

L-CYSTEINE HYDROCHLORIDE MONOHYDRATE

GHS Safety Data Sheet

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Section 1 - CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME

L-CYSTEINE HYDROCHLORIDE MONOHYDRATE

OTHER NAMES

C3-H7-NO2-S.HCl, "C3-H7-N-O2-S. Cl-H", "C3-H7-N-O2-S. Cl-H", "beta-mercaptoalanine hydrochloride", "2-amino-3-mercaptopropanoic acid hydrochloride", "2-amino-3-mercaptopropionic acid hydrochloride", "alpha-amino-beta-thiolpropionic acid hydrochloride", "cysteine-L hydrochloride L-cystein-hydrochloride", "L-cysteine monohydrochloride cysteine monohydrochloride"

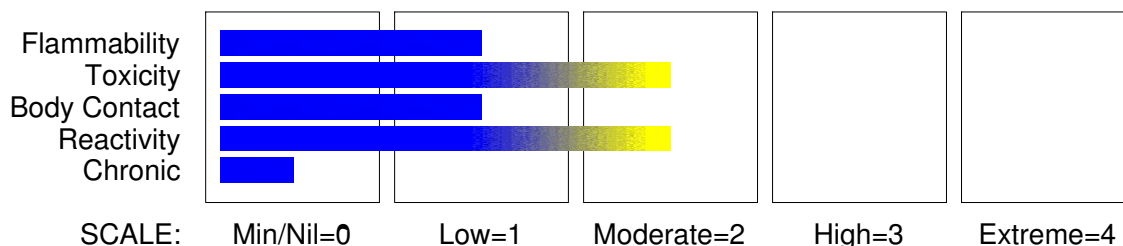
PRODUCT USE

Approved for use as flour treatment agent, Food Additive 920.
Used topically in ophthalmology and in some antibiotic treatments applied to damaged skin. NMDA agonist.

SUPPLIER

Company: S D FINE- CHEM LIMITED
Address:
315- 317, T.V. INDUSTRIAL ESTATE,
248, WORLI,
MUMBAI- 400030.INDIA.
technical@sdfine.com
Telephone: 91- 22- 24959898
Telephone: 91- 22- 24959899
Fax: 91- 22- 24937232

HAZARD RATINGS



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Section 2 - HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW

HAZARD

Not hazardous
No hazards determined by using GHS criteria

PRECAUTIONARY STATEMENTS

Section 3 - COMPOSITION / INFORMATION ON INGREDIENTS

NAME	CAS RN	%
L- cysteine hydrochloride	52-89-1	>98

Section 4 - FIRST AID MEASURES

SWALLOWED

Rinse mouth out with plenty of water.
For advice, contact a Poisons Information Centre or a doctor.

- If swallowed do NOT induce vomiting.
- If vomiting occurs, lean patient forward or place on left side (head-down position, if possible) to maintain open airway and prevent aspiration.
- Observe the patient carefully.
- Never give liquid to a person showing signs of being sleepy or with reduced awareness; i.e. becoming unconscious
- Give water to rinse out mouth, then provide liquid slowly and as much as casualty can comfortably drink.
- Seek medical advice.

EYE

If this product comes in contact with the eyes:

- Immediately hold eyelids apart and flush the eye continuously with running water.
- Ensure complete irrigation of the eye by keeping eyelids apart and away from eye and moving the eyelids by occasionally lifting the upper and lower lids.
- Continue flushing until advised to stop by the Poisons Information Centre or a doctor, or for at least 15 minutes.
- Transport to hospital or doctor without delay.
- Removal of contact lenses after an eye injury should only be undertaken by skilled personnel.

SKIN

If skin or hair contact occurs:

- Flush skin and hair with running water (and soap if available).
- Seek medical attention in event of irritation.

INHALED

- If fumes or combustion products are inhaled remove from contaminated area.
- Lay patient down. Keep warm and rested.

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Section 4 - FIRST AID MEASURES

- Prostheses such as false teeth, which may block airway, should be removed, where possible, prior to initiating first aid procedures.
- Apply artificial respiration if not breathing, preferably with a demand valve resuscitator, bag-valve mask device, or pocket mask as trained. Perform CPR if necessary.
- Transport to hospital, or doctor.

NOTES TO PHYSICIAN

Treat symptomatically.

Section 5 - FIRE FIGHTING MEASURES

EXTINGUISHING MEDIA

- Water spray or fog.
- Foam.
- Dry chemical powder.
- BCF (where regulations permit).
- Carbon dioxide.

FIRE FIGHTING

Alert Fire Brigade and tell them location and nature of hazard.

- Wear breathing apparatus plus protective gloves.
- Prevent, by any means available, spillage from entering drains or water courses.

DO NOT approach containers suspected to be hot.

If safe to do so, remove containers from path of fire.

Use fire fighting procedures suitable for surrounding area.

FIRE/EXPLOSION HAZARD

- Combustible.
- Slight fire hazard when exposed to heat or flame.
- Heating may cause expansion or decomposition leading to violent rupture of containers.
- On combustion, may emit toxic fumes of carbon monoxide (CO).
- May emit acrid smoke.
- Mists containing combustible materials may be explosive.

Moderate fire hazard when exposed to heat, flame or oxidisers.

Decomposes on heating and produces toxic fumes of: carbon monoxide (CO), carbon dioxide (CO₂) and minor amounts of nitrogen oxides (NO_x), sulfur oxides (SO_x), chlorides.

FIRE INCOMPATIBILITY

- Solid which exhibits difficult combustion or is difficult to ignite.
- Avoid generating dust, particularly clouds of dust in a confined or unventilated space as dusts may form an explosive mixture with air, and any source of ignition, i.e. flame or spark, will cause fire or explosion. Dust clouds generated by the fine grinding of the solid are a particular hazard; accumulations of fine dust may burn rapidly and fiercely if ignited.
- Dry dust can also be charged electrostatically by turbulence, pneumatic transport, pouring, in exhaust ducts and during transport.
- Build-up of electrostatic charge may be prevented by bonding and grounding.
- Powder handling equipment such as dust collectors, dryers and mills may require additional protection measures such as explosion venting.
- All movable parts coming in contact with this material should have a speed of less than 1-metre/sec.

Avoid contamination with oxidising agents i.e. nitrates, oxidising acids, chlorine

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Section 5 - FIRE FIGHTING MEASURES

bleaches, pool chlorine etc. as ignition may result.

Section 6 - ACCIDENTAL RELEASE MEASURES

EMERGENCY PROCEDURES

MINOR SPILLS

Clean up all spills immediately. Avoid contact with skin and eyes.

Wear impervious gloves and safety glasses.

Use dry clean up procedures and avoid generating dust.

Place spilled material in clean, dry, sealable, labelled container.

MAJOR SPILLS

Clear area of personnel and move upwind.

Alert Fire Brigade and tell them location and nature of hazard.

- Wear breathing apparatus plus protective gloves.

- Prevent, by any means available, spillage from entering drains or water courses.

Increase ventilation. Stop leak if safe to do so.

Use dry clean up procedures and avoid generating dust.

Recover uncontaminated product in clean, dry, labelled containers.

Wash area down with large quantity of water and prevent runoff into drains.

After clean up operations, decontaminate and launder all protective clothing and equipment before storing and re-using.

If contamination of drains or waterways occurs, advise emergency services.

SAFE STORAGE WITH OTHER CLASSIFIED CHEMICALS



+



+



+



+



+



+

+: May be stored together

O: May be stored together with specific precautions

X: Must not be stored together

Personal Protective Equipment advice is contained in Section 8 of the MSDS.

Section 7 - HANDLING AND STORAGE

PROCEDURE FOR HANDLING

- Limit all unnecessary personal contact.
- Wear protective clothing when risk of exposure occurs.
- Use in a well-ventilated area.
- When handling DO NOT eat, drink or smoke.
- Always wash hands with soap and water after handling.
- Avoid physical damage to containers.
- Use good occupational work practice.
- Observe manufacturer's storing and handling recommendations.

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Section 7 - HANDLING AND STORAGE

SUITABLE CONTAINER

Packaging as recommended by manufacturer.

- Check that containers are clearly labelled.

Multi-ply woven plastic or paper bag with sealed plastic liner

NOTE: Bags should be stacked, blocked, interlocked, and limited in height so that they are stable and secure against sliding or collapse. or Plastic drum.

STORAGE INCOMPATIBILITY

Avoid reaction with oxidising agents.

Segregate from copper and iron contaminants.

Food grade materials must be protected from all possible contaminants.

STORAGE REQUIREMENTS

Observe manufacturer's storing and handling recommendations.

Keep containers securely sealed.

Store in a cool, dry place.

Keep dry.

No smoking, naked lights or ignition sources.

Store at ambient temperatures.

Store away from oxidising materials.

Protect containers against physical damage.

Check regularly for spills and leaks.

Section 8 - EXPOSURE CONTROLS / PERSONAL PROTECTION

EXPOSURE CONTROLS

The following materials had no OELs on our records

- L- cysteine hydrochloride:

CAS:52- 89- 1 CAS:7048- 04- 6 CAS:124558- 06- 1
CAS:122882- 13- 7 CAS:122641- 75- 2 CAS:29844- 56- 2

MATERIAL DATA

These "dusts" have little adverse effect on the lungs and do not produce toxic effects or organic disease. Although there is no dust which does not evoke some cellular response at sufficiently high concentrations, the cellular response caused by P.N.O.C.s has the following characteristics:

- the architecture of the air spaces remain intact,
- scar tissue (collagen) is not synthesised to any degree,
- tissue reaction is potentially reversible.

Extensive concentrations of P.N.O.C.s may:

- seriously reduce visibility,
- cause unpleasant deposits in the eyes, ears and nasal passages,
- contribute to skin or mucous membrane injury by chemical or mechanical action, per se, or by the rigorous skin cleansing procedures necessary for their removal. [ACGIH]

This limit does not apply:

- to brief exposures to higher concentrations
- nor does it apply to those substances that may cause physiological impairment at lower concentrations but for which a TLV has as yet to be determined.

This exposure standard applies to particles which

- are insoluble or poorly soluble* in water or, preferably, in aqueous lung fluid (if data is available) and

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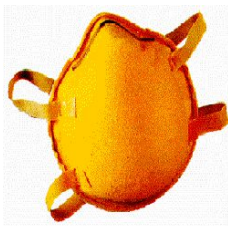
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Section 8 - EXPOSURE CONTROLS / PERSONAL PROTECTION

- have a low toxicity (i.e.. are not cytotoxic, genotoxic, or otherwise chemically reactive with lung tissue, and do not emit ionizing radiation, cause immune sensitization , or cause toxic effects other than by inflammation or by a mechanism of lung overload).

PERSONAL PROTECTION



EYE

- Safety glasses.
- Contact lenses may pose a special hazard; soft contact lenses may absorb and concentrate irritants. A written policy document, describing the wearing of lens or restrictions on use, should be created for each workplace or task. This should include a review of lens absorption and adsorption for the class of chemicals in use and an account of injury experience. Medical and first-aid personnel should be trained in their removal and suitable equipment should be readily available. In the event of chemical exposure, begin eye irrigation immediately and remove contact lens as soon as practicable. Lens should be removed at the first signs of eye redness or irritation - lens should be removed in a clean environment only after workers have washed hands thoroughly. [CDC NIOSH Current Intelligence Bulletin 59].

HANDS/FEET

Wear general protective gloves: i.e. Disposable polythene gloves or Cotton gloves or Light weight rubber gloves, with Barrier cream preferably Safety footwear.

OTHER

- Overalls.
- Eyewash unit.

RESPIRATOR

Protection Factor	Half- Face Respirator	Full- Face Respirator	Powered Air Respirator
10 x ES	P1 Air- line*	- -	PAPR- P1 -
50 x ES	Air- line**	P2	PAPR- P2
100 x ES	-	P3	-
		Air- line*	-
100+ x ES	-	Air- line**	PAPR- P3

* - Negative pressure demand ** - Continuous flow.

The local concentration of material, quantity and conditions of use determine the type of personal protective equipment required.

For further information consult your Occupational Health and Safety Advisor.

ENGINEERING CONTROLS

None under normal operating conditions.

Provide adequate ventilation in warehouse or closed storage areas.

- Local exhaust ventilation is required where solids are handled as powders or crystals;

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Section 8 - EXPOSURE CONTROLS / PERSONAL PROTECTION

even when particulates are relatively large, a certain proportion will be powdered by mutual friction.

- Exhaust ventilation should be designed to prevent accumulation and recirculation of particulates in the workplace.

- If in spite of local exhaust an adverse concentration of the substance in air could occur, respiratory protection should be considered. Such protection might consist of:

- (a): particle dust respirators, if necessary, combined with an absorption cartridge;

- (b): filter respirators with absorption cartridge or canister of the right type;

- (c): fresh-air hoods or masks

- Build-up of electrostatic charge on the dust particle, may be prevented by bonding and grounding.

- Powder handling equipment such as dust collectors, dryers and mills may require additional protection measures such as explosion venting.

Air contaminants generated in the workplace possess varying "escape" velocities which, in turn, determine the "capture velocities" of fresh circulating air required to efficiently remove the contaminant.

Type of Contaminant:

direct spray, spray painting in shallow booths, drum filling, conveyer loading, crusher dusts, gas discharge (active generation into zone of rapid air motion)

grinding, abrasive blasting, tumbling, high speed wheel generated dusts (released at high initial velocity into zone of very high rapid air motion).

Air Speed:

1- 2.5 m/s (200- 500 f/min.)

2.5- 10 m/s (500- 2000 f/min.)

Within each range the appropriate value depends on:

Lower end of the range

1: Room air currents minimal or favourable to capture

2: Contaminants of low toxicity or of nuisance value only

3: Intermittent, low production.

4: Large hood or large air mass in motion

Upper end of the range

1: Disturbing room air currents

2: Contaminants of high toxicity

3: High production, heavy use

4: Small hood- local control only

Simple theory shows that air velocity falls rapidly with distance away from the opening of a simple extraction pipe. Velocity generally decreases with the square of distance from the extraction point (in simple cases). Therefore the air speed at the extraction point should be adjusted, accordingly, after reference to distance from the contaminating source. The air velocity at the extraction fan, for example, should be a minimum of 4-10 m/s (800-2000 f/min) for extraction of crusher dusts generated 2 metres distant from the extraction point. Other mechanical considerations, producing performance deficits within the extraction apparatus, make it essential that theoretical air velocities are multiplied by factors of 10 or more when extraction systems are installed or used.

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Section 9 - PHYSICAL AND CHEMICAL PROPERTIES

APPEARANCE

White crystalline, hygroscopic powder with slight characteristic odour and acid taste; mixes with water, alcohol, acetone.

PHYSICAL PROPERTIES

Solid.

Mixes with water.

Molecular Weight: 157.63

Melting Range (°C): 175 (decomposes)

Solubility in water (g/L): Miscible

pH (1% solution): <7

Volatile Component (%vol): Negligible

Relative Vapour Density (air=1): Not applicable

Lower Explosive Limit (%): Not available

Autoignition Temp (°C): Not available.

State: Divided solid

Boiling Range (°C): Not available.

Specific Gravity (water=1): Not available.

pH (as supplied): Not applicable

Vapour Pressure (kPa): Negligible

Evaporation Rate: Not applicable

Flash Point (°C): Not available

Upper Explosive Limit (%): Not available.

Decomposition Temp (°C): 175

Section 10 - CHEMICAL STABILITY AND REACTIVITY INFORMATION

CONDITIONS CONTRIBUTING TO INSTABILITY

Presence of extreme humidity or Presence of heat source.

- Presence of incompatible materials.
- Product is considered stable.
- Hazardous polymerisation will not occur.

Section 11 - TOXICOLOGICAL INFORMATION

POTENTIAL HEALTH EFFECTS

ACUTE HEALTH EFFECTS

SWALLOWED

Accidental ingestion of the material may be damaging to the health of the individual.

Considered an unlikely route of entry in commercial/industrial environments.

Use as a food additive indicates good tolerance of small amounts, but excessive amounts or overuse may bring irritant and/or harmful effects.

The material may bind to the N-methyl-D-aspartate (NMDA) neuroreceptor. The NMDA receptor is an ionotropic glutamate receptor found on post-synaptic neurons and is a membrane channel that regulates the flow of sodium and calcium ions, flowing into the neuron, while potassium ions flow out. The NMDA receptor, therefore, tightly regulates "ion channel conductance". NMDA agonists (receptor activators), such as the glutamates, can, however, be highly toxic to the neuron. Excessive amounts of glutamate or its congeners, can be highly toxic to neurons and may contribute to neuron damage/death in stroke, epilepsy and neurodegenerative diseases. The decreased supply of oxygen (hypoxia) in stroke has been shown to result in excess glutamate release.

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Section 11 - TOXICOLOGICAL INFORMATION

Overactivation by glutamates, other excitatory amino-acids (EAAs) such as the cysteines and homocysteines, and its congeners (excitotoxins), causes an excessive influx of calcium, into neurons, triggering nervous tissue damage. Glutamate is the major excitatory neurotransmitter in the central nervous system. When concentrations of glutamate and excitotoxins rise above a certain level, in the extracellular fluid, the neuron begins to fire abnormally. At higher concentrations, the cells of the neuron undergo a specialised process of delayed cell death known as excitotoxicity. Although the effects of excitotoxins are generally not dramatic, certain individuals may be especially sensitive and may develop severe symptoms as a result of cardiac irritability.

Excess calcium can activate pathways that are potentially harmful to the cell. For example, kinases, phospholipase A2, calpains, NO synthase, endonucleases and other enzymes can be activated. Phospholipase A2 stimulates arachidonic acid production while NO synthase produces nitric oxide. The production of both species ultimately results in free radical damage. Calpain activation may cause breakdown of the cytoskeleton and also contributes to free radical production and lipid peroxidation. Endonucleases damage neuronal DNA, as do free radicals. In addition, high internal calcium ion concentrations create large osmotic forces that drive water into the cell causing swelling and possibly, rupture. Rupture, in turn, causes the release of even more glutamate, inducing excitotoxicity in neighbouring cells. When brain cells are injured, they also release large amounts of glutamate from surrounding astrocytes and this glutamate can produce further damage in adjacent normal neuronal cells. This appears to be the case in strokes, seizures and brain trauma.

Activation of calcium-dependent enzymes is thought to produce changes in neuronal function that are long-lasting, persisting for weeks or months; it has been suggested that such activation is responsible for memory. Blockade (antagonism) of the receptor by several chemical agents produces amnesia in laboratory animals.

NMDA antagonists have been used as neuroprotective agents counteracting the effects of overactivation of the receptor; however such antagonists may also be harmful, at high doses, as the neuron also needs calcium for normal function. Very high doses may produce irreversible damage (including the psychomimetic effects caused by PCP -"angel dust"-abuse). Certain NMDA antagonists (notably those used to produce anaesthesia) induce arousal and even seizures. This class of drug has also produced a model psychosis indistinguishable from schizophrenia.

Large doses of calcium channel blocking agents may produce nausea, weakness, dizziness, drowsiness, confusion and slurred speech. Marked and prolonged hypotension and bradycardia may result from second or third degree atrioventricular block, decreased cardiac output and junctional rhythms; death may ensue.

Certain NMDA receptor antagonists may produce lightheadedness, ataxia, mood elevation and muscle incoordination. Side-effects of uptake of these antagonists (such as the isoxazole derivative, ibotenic acid, isolated from hallucinogenic mushrooms), by neurones, include dizziness, ataxia, euphoria, muscle twitches, and initial psychic stimulations followed by dream-filled sleep. More severe ingestions may produce visual disturbances, fever, confusion, myoclonus, mydriasis, seizures and coma. Residual headache may persist for several days. Ibotenic acid binds to NMDA neurotransmitter and inhibits (antagonises) its action. The congener muscimol (also isolated from mushrooms) which is structurally related to ibotenic acid and glutamic acid, by contrast, binds to another neuroreceptor, the so-called GABA receptor. This receptor, when activated inhibits the firing of some central neurones by causing influx of anions (e.g. chloride) into the cell. Muscimol is a GABA receptor agonist and produces a similar effect and almost identical clinical outcome to that of ibotenic acid. Systemic administration of ibotenic acid and muscimol to laboratory animals produces central inhibition of motor activity with little change to peripheral autonomic activity. Both compounds induce EEG changes in cats, rabbits and rats and thus within the central nervous system both compounds behave as false inhibitory neurotransmitters.

There are at least five different NMDA receptor sites that determine whether or not the

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Section 11 - TOXICOLOGICAL INFORMATION

channel opens. Two important ligands, glutamate and glycine (both amino-acids), are required to bind their respective NMDA sites for the channel to open. At low micromolar concentrations, polyamines, such as dopamine or cholinergic agents (binding to polyamine sites), increase the probability that glutamate and glycine will open the channel; high concentrations of polyamine, in contrast, produce the reverse effect. Two other regulatory ions, magnesium and zinc inhibit the action of amino- acids by binding to sites in the inner pore region of the NMDA channel.

EYE

Although the material is not thought to be an irritant (as classified by EC Directives), direct contact with the eye may produce transient discomfort characterised by tearing or conjunctival redness (as with windburn).

The dust may produce eye discomfort causing transient smarting, blinking.

SKIN

The material is not thought to produce adverse health effects or skin irritation following contact (as classified by EC Directives using animal models). Nevertheless, good hygiene practice requires that exposure be kept to a minimum and that suitable gloves be used in an occupational setting.

INHALED

The material is not thought to produce adverse health effects or irritation of the respiratory tract (as classified by EC Directives using animal models). Nevertheless, good hygiene practice requires that exposure be kept to a minimum and that suitable control measures be used in an occupational setting.

Persons with impaired respiratory function, airway diseases and conditions such as emphysema or chronic bronchitis, may incur further disability if excessive concentrations of particulate are inhaled.

CHRONIC HEALTH EFFECTS

Principal routes of exposure are by accidental skin and eye contact and inhalation of generated dusts.

No human exposure data available. For this reason health effects described are based on experience with chemically related materials.

As with any chemical product, contact with unprotected bare skin; inhalation of vapour, mist or dust in work place atmosphere; or ingestion in any form, should be avoided by observing good occupational work practice.

TOXICITY AND IRRITATION

No significant acute toxicological data identified in literature search.

NOTE: Substance has been shown to be mutagenic in at least one assay, or belongs to a family of chemicals producing damage or change to cellular DNA.

Section 12 - ECOLOGICAL INFORMATION

No data for L-cysteine hydrochloride.

Section 13 - DISPOSAL CONSIDERATIONS

Recycle wherever possible. Consult manufacturer for recycling options.
Consult State Land Waste Management Authority for disposal.
Bury or incinerate residue at an approved site.

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Section 13 - DISPOSAL CONSIDERATIONS

Recycle containers if possible, or dispose of in an authorised landfill.

Section 14 - TRANSPORTATION INFORMATION

HAZCHEM: None

NOT REGULATED FOR TRANSPORT OF DANGEROUS GOODS:UN, IATA,
IMDG

Section 15 - REGULATORY INFORMATION

REGULATIONS

L-cysteine hydrochloride (CAS: 52-89-1) is found on the following regulatory lists;
WHO Guidelines for Drinking-water Quality - Chemicals for which guideline values have
not been established

L-cysteine hydrochloride (CAS: 7048-04-6) is found on the following regulatory lists;
WHO Guidelines for Drinking-water Quality - Chemicals for which guideline values have
not been established

No data available for L-cysteine hydrochloride as CAS: 124558-06-1, CAS: 122882-13-7, CAS
: 122641-75-2, CAS: 29844-56-2.

Section 16 - OTHER INFORMATION

INGREDIENTS WITH MULTIPLE CAS NUMBERS

Ingredient Name	CAS
L- cysteine hydrochloride	52- 89- 1, 7048- 04- 6, 124558- 06- 1, 122882- 13- 7, 122641- 75- 2, 29844- 56- 2

The above information is believed to be accurate and represent the best information currently available to us, but does not represent any warranty expressed or implied of the properties of the product. User should make their own investigation to determine the suitability of the information for their particular purpose.

Issue Date: 5-Apr-2018