

DAESANG

BIO BUSINESS DIVISION



Daesang has grown together with its customers in the new millennium.

Daesang will grow to be a top business group in the 21st century
through the push for the value-creation management.



Daesang Corporation

Company Overview

Founded in 1956, Daesang Corporation has become one of the largest fermentation businesses in the world and the leading consumer food producer in Korea with annual sales revenue of 2 billion dollar's. Daesang employs nearly 3,000 people and maintains 25 subsidiaries around the globe.

Daesang opened a new chapter of biotechnology in Korea by developing Glutamine Acid via fermentation in 1962, and then developed about twenty different amino acids and nucleic acids (IMP, GMP, I+G) including MSG, L-Phenylalanine, L-Glutamine, L-Arginine, Shikimic Acid, Chlorella. Daesang is renowned as a worldwide leader in the bio-fermentation industry as it sustains its competitive edge in the global market. Based on its proprietary technologies accumulated for a half century, Daesang continues to invest in R&D for value-added amino acids and other fermented products.

Daesang's flagship food brand CHUNGJUNGWON encompasses a variety of foods such as hot pepper paste, soybean paste, soy sauce, processed meats, frozen foods, western seasonings, agricultural products, seafood, and more. By adding nothing but devotion to nature, CHUNGJUNGWON contributes to making food culture richer and healthier.

Daesang maximizes synergistic effects by introducing family brands such as WellLife for dietary supplements, Rosebud for Espresso Coffee, O'Food for organic foods, CookJoy for ready-to-eat foods, HiPork for high quality frozen pork and more.

As a leading corn wet miller in Korea, Daesang produces various Cornstarches used in processed foods and confectioneries, High Fructose Corn Syrup and Oligosaccharide used in beverages, and other corn based ingredients. Daesang's cutting edge technology has been applied to the development of environmentally friendly products and succeeded in producing biodegradable plastics from cornstarch.

**Leading the Global
Market with Cutting
Edge Fermentation
Technology**

Introduction in Daesang Group

- 1956年 Established
- 1960年 Began production of MSG by fermentation
- 1964年 Began production of corn starches & corn sweeteners
- 1967年 Miwon brand of MSG, received the KS (Korean Standard) Certification
- 1970年 Awarded the gold medal at the 9th international Food Contest
- 1973年 Established PT. Miwon Indonesia Tbk
- 1986年 Began production of Nucleotides (I+G, IMP, GMP)
- 1987年 Began production of L-Phenylalanine
- 1989年 Began production of L-Glutamine Established PT. IMCI (Indomiwon Citra Int'l)
- 1992年 Began production of Aspartame
- 1994年 Established Miwon Vietnam
- 1996年 Began production of Chlorella
- 2002年 Began production of L-Arginine



GUNSAN PLANT's General View

Bio R&D Center



Central Bio R&D Center's General View

Daesang's Bio R&D Center was established in 1980. Based on its cutting edge technologies and specialized professionals, the center is focusing on developing the most advanced and highly value-added technologies.

Major R&D Projects

- Nucleotides : Analysis of the sequence of strains
- Chlorella : Research on cultivating superior species
- Research on L-Phenylalanine & Nucleotides through cooperation between industry and university
- Process development of IMP & GMP
- R&D of dietary supplements and functional beverages
- Process development of Arginine

Nucleotide (Nucleic Acid)

Nucleotide (Nucleic Acid)

A nucleotide is a subunit of DNA or RNA consisting of a nitrogenous base, a phosphate molecule, and a sugar molecule. The type of sugar in the nucleic acid determines the identity of the molecule. For instance, when the sugar is ribose, the nucleotides are called Ribonucleic Acid (RNA). When the sugar is deoxyribose, the nucleotides are called Deoxyribonucleic Acid (DNA). Disodium 5' - Inosinate (IMP) and Disodium 5' - Guanylate (GMP) are the flavor enhancing nucleotides. When used in combination with MSG, nucleotides lead to synergistic flavor effects.



■ Characteristics

- Substitute flavors for natural ingredients
IMP, a nucleic acid rich in meat & fish, imparts flavors of beef & tuna. GMP produces flavors of mushroom.
- Cost-savings in synergy with MSG
The flavor enhancement value of a mixture consisting of 3% of IMP & 97% of MSG is 3.8 times stronger than 100% MSG alone. In case of GMP, this synergy is 5.8 times stronger. The synergistic effects provide significant cost-savings.
- Convenient handling
Daesang nucleotides have excellent stability to heat. As white crystalline powders, they are easy to measure, mix, or dissolve.

■ Applications

- Used in various foods such as soup, canned foods, sauces, ketchup, juice, frozen foods, hamburger, processed cheese, dressing, processed meats, snacks, etc.



MSG (Monosodium Glutamate)

●●● MSG (Monosodium Glutamate)

Miwon brand of MSG is one of the most recognized flavor enhancers in the world. MSG is an amino acid that naturally exists in various unprocessed foods such as corn and grain, cheese, rice, milk, meat, sea tangle, and human breast milk. Our bodies contain MSG in muscle and brain. Daesang manufactures Miwon MSG with state of the art fermentation technologies accumulated over fifty years of experience. When MSG is mixed with other nucleotides, the superior flavor enhancement synergy can lead to great cost savings for food processors.



■ Characteristics

- Flavor enhancement and modifying effects

MSG itself does not impart any taste itself. Instead, it enhances flavors of foods, suppresses undesirable odor, and reduces excessive sour or salty flavor notes.

- Stability & shelf-life

MSG continues to be used in almost every processed food and its stability is confirmed over a long history of use. As the product itself is stable, it provides a long shelf-life.

■ Manufacturing Process

- Glutamic Acid is produced from a fermentation procedure in which raw cane sugar is mixed with various micronutrients that facilitate growth of microorganisms. MSG is derived from glutamic acid that is crystallized and dried after purification from the fermentation media. The process for manufacturing MSG is identical to many other traditional fermentation methods.



AMINO ACID



L-Glutamine

Daesang began its production of L-Glutamine by fermentation in 1989. Both pharmaceutical grade & food grade have been well recognized by customers all over the world. L-Glutamine has recently been re-classified as a conditionally essential amino acid.



L-Arginine

L-Arginine, manufactured by Daesang via its fermentation technologies, is an amino acid and is a component of collagen. It helps produce healthy semen and comprises 60% of amino acids present in semen. It is a key intermediate in the Krebs-Henseleit urea cycle and is required to be present in the body.



L-Phenylalanine

Daesang's L-Phenylalanine is a product of fermentation via synthesis using sweeteners from corn as the main raw material. It is an essential amino acid necessary for proper growth of infants and nitrogen balance of adults. It is in the spotlight as a derivative of pharmaceuticals and a main raw material of a high intensity sweetener.



AMINO ACID

■ Amino Acid Manufacturing Process



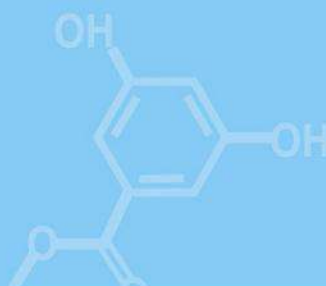
■ Amino Acid Specification

No.	Products	Product name abbreviation	CAS number	Corforms to
1	L-PHENYLALANINE	L-PHE	63-91-2	FCC, USP
2	L-GLUTAMINE	L-GLN	56-85-9	FCC, USP, EP, DAB
3	L-ARGININE	L-ARG	74-79-3	FCC, USP, EP
4	L-ARGININE HYDROCHLORIDE	L-ARG HCL	1119-34-2	FCC, USP, EP

■ Amino Acid Packing

No.	Products	Net Weight per Box	Packing	Special remarks
1	L-PHENYLALANINE	25kg 25kg	Fiber Drum Cartoon Box	
2	L-GLUTAMINE	50kg 20kg	Fiber Drum Cartoon Box	
3	L-ARGININE	20kg	Cartoon Box	
4	L-ARGININE HYDROCHLORIDE	20kg	Cartoon Box	

SWEETENER



Aspartame

Aspartame of Daesang Corporation is being produced through its production system that maintains safety based on the advanced sanitation & quality management system (ISO 9002 & cGMP).



■ Characteristics

- High Intensity Sweetness
It has about 200 times higher sweetness compared to sugar
- Taste Similar to Sugar
Unlike other high intensity sweeteners such as saccharin and stevioside, it has a clean taste without any bitter aftertaste and has the most similar sweetness quality among high intensity sweeteners
- Low-calorie & the Same Metabolism as Protein
Although 4kcal/g is produced as it becomes dissolved, digested and absorbed

■ Applications

- Beverages
(carbonated, fruit juice, powder...)
- Dairy products
(milk beverage, concentrated fermented milk...)
- Confectionery Assorts
(gum, snack, chocolate, candy...)
- Seasonings (soup, pickle...)

■ Specification of Aspartame

Test Items	Specification
Assay(%)	98% ~ 102%
Loss on drying(%)	Not more than 4.5%
pH	4.5 ~ 6.0
Diketopiperazine(DKP)	Not more than 1.5%

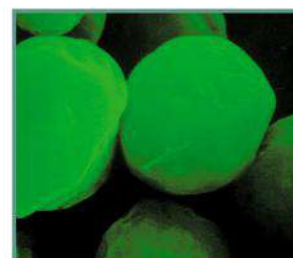
■ Aspartame Packing

Type	Net Weight / Box	Packing
Granular	25kg / 1kgs pack × 10 pack (10kg)	Cartoon Box / Cartoon Box
Power	20kg / 1kgs pack × 10 pack (10kg)	Cartoon Box / Cartoon Box

CHLORELLA

Chlorella

Chlorella is a single-celled green algae with sizes of 2-10 microns in diameter. Its high content of chlorophyll promotes vigorous photosynthesis. Due to its superb capability of cell division, Chlorella can survive deteriorated environment by multiplying itself at an incredible rate. Chlorella is a rich and balanced source of various nutrients such as protein, essential amino acids, essential fatty acids, vitamins, minerals, etc. By not cultivating Chlorella outdoors in ponds but producing it in strictly controlled indoor tanks, Daesang ensures consistent quality and superior hygiene. Chlorella has been ranked as the top dietary supplement in Japan for a long time. Research suggests that Chlorella is helpful in preventing osteoporosis and detoxifying heavy metals and dioxin.



■ Characteristics

- Chlorella is a single-celled green algae with an excellent capability of cell division.
- Chlorella contains quality proteins and approximately twenty minerals.
- Daesang ensures consistent quality and superior hygiene by producing Chlorella in strictly controlled indoor tanks.
- Chlorella is a leading dietary supplement among Japanese who are renowned for their longevity.

■ Applications

- Powder Chlorella : Used in Chlorella tablets, CGF extracts, instant noodles, dumplings, bakery, beverages, ice cream, etc.
- Liquid Chlorella : Used as a feed for aquaculture and a feed for rotifers.



NATURAL FLAVOR ENHANCERS



Natural Flavor Enhancers

Daesang, one of the leading fermentation companies in the world, is now launching a new business category of Natural Flavor Enhancers by a state of art fermentation technology based on 50 year know-how and experiences in the field.



Yeast Extract YG Series

■ Characteristics

- Labeling as 'natural'
- Umami taste from maximized amino acids content
- No unpleasant taste by highly developed recovery process
- Low salt content for various applications
- Allergen free, BSE free, MCPD free, No E-number

■ Applications

- Instant noodle soups and seasonings
- Soup and bouillon
- Seasonings for bakery and confectionary
- Various sauces and dressings
- Processed foods

■ Specification (YG-10)

Test Items	Specification
Total Nitrogen (%)	7.0% ~ 9.0%
Glutamic acid (%)	Not less than 8%
pH	5.5 ~ 6.5
Salt(%)	Not more than 5%

DHA-rich Dried cell and DHA-rich Oil from microalgae

●●● DHA-rich Dried cell and DHA-rich Oil from microalgae

Increasingly the large concentration of DHA and guaranteed lack of dioxins and PCBs in algae sources has provided a viable raw material alternative for omega-3.

■ Detailed Product Description

1. DHA-rich Dried cell from microalgae for feed, especially aquafeed
 - To consist of spray-dried cells of Schizochytrium sp. heterotrophically grown in a sterile environment
2. DHA-rich Oil from microalgae for dietary supplement, food, etc.
 - To be extracted from Schizochytrium sp.
 - To contain at least 45% DHA of Total fatty acid(TFA)

■ Characteristics

1. DHA-rich Dried cell from microalgae for feed, especially aquafeed
 - To improve survival, disease resistance, growth
 - To be cost effective diets with high levels of DHA
2. DHA-rich Oil from microalgae for dietary supplement, food, etc.
 - To lower cardiovascular disease(CVD) risk
 - To reduce the rate of age-related cognitive decline
 - To prevent certain cancers, such as breast, prostate, and colorectal cancer
 - To play a role in maintaining eye health and reducing the risk of conditions such as age-related macular degeneration(AMD)

■ Specification (for DHA-rich Oil)

Test Items	Specification
Appearance	Light yellow clear liquid
Odor and taste	Characteristic
Acid Value (mg KOH/g)	Not More Than 0.1
Peroxide Value (meq./kg)	Not More Than 0.5
Unsaponifiables (%)	Not More Than 2.0
Moisture (%)	Not More Than 0.1
Residual Solvent (ppm)	Not More Than 0.5
Heavy Metal (as Pb, ppm)	Not More Than 10.0
Arsenic (ppm)	Not More Than 1.0
Lead (ppm)	Not More Than 1.0
Cadmium (ppm)	Not More Than 1.0
Mercury (ppm)	Not More Than 0.5



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