

**WACKER**

CREATING TOMORROW'S SOLUTIONS

LIFE SCIENCE | FOOD & PHARMA

# WACKER FERMENTATION-GRADE CYSTINE AND CYSTEINE

DISCOVER A NEW  
DIMENSION OF PURENESS:  
VEGETARIAN CYSTEINE



**For decades there was no substitute for human or animal-derived cysteine. WACKER offers a vegetarian alternative through fermentation.**

Cysteine is obtained primarily from feathers, though it is also commonly extracted from human hair and from the bristles and hooves of swine. In Asia, above all in China, feathers are the raw material of choice.

Until now, a large part of the world's demand for cysteine has been met by boiling these substances with concentrated hydrochloric acid and activated carbon followed by electrolysis.

In contrast to most other amino acids, a fermentation-based production method for cysteine was not available. Outbreaks of BSE and avian influenza have reinforced a continuing trend away from animal-based raw materials, and are fueling increased consumer interest in the origin of the raw materials used. Consequently, WACKER offers a range of vegetarian-grade L-cystine/L-cysteine products. Starting from raw materials of vegetable origin and inorganic trace elements, the products are manufactured by fermentation.

# BECAUSE YOU CAN'T LOSE BY PLAYING IT SAFE



The WACKER fermentation-grade L-cystine/L-cysteine products are manufactured using a patented production process. The new approach does not require the introduction of foreign genes into *Escherichia coli* as does the conventional cultivation and selection of microorganisms, but simply optimizes the existing metabolism of the bacterium's native metabolism. Rather than producing only enough cysteine to sustain itself, the optimized *E. coli* strain releases large quantities of the amino acid into the nutrient medium.

## Broad Application Base

Cysteine is a versatile compound suitable for a wide range of applications in the food, pharmaceutical and cosmetics industries. Table 2 lists several key applications and the cysteine products that are either typically used for or potentially suitable for that application. Their antioxidant properties in particular are inspiring the continuous development of new applications.

Table 1: Product Recommendations for Selected Applications

	Food				Pharma		Cosmetics
	Flavor ingredient	Industrial baking	Nutraceutical/nutrition	Fermentation	Raw material	Refolding agent	Hair care
L-cystine pharma					•	•	•
L-cystine food	•		•				
L-cystine baby food			•				
L-cysteine hydrochloride monohydrate food	•			•			
L-cysteine hydrochloride monohydrate baby food			•				
L-cysteine hydrochloride monohydrate pharma					•	•	•
L-cysteine hydrochloride monohydrate food 20 mesh	•	•					
L-cysteine HCl anhydrous food	•	•	•				
L-cysteine free base	•		•	•	•		



**For Soft and Fresh Bread –  
Cysteine for Bakeries**

In bakery applications, cysteine's sulfhydryl groups tear apart the disulfide bonds of gluten, a protein found in flour that also gives dough its thickness. This lowers the viscosity of the dough, making it softer and easier to work. An added advantage is the increase in elasticity it confers to the formed dough, helping it to rise during baking.

**For Vegetarian Flavor –  
Cysteine for the Food Industry**

By reacting cysteine with various sugars, a number of savory flavors can be synthesized. Thus, innovative vegetarian, halal and kosher snacks as well as ready-made meals can be prepared for the market.

**For Longer-Lasting Beauty –  
Cysteine for the Cosmetics Industry**

Cysteine breaks the disulfide bonds in Keratin and is therefore used – especially in Asia – to prepare hair for “perms.” Thioglycolic acid, predominantly used in Europe for this purpose, has an unpleasant smell and is allergenic. These undesirable properties can be overcome by using L-cysteine.

**For Utmost Purity –  
Cysteine for Pharma Applications**

Cysteine is in great demand within the traditional field of pharmaceuticals. WACKER's cystine and cysteine products offer utmost purity and are therefore ideally suited as building blocks for the pharma industry.

Cysteine is also a valuable processing aid for biotech applications such as the production of insulin and the refolding of cutting-edge biologics. Whenever the correct folding of disulfide bonds is relevant to molecular function, WACKER's vegetarian cystine/cysteine is the safe choice.

**For a Growing Industry –  
Cysteine for Other Industries**

Cysteine's properties as a free-radical scavenger, reducing agent and glutathione precursor make it an extremely versatile raw material for the fast-growth market of functional food supplements. Furthermore, L-Cysteine can be used in a variety of fermentation media to support the growth of microorganisms.

# IT'S YOUR CHOICE



Table 2: Product Overview

	Special particle size	Kosher	Halal	Package size	Product code
L-cystine pharma		•	•	25 kg	244101
L-cystine food		•	•	25 kg	291004
L-cystine baby food		•	•	25 kg	291006
L-cysteine hydrochloride monohydrate food		•	•	25 kg	60041286
L-cysteine hydrochloride monohydrate baby food		•	•	25 kg	60079868
L-cysteine hydrochloride monohydrate pharma		•	•	25 kg	60030425
L-cysteine hydrochloride monohydrate food 20 mesh	• (20 mesh)	•	•	25 kg	60041284
L-cysteine HCl anhydrous food	• (100 mesh)	•	•	25 kg	60041285
L-cysteine free base		•	•	25 kg	60058083

WACKER offers a broad range of cystine/cysteine products designed to meet the needs of your particular application. Our products comply to all legislation relevant to the food and pharma industries, and are available in different particle sizes. In addition they meet and are certified for major ethnic food standards such as kosher and halal. Figure 3 provides an overview of the products we offer.

## A Unique Ingredient with Versatile Benefits

WACKER cysteine offers a unique fermentation grade that is not only a very reliable, safe and highest-purity source, but also made in accordance with GMP standards. Compared to the conventional

method, the WACKER technology has the advantage of much lower energy and raw material consumption as well as less waste. With that, this process sets new standards in environmental compatibility. WACKER cysteine is not derived from raw materials of animal or human origin. The starting products are sugar, salt and trace elements, all of which are of vegetable or inorganic origin. These raw materials are available in unlimited quantities, thereby ensuring continuous industrial production and punctual deliveries in the future.

Our technology is fully capable of meeting the growing demand for cysteine and keeping pace with market developments.

## Main Product Properties

- Non-human non-animal origin
- Vegetarian
- Kosher
- Halal
- Compliant with all major food and pharma standards (EP, EU Directive 2000/63/EC, USP, JP, FCC)
- TSE/BSE safe
- High GMP standards
- Highest purity (according to FCC and EP)

# EXPERTISE AND SERVICE NETWORK ON FIVE CONTINENTS



WACKER is one of the world's leading and most research-intensive chemical companies, with total sales of €4.91 billion. Products range from silicones, binders and polymer additives for diverse industrial sectors to bio-engineered pharmaceutical actives and hyperpure silicon for semiconductor and solar applications. As a technology leader focusing on sustainability, WACKER promotes products and ideas that offer a high value-added potential to ensure that current and future generations enjoy a better quality of life based on energy efficiency and protection of the climate and environment. Spanning

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tailored to regional demands, supporting them during every stage of their complex production processes, if required. WACKER e-solutions are online services provided via our customer portal and as integrated process solutions. Our customers and business partners thus benefit from comprehensive information and reliable service to enable projects and orders to be handled fast, reliably and highly efficiently. Visit us anywhere, anytime around the world at:

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