, LLC - Troy, IN

Established in 1979, MEG 2, LLC (a subsidiary of CGH-EV, Inc.). specializes in the reclamation of glycols from spent automotive antifreeze. Also processed at this site are various industrial glycol streams, biodiesel based crude glycerin, and high aromatic content crude oils. In addition to toll processing activities, this site produces a number of branded and private label antifreeze products, secondary plasticizers, specialty solvents, and pitch products.

Located at 11210 Solomon Road, this 18 acre site occupies three adjacent lots of the Tell City Industrial Park and features several buildings offering 47,900 sq. ft. of indoor process area, 26,712 sq. ft. of warehouse space and 5,940 sq. ft. of office / laboratory space. In addition to more than 2,000,000 gallons of on site tank storage and direct access to rail via Hoosier Southern railroad, this site includes its own waste water treatment facility, a small automated packaging plant, a boiler house capable of generating more than 16,000 pounds of steam an hour, and 2,000 tons of cooling tower capacity.

MEG2 LLC operates 24 hours a day, 365 days a year and can both ship and receive materials in drums, totes, tank trucks, and rail- cars. It also enjoys the distinction of being the largest U.S. producer of ASTM compliant glycol for use in automotive antifreeze.

Short Path Distillation System

51.2 sq. ft. Pfaudler style short path evaporator equipped with a 75 sq. ft. internal condenser, dual stage vacuum set, degasser, cold trap and dedicated Fulton FT-0160-C natural gas fired hot oil system.

200 System - Packed Column

A 50 ft. tall, 2 ft. diameter packed column featuring two section of Mellapak structured metal packing, this system column can be operated at atmospheric conditions or under vacuum with a maximum reboiler temperature of 650°F provided by a 6 MM Btu/hr Fulton FT-0600-C natural gas fired hot oil circulator. System vacuum is provided by a 7.5 HP MD Pneumatics vacuum booster and a 25 HP Sihi liquid ring pump.

T-System & L-System

These quad-column distillation systems constitute two separate proprietary designs utilized almost exclusively for the reclamation of glycols from spent automotive antifreeze. Component columns of these systems are sometimes operated separately for special projects.

Mott Hypulse Filter

This 220 sq. ft. 316 stainless steel filtration system can be configured with either 2.0 um or 0.2 um filtration elements and offers a maximum operating pressure of 150 psi at 300°F.

Research & Development

As a commercial toll processor, many customers come to us with already well formulated process strategies. In others cases, we work extensively with customers to develop a strategy, reduce it to practice and, ultimately, provide a full scale solution that meets their specific objectives.

We do this guided by decades of experience coupled with direct access to some of the best process simulation and equipment design tools available. As a result, our team of distillation experts, chemists, and chemical engineers is able to respond quickly to new opportunities as well as the changing requirements of existing customers.

Supporting this process from beginning to end is our analytical services group offering capabilities ranging from gas chromatography, thermal analysis, Karl Fischer titration, pH measurement, TOC measurement, and simulated distillation to the determination of various physical properties such as color, viscosity, specific gravity, refractive index, congealing point, and flash point (both Cleveland open cup and Pensky Martin closed cup methods).

When it comes time to implement the strategy we develop, customers typically find that we already have the required assets in place, but when we don’t, rest assured that we maintain an extensive inventory of additional equipment from which the necessary elements can be rapidly configured and commissioned at one of our sites or possibly one of yours.

Micro-Tolling

In some cases, less is more! Truckload quantities of a new feedstock may not yet be available or large quantities of finished product may not yet be required. At other times, the materials involved may be of a nature that processing only a few kilograms a year is sufficient.

For customers interested in toll processing smaller quantities of material, we offer access to several laboratory scale versions of the same technology we offer in our plants. These system are available at a flat daily rate that includes operational support as well as access to many of the same engineering and analytical resources relied upon by our commercial toll processing customers.

Process Specialties

The distillation of heat sensitive and high boiling mixtures is complicated by the high temperatures to which such materials must be exposed during the evaporation of more volatile components.

Though lower distillation temperatures can generally be achieved under vacuum, the length of time to which materials are exposed to even these lower temperatures can result in thermal damage.

In wiped film and short path distillation, the separation, purification, or concentration of heat sensitive materials occurs under vacuum, but at residence time that are greatly reduced by com- parison to more conventional distillation methods.

At CHEM Group, heat sensitive and high boiling materials are typically distilled using modified Pfaudler style short path evaporators. In such evaporators, the mixture or feedstock to be distilled enters the evaporator and is immediately distributed by the centripetal force of a rotating plate. This results in the formation of a thin film on the inside wall of the evaporator which is fully jacketed and heated with heat transfer fluid to provide for the evaporation of more volatile components.

As this film falls under force of gravity, a series a wiper blades affixed to a rotating series of supports provides for

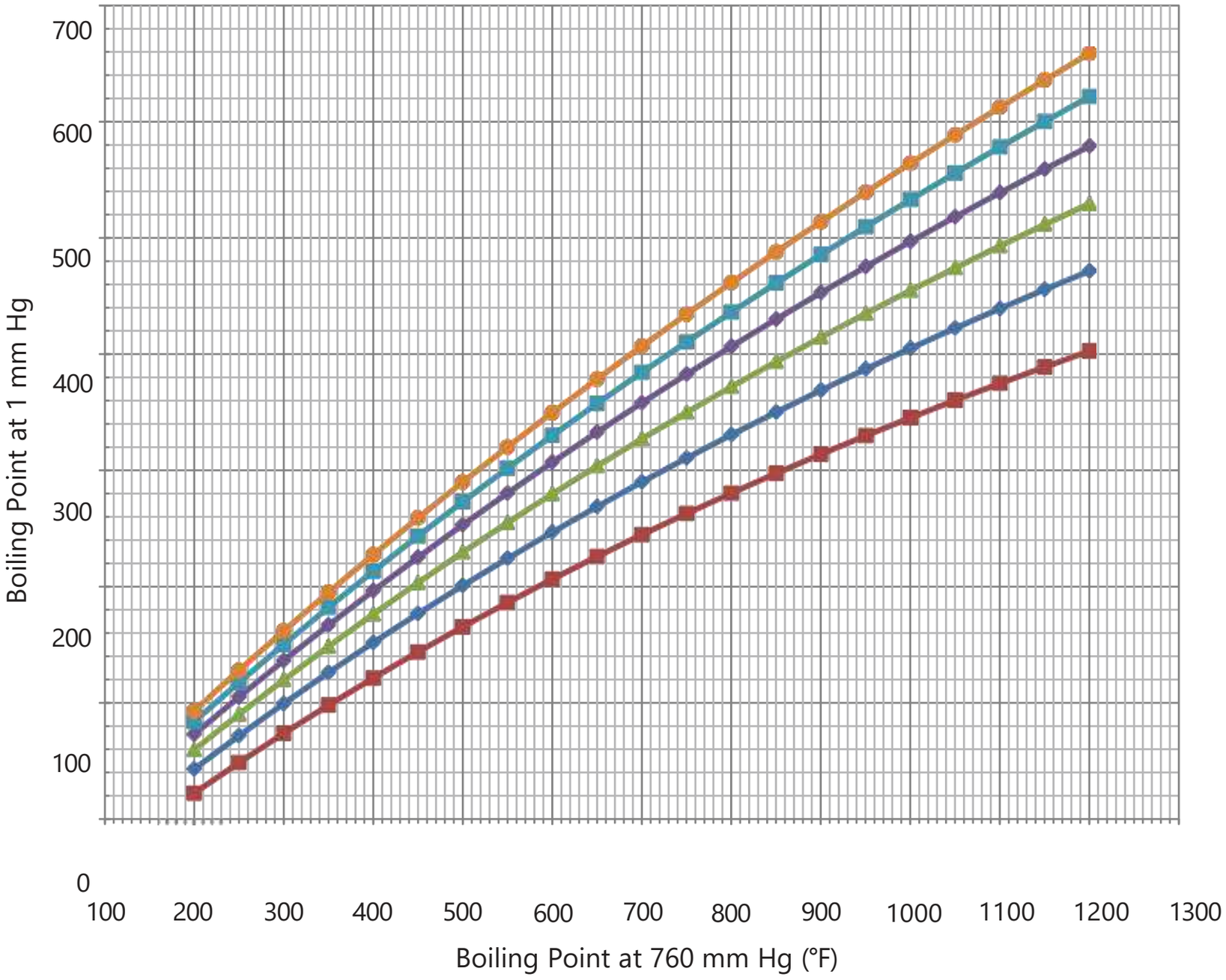
Anatomy of a short path evaporator:
1 Drive Motor; 2 Feed Inlet;
3 Distributor Plate; 4 Hot Oil Outlet;
5 Wiper Blades; 6 Entrainment Separator;
7 Hot Oil Jacket; 8 Internal Condenser;
9 Hot Oil Inlet; 10 Extruder Blades;
11 Residue Discharge; 12 Vacuum Outlet;
13 Cooling Water Inlet; 14 Cooling Water Outlet;
15 Distillate Discharge.

agitation of the film to assure uniform film thickness and even film distribution throughout the distillation process.

As more volatile components of the feed are evaporated, the resultant vapors travel the short distance or short path to an internal tube bundle serving as an internal condenser. What remains on the heated evaporator surface continues to fall until it is collected as residue at the base of the unit. Condensed material collects and is ultimately discharged from the central core of the system. A chevron, situated between the heated evaporator surface and internal condenser help prevent entrainment and extruder blades attached to the base of the wiper basket provide for the efficient removal of higher viscosity residues from the system.

With the ability to operate at vacuums as low as a few microns and jacket temperatures as high as 650° F (343° C), materials exhibiting atmospheric equivalent boiling points as high as 1,200° F can be distilled at rates ranging from 15 to 50 pounds per hour per square foot of heated evaporator surface.

This makes CHEM Group short path distillation systems ideal for processing paraffinic and synthetic waxes; tocopherols and tocotrianols; fatty acids; monoglycerides; glycerin; glycols; polyols; cold mill rolling oils; hydraulic fluids; fish oil; high aromatic oils; transformer fluids; pitch products; synthetic organic heat transfer fluids; and a variety of other materials.



The figure above illustrates the significant boiling point advantage derived from distillation under fine vacuum for compounds with a molar heat of vaporization of 55,000 J/mol (red); 65,000 J/mol (blue); 75,000 J/mol (green); 85,000 J/mol (purple); 95,000 J/mol (turquois); and 105,000 J/mol (orange). If for example, a compound having a normal boiling point of 650 °F and a molar heat of vaporization of 55,000 J/mol, it would boil at only 226 °F during distillation under vacuum at 1 mm Hg. Similarly, if this compound had a molar heat of vaporization of 95,000 J/mol, it would boil at 358 °F during distillation at 1 mm Hg.

ChemStewards® Program - SOCMA

As a member of SOCMA, the Society of Chemical Manufacturers & Affiliates, Inc. since 1998, our company is certified under the organization's voluntary ChemStewards® program. This program is dedicated to continuous improvement in environmental, health, safety and security (EHS&S) performance. To meet these responsibilities, we pledge to manage our business according to the following principles:

- Communicate with and engage employees, business partners and the community to foster a greater understanding on EHS&S matters.

- Promote the concepts of product stewardship throughout a product's life cycle.

- Make environmental, health, safety and security a priority in our planning and operations for all new and existing products and processes.

- Train employees in EHS&S security responsibilities and promote involvement and accountability in these areas.

- Continuously strive to use our resources efficiently and minimize waste.

Notes: