



**G E O**®  
SPECIALTY CHEMICALS

## Business Unit Profile

### CONSUMER ADDITIVES DIVISION

## Glycine, a versatile formulation ingredient

Glycine is the simplest amino acid. Found naturally in many foods, glycine is synthesized in the human body and performs multiple metabolic functions. Additionally, this versatile substance is widely used in a range of applications, such as flavor enhancers and maskers, pH buffers and stabilizers, ingredients in pharmaceutical products and as a chemical intermediate.

#### Applications

##### Flavor Masking/Flavor Enhancement

Glycine has a sweet taste, is 1.5 times as sweet as sugar and has the ability to mellow saltiness and bitterness. The bitter after-taste of saccharin, for example, is lessened by glycine. Glycine can mask the bitter tastes of some hydrolyzed proteins and food substances, especially in applications such as animal feed. Glycine enhances the consumer appeal of oral medications and hygiene products such as lozenges, mouthwashes and cough syrups.

##### Buffering/pH Stabilization

With acidic and basic properties in the same molecule, glycine acts to buffer or stabilize the pH of those systems containing it. Many of the uses for glycine depend on this ability. Glycine's efficiency in stabilizing pH has resulted in its wide usage as a buffering agent in many pharmaceutical products. Antacid and analgesic products are often formulated with glycine to stabilize the acidity of the digestive tract and prevent hyperacidity. Glycine also promotes the gastric absorption of certain drugs, including aspirin. When formulated in an aluminum-zirconium tetrachlorohydrate complex, glycine buffers the high acidity of active ingredients in antiperspirants. It is an effective buffer in cosmetics, toiletry products and nasal sprays.



##### Flavor Enhancement

- Soft drinks
- Lozenges and tablets
- Syrups
- Mouthwashes
- Animal feeds

##### pH Buffering

- Antacids
- Analgesics
- Cosmetics
- Antiperspirants
- Toiletries

##### Chemical Building Block

- Pharmaceuticals
- Agricultural chemicals

### Chemical Intermediate

The simple multifunctionality and low cost of glycine give it exceptional utility as a chemical building block in a variety of industrial, technical and synthetic applications. These include rubber foam sponge production, metal plating baths, chemical synthesis and provide mineral complexing sites for optimal absorption in human/agricultural applications, among others.

### Other Pharmaceutical Applications

Glycine is used as a component of amino acid mixtures for oral and parenteral use and as a resorbable amino acid for the treatment of diarrhea and animal scours. It is a versatile intermediate in the chemical synthesis of pharmacologically active compounds. Glycine has antimicrobial preservative properties and has been shown to stabilize vitamin C.

## Consumer Additives Division product grades available

GEO is the leading manufacturer of glycine in North America. GEO offers three grades of glycine – USP-NF Pharmaceutical grade, USP-NF grade and Technical grade. The USP-NF Pharmaceutical grade is used for Intravenous (IV) Injections and propriety specifications. The USP-NF grade is suitable for antiperspirant, animal feed, pH buffers and sweeteners. The technical grade product is suitable for most industrial and technical applications; in agricultural uses it improves the efficacy and delivery of nutrients. All grades offer exceptional purity, including low chloride levels, to meet the demanding requirements of food, pharmaceutical and personal care product formulations. All grades have earned Kosher & Halal certifications.

### Quality Products and Quality Support

GEO produces glycine in a modern, ISO 9001:2008 certified, high capacity manufacturing facility adhering to current Good Manufacturing Practices (cGMPs) established by the U.S. Food and Drug Administration (FDA). Our unique process technology offers unsurpassed purity, outstanding economy and long-term cost stability. GEO's glycine Drug Master File is registered with the FDA and has a CEP certificate to meet your needs outside the United States.

### USP 34-NF 29 Grade Specifications

Formula	H <sub>2</sub> N—CH <sub>2</sub> —COOH
Description	white, odorless, crystalline powder with sweet taste
Assay	98.5—101.5% calculated on a dry basis
Loss on Drying	0.2% maximum
Residue on Ignition	0.1% maximum
Chloride	70 ppm maximum
Sulfate	65 ppm maximum
Heavy Metals	20 ppm maximum
Hydrolyzable Substances	passes test
Identification	passes test
Residual Solvents	meets the requirements

The specifications listed above conform to standards set by the United States Pharmacopeia 34 and National Formulary 29, through the Second Supplement.

### Additional Typical Pharmaceutical Specifications

Endotoxins	3.69 EU/g maximum
Silicon	0.5 ppm maximum
Iron	run & record
Aluminum	run & record



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The Consumer Additives Division Deer Park facility has idle equipment ready to meet your tolling needs. Let's discuss possible chemical synergies.

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