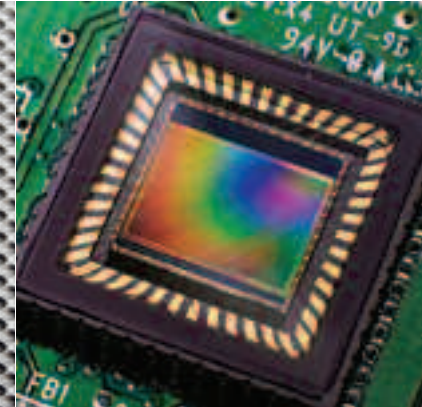
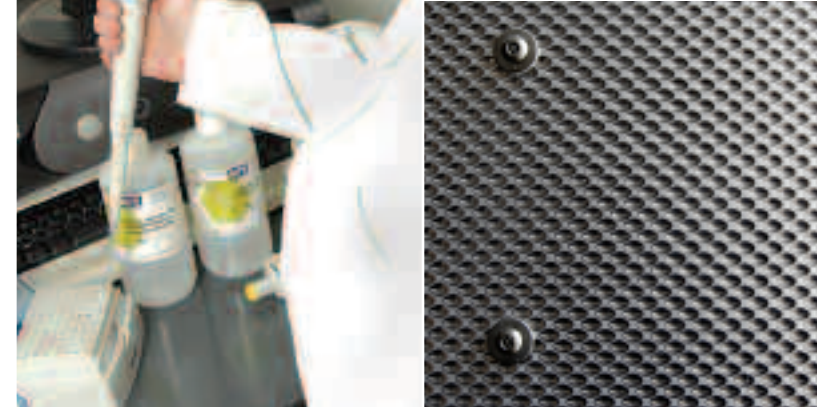
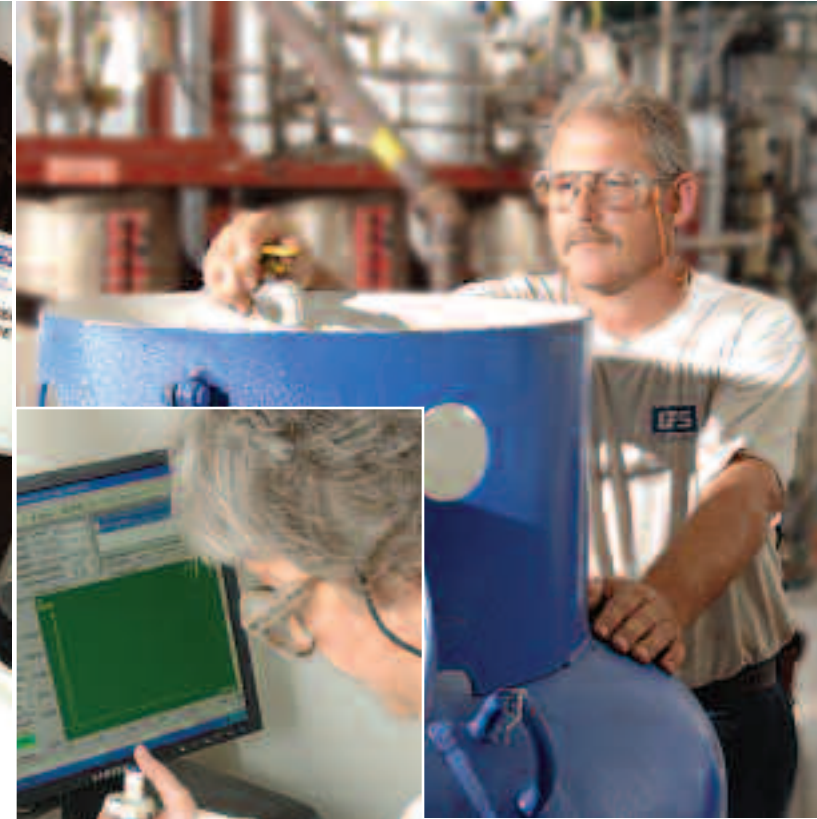


## Custom Products

GFS remains focused on what we do well. Our production environment provides the flexibility to offer customers solutions to their problems. We have a development staff ready to support your application need and the manufacturing capabilities to support you long term. GFS is the perfect business partner for your specialty chemical need. Our flexibility is an asset.

We would be happy to talk directly with you about your individual requirements. Please contact us and learn the advantages of working directly with the manufacturer for any of your organic production needs. For more information call toll-free at: **800-858-9682** or visit **[gfschemicals.com](http://gfschemicals.com)**  
e-mail: **[development@gfschemicals.com](mailto:development@gfschemicals.com)**



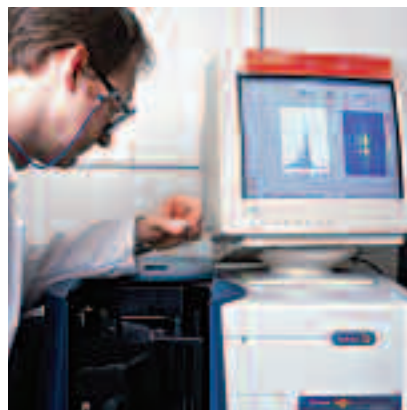
**GFS Chemicals, Inc.**

*A specialty chemical manufacturing company  
supporting businesses on bulk/pilot/research scales*

## Our long term commitment to the specialty organic chemical business



GFS Chemicals is a specialty chemical manufacturing company capable of supporting businesses on research, pilot and bulk scales. As an ISO 9001:2000 certified organization, we have a proven track record for meeting the rigorous demands of our customers in an efficient and timely manner.



As a full service supplier of synthetic intermediates, Grignards, catalysts, solvents, inorganics, analytical reagents we enable the synthesis of larger, more complex organic molecules and materials. GFS has experience in manufacturing and handling over 400 acetylenic compounds available today.

Many of these derivatives are used in support of other synthetic methodologies to produce such downstream intermediates as heterocycles, carbocycles and olefins as needed.

We offer an extensive line of silyl-intermediates, triflates, and many other core organic products available in research or bulk. Our staff has decades of technical expertise in acetylene, olefin, Grignard, and liquid ammonia chemistries.

For inquiries, please call 800-858-9682 or e-mail [development@gfschemicals.com](mailto:development@gfschemicals.com)

The organic chemical manufacturing capabilities of GFS Chemicals reside in a 14,000 square foot, state-of-the-art, indoor production facility. This new facility demonstrates GFS Chemicals' long term commitment to the specialty organic chemical business, which it has been engaged in since the 1940's.

### GFS Core Competencies include:

- Acetylene chemistry
- Propargylic amines
- Grignard chemistry
- Specialty halides
- Si blocked compounds
- Birch reductions
- Alpha/omega functionalization



### Core Reaction Expertise Includes:

- Alkali metal/liquid NH<sub>3</sub>
- Grignard Reactions
- Brominations
- Iodinations
- Alkylations
- Acylations
- Birch reductions
- Organolithium reactions
- Sonogashira coupling

### Equipment List:

*Kilo lab:* Glassware up to 50LT. Processing is carried out in walk-in lab hoods and benchtop hoods. Distillation columns from 1" x 1' to 2.5" x 6'.

### Production Plant:

*Reactor Capacity:*  
Glass lined steel: 10, 25, 30, 50, 100, 500 gal, 1000 gal (expansion planned)  
316L stainless steel: 50 LT; 50 and 200 gal (Pressure to 150 psi)  
Hastelloy C: up to 500 gal  
All reactors equipped with 75 psi steam/refrigerated PG/well water (jacket) and well water/refrigerated PG (condensor)

### Distillation Equipment (all capable of full vacuum operation):

30 gal glass-lined pot/4" x 4' column w/receiver (column internals: structured glass packing)  
50 gal glass-lined pot/4" x 8' column w/receiver (column internals: structured glass packing)  
50 gal glass-lined pot/4" x 10' column w/receiver (column internals: 316L SS random packing)  
100 gal 316L SS pot/50 theoretical plate (column internals: 316L SS random packing)  
Pope 4" Wiped Film Still w/feed tank & receiver  
500 gal glass lined pot/ 4"x 4' column with receiver

### Other Plant Equipment:

30" x 18" Tollhurst Hastelloy basket centrifuge  
Glass-lined and 316 SS rotary vacuum dryers (5 cu. ft. - 110 cu. ft.)  
42" x 24" 316 SS Tollhurst basket centrifuge (planned expansion)  
24" x 12" 316 SS Tollhurst basket centrifuge  
Three Celicote Engineering vent scrubbers (3000 cfm – 9000 cfm) for the removal of sulfide-laden vent streams, chloride/acid gas and ammonia-laden vent streams  
AGA Gas Cumulus PX-20 heat transfer system for near-cryogenic cooling capability  
Emergency vent and containment system designed by Fauske and Associates



Bulk acetylene, liquid Nitrogen and anhydrous ammonia storage and handling

### QC/Analytical Capabilities:

Includes GC; GC/MS; FT-IR; UV-Vis; Karl Fischer; Melting point; ICP, AAGE, Ion Chromatography and Standard Wet Chemistry capabilities

### GFS Serves a wide variety of industries including:

- Pharmaceuticals
- Research/Combi Chemistry
- Electronics
- Engineering materials
- Inks & coatings
- Fuel/Energy storage
- Petrochemical
- Automotive
- Flavor & Fragrance
- Water Treatment

