PRODUCT TECHNICAL DOSSIER

N-ACETYL L-CARNITINE

Product Code:
P03157

Raw Material Full Name:
N-Acetyl L-Carnitine HCl

Raw Material Full Botanical/Chemical/Latin/Trade Name/Synonyms:
N-phenmethyl piperazine dihydrochloride

This material is Food Grade:
Yes

Vegan / Vegetarian Status
Suitable for Both

Limit/Range/Specification:
N-Acetyl L-Carnitine 98.0% - 102.0% (by titration)
D-Carnitine content: Max 0.5%
L-Carnitine Approx. 67.25% (Calculated)

Identification Method:
IR (USP)

CAS Number:
5080-50-2

EINECS Number:
208-768-0

ATC Number:
N06BX12

Molecular Formula for the raw material:
C₉H₁₇NO₄.HCl

Average Molecular weight:
239.70
Molecular structure:

![Molecular structure image]

Solubility in Water:
Easy soluble in water

Solubility in Alcohol:
Slight soluble in Alcohol

Particle Size:
20 Mesh

Percentage passed through:
100%

Bulk Density:
0.3~0.7g/ml

Tapped Density:
0.5~0.9g/ml

pH:
2.0 - 3.0

Specific Rotation:
-27° to -29°

Loss on Drying:
Max 1%

Residue on Ignition:
Max 0.5%

Country of Origin:
China

Country of Origin of the Manufacture:
China
Base Source/Start Material:
S.R-epichlorohydrine

Origin of Product – Synthetic, Plant, Mineral, Animal, Fish or Fermented:
Synthetic

Material is:
100%

Compound Ingredients Origin, Function and Percentages:
None

Shelf Life from Date of Manufacture:
Min 2 Years

Storage Conditions:
Store in a dry place and keep away from strong direct light and heat.

Appearance (Fine/Crystals/Crystalline/Hygroscopic):
Crystalline Powder

Colour:
White to Off White

Flavour/Taste:
Characteristic

Odour:
Characteristic

Do any of the parameters change in different seasons?
No

Microbiological Test

Total Viable Count:
Max 1,000cfu/g

Yeast & Moulds:
Max 100cfu/g

E. coli:
Negative/g
Salmonella:
Negative/25g

**Heavy Metals**

**Heavy Metals:**
Max 10ppm

**Lead (Pb):**
Max 3ppm

**Cadmium (Cd):**
Max 1ppm

**Mercury (Hg):**
Max 0.1ppm

**Arsenic (As):**
Max 1ppm

**Pharmacopeia Standard Used:**
Complies with the French Arrêté 26 September 2016 (list of substances authorized in food supplements).

Please note that surveillance testing may mean that not all the parameters stated on this specification are tested for every batch.
The allergen information is supplied by the manufacturer, we have not tested for each individual allergen to ensure they are not present. The information given is based on a documented risk assessment and is accurate to the best of our knowledge. If you intend to make a voluntary “free from” claim on your pack, additional testing may need to be carried out. For technical and labelling guidance you should always speak to the competent authority for the market or member state in which the final products are placed.

<table>
<thead>
<tr>
<th>ALLERGENS</th>
<th>Product Contains YES/NO</th>
<th>Listed Item on Site at Manufacturer YES/NO</th>
<th>If YES, Please Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Peanuts and Peanut Derivatives (including possible cross contamination)</td>
<td>NO</td>
<td>NO</td>
<td></td>
</tr>
<tr>
<td>Other Nut and Nut Derivatives</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Almond (Amygdalus communis L.), Hazelnut (Corylus avellana), Walnut (Juglans regia), Cashew (Anacardium occidentale), Pecan nut (Carya illinoiensis (Wangenh.) K. Koch), Brazil nut (Bertholletia excelsa), Pistachio nut (Pistacia vera), Macadamia nut and Queensland nut (Macadamia ternifolia)</td>
<td>NO</td>
<td>NO</td>
<td></td>
</tr>
<tr>
<td>Sesame Seeds and Sesame Seed Derivatives</td>
<td>NO</td>
<td>NO</td>
<td></td>
</tr>
<tr>
<td>other Seeds and Seed Derivatives (Poppy Seeds, Cotton Seeds, Sunflower Seeds)</td>
<td>NO</td>
<td>NO</td>
<td></td>
</tr>
<tr>
<td>Milk and Milk Derivatives (including lactose)</td>
<td>NO</td>
<td>NO</td>
<td></td>
</tr>
<tr>
<td>Egg and Egg Derivatives</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cereals and Derivatives containing OR POTENTIALLY CONTAMINATED WITH Gluten (wheat, wheatgrass, faro, freekeh, spelt, kamut, rye, oats, barley, barley grass)</td>
<td>NO</td>
<td>NO</td>
<td></td>
</tr>
<tr>
<td>Soya and Soya Derivatives</td>
<td>NO</td>
<td>NO</td>
<td></td>
</tr>
<tr>
<td>Lupin and Lupin Derivatives</td>
<td>NO</td>
<td>NO</td>
<td></td>
</tr>
<tr>
<td>Mustard and Mustard Derivatives</td>
<td>NO</td>
<td>NO</td>
<td></td>
</tr>
<tr>
<td>Celery or Celery Derivatives (including Celeriac)</td>
<td>NO</td>
<td>NO</td>
<td></td>
</tr>
<tr>
<td>Fish and Fish Derivatives</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Molluscs and their Derivatives</td>
<td>NO</td>
<td>NO</td>
<td></td>
</tr>
<tr>
<td>Crustaceans and their Derivatives</td>
<td>NO</td>
<td>NO</td>
<td></td>
</tr>
<tr>
<td>Sulphur Dioxide and Sulphites (E220, E228) at levels &gt; 10mg/kg or 10mg/litre</td>
<td>NO</td>
<td>NO</td>
<td></td>
</tr>
<tr>
<td>ADDITIVES / CONTAMINANTS / DIETARY REQUIREMENTS</td>
<td>Product Contains YES/NO</td>
<td>Listed Item on Site at Manufacturer YES/NO</td>
<td>If YES, Please Comment</td>
</tr>
<tr>
<td>-----------------------------------------------</td>
<td>-------------------------</td>
<td>---------------------------------------------</td>
<td>------------------------</td>
</tr>
<tr>
<td>Additives</td>
<td>NO</td>
<td>NO</td>
<td></td>
</tr>
<tr>
<td>Antioxidants</td>
<td>NO</td>
<td>NO</td>
<td></td>
</tr>
<tr>
<td>Ethylene Oxide</td>
<td>NO</td>
<td>NO</td>
<td></td>
</tr>
<tr>
<td>Gelatine</td>
<td>NO</td>
<td>NO</td>
<td></td>
</tr>
<tr>
<td>Flavourings (Artificial / Nature Identical / Natural / Smoked)</td>
<td>NO</td>
<td>NO</td>
<td></td>
</tr>
<tr>
<td>Maize / Corn and any Derivatives</td>
<td>NO</td>
<td>NO</td>
<td></td>
</tr>
<tr>
<td>Legumes / Pulses</td>
<td>NO</td>
<td>NO</td>
<td></td>
</tr>
<tr>
<td>Rice and Rice Derivatives</td>
<td>NO</td>
<td>NO</td>
<td></td>
</tr>
<tr>
<td>Added Salt</td>
<td>NO</td>
<td>NO</td>
<td></td>
</tr>
<tr>
<td>Added Sugar / artificial or natural sweeteners</td>
<td>NO</td>
<td>NO</td>
<td></td>
</tr>
<tr>
<td>Aspartame</td>
<td>NO</td>
<td>NO</td>
<td></td>
</tr>
<tr>
<td>BHA / BHT (E320 / E321)</td>
<td>NO</td>
<td>NO</td>
<td></td>
</tr>
<tr>
<td>Caffeine</td>
<td>NO</td>
<td>NO</td>
<td></td>
</tr>
<tr>
<td>Colours (Artificial / Nature Identical / Natural / Smoked)</td>
<td>NO</td>
<td>NO</td>
<td></td>
</tr>
<tr>
<td>Dextrose</td>
<td>NO</td>
<td>NO</td>
<td></td>
</tr>
<tr>
<td>Dioxins</td>
<td>NO</td>
<td>NO</td>
<td></td>
</tr>
<tr>
<td>MSG (Added and Naturally Occurring E621) or Glutamates (E620 to E625)</td>
<td>NO</td>
<td>NO</td>
<td></td>
</tr>
<tr>
<td>Nucleotides (E627, E630, E631, E635)</td>
<td>NO</td>
<td>NO</td>
<td></td>
</tr>
<tr>
<td>Polys (sugar alcohols)</td>
<td>NO</td>
<td>NO</td>
<td></td>
</tr>
<tr>
<td>Benzoates (E210 / E219)</td>
<td>NO</td>
<td>NO</td>
<td></td>
</tr>
<tr>
<td>Sorbic Acid (E200, E203)</td>
<td>NO</td>
<td>NO</td>
<td></td>
</tr>
<tr>
<td>any other Preservatives</td>
<td>NO</td>
<td>NO</td>
<td></td>
</tr>
<tr>
<td>Ethanol</td>
<td>YES</td>
<td>YES</td>
<td>Ethanol is a starting material</td>
</tr>
<tr>
<td>Honey</td>
<td>NO</td>
<td>NO</td>
<td></td>
</tr>
<tr>
<td>Lactose</td>
<td>NO</td>
<td>NO</td>
<td></td>
</tr>
<tr>
<td>Yeast and Yeast Derivatives</td>
<td>NO</td>
<td>NO</td>
<td></td>
</tr>
<tr>
<td>All Animal Products (Beef, Pork, Poultry or other) and Derivatives (which may include growth/yield hormones, antibiotics etc.)</td>
<td>NO</td>
<td>NO</td>
<td></td>
</tr>
<tr>
<td>Bovine Products or Derivatives (which may include growth/yield hormones, antibiotics etc.)</td>
<td>NO</td>
<td>NO</td>
<td></td>
</tr>
</tbody>
</table>
PRODUCTION FLOW CHART

S.R-epichlorohydrine

Hydrolytic Kinetic Resolution Split

S-epichlorohydrine

Chemical Reaction

L-Carnitine and Sodium Chloride Water Solution

Separate Sodium Chloride, crystal and dry

L-Carnitine Base

Add Acetyl Chloride and Acetic Acid

Separate Sodium Chloride, crystal and dry

N-Acetyl L-Carnitine HCl
CONFIRMATION OF BSE/TSE STATUS
This is to certify that this product complies with all relevant current UK and EU Legislative requirements in regard to Transmissible Spongiform Encephalopathies (TSE) and Bovine Spongiform Encephalopathy (BSE) for human food, and so is free of TSE/BSE.

This is also to certify that, during the course of their manufacture, the above-mentioned product did not come into contact with any materials, which could be derived from TSE/BSE risk materials.

CONFIRMATION OF GM STATUS
This is to certify that this product is not manufactured from GM raw materials and is therefore not subject to labelling under regulations 1829/2003/EC and 1830/2003/EC.

CONFIRMATION OF NON IRRADIATION STATUS
This is to certify that this product, whole or in part, has not been subjected to Ionising Radiation as per European Directives 1999/3/EC.

CONFIRMATION OF NANDROLINE STATUS
This is to certify that this product, whole or in part, has not come into contact with Nandrolone or any of its precursors in any way.

CONFIRMATION OF IOC PRODUCT STATUS
This is to certify that this product, whole or in part, has not come into contact with any product/s, which is banned by the IOC (International Olympics Committee) and or WADA.

CONFIRMATION OF ANIMAL TESTING STATUS
This is to certify that all the products sold by Cambridge Commodities have not been tested on animals in any part of its manufacture in accordance with regulation 86/609/EEC.

CONFIRMATION OF PESTICIDES STATUS
This is to certify that the above-mentioned product complies with the regulation (EC) No.396/2005 of 23rd February 2005 and commission Regulation (EU) No. 559/2011 of 7th June 2011 amending annexes II and III of the above Regulation.

CONFIRMATION OF NANOPARTICLE STATUS
This is to certify that unless otherwise stated, the above-mentioned product is free of nanoparticles. Commission Recommendation 2011/696/EU, defines as follows: "'Nanomaterial' means a natural, incidental or manufactured material containing particles, in an unbound state or as an aggregate or as an agglomerate and where, for 50 % or more of the particles in the number size distribution, one or more external dimensions is in the size range 1 nm - 100 nm".


## SECTION 1 IDENTIFICATION OF THE SUBSTANCE / MIXTURE AND OF THE COMPANY / UNDERTAKING

### 1.1. Product Identifier

<table>
<thead>
<tr>
<th>Product name</th>
<th>Acetyl (N) L-Carnitine</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chemical Name</td>
<td>acetyl-L-carnitine hydrochloride</td>
</tr>
<tr>
<td>Synonyms</td>
<td>Not Available</td>
</tr>
<tr>
<td>Other means of identification</td>
<td>5080-50-2, P03157</td>
</tr>
</tbody>
</table>

### 1.2. Relevant identified uses of the substance or mixture and uses advised against

**Relevant identified uses**
- Use according to manufacturer's directions.

**Uses advised against**
- Not Applicable

### 1.3. Details of the supplier of the safety data sheet

<table>
<thead>
<tr>
<th>Registered company name</th>
<th>Cambridge Commodities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Address</td>
<td>Lancaster Way Business Park Ely Cambridgeshire CB6 3NX United Kingdom</td>
</tr>
<tr>
<td>Telephone</td>
<td>+44 1353 667258</td>
</tr>
<tr>
<td>Fax</td>
<td>+44 1353 667289</td>
</tr>
<tr>
<td>Website</td>
<td><a href="https://www.c-c-l.com/">https://www.c-c-l.com/</a></td>
</tr>
<tr>
<td>Email</td>
<td><a href="mailto:info@c-c-l.com">info@c-c-l.com</a></td>
</tr>
</tbody>
</table>

### 1.4. Emergency telephone number

**Association / Organisation**
- Not Available

**Emergency telephone numbers**
- Not Available

### 2.1. Classification of the substance or mixture

<table>
<thead>
<tr>
<th>CHEMWATCH HAZARD RATINGS</th>
<th>Min</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flammability</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Toxicity</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Body Contact</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Reactivity</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Chronic</td>
<td>0</td>
<td></td>
</tr>
</tbody>
</table>

**Classification according to regulation (EC) No 1272/2008 [CLP]**
- H302 - Acute Toxicity (Oral) Category 4
- H315 - Skin Corrosion/Irritation Category 2
- H319 - Eye Irritation Category 2
- H335 - Specific target organ toxicity - single exposure Category 3 (respiratory tract irritation)

**Legend:**

### 2.2. Label elements

**Continued...**
### SECTION 3 COMPOSITION / INFORMATION ON INGREDIENTS

#### 3.1. Substances

See ‘Composition on ingredients’ in Section 3.2

#### 3.2. Mixtures

<table>
<thead>
<tr>
<th>CAS No</th>
<th>Name</th>
<th>Classification according to regulation (EC) No 1272/2008 [CLP]</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.5080-50-2</td>
<td>acetyl-L-carnitine hydrochloride</td>
<td>Acute Toxicity (Oral) Category 4, Skin Corrosion/Irritation Category 2, Eye Iritation Category 2, Specific target organ toxicity - single exposure Category 3 (respiratory tract irritation); H302, H315, H319, H335 [1]</td>
</tr>
</tbody>
</table>

#### Legend:


### SECTION 4 FIRST AID MEASURES

#### 4.1. Description of first aid measures

Continued...
### Acetyl (N) L-Carnitine

**Eye Contact**
- Generally not applicable.

**Skin Contact**
- If skin contact occurs:
  - Immediately remove all contaminated clothing, including footwear.
  - Flush skin and hair with running water (and soap if available).
  - Seek medical attention in event of irritation.
  - Generally not applicable.

**Inhalation**
- If fumes or combustion products are inhaled remove from contaminated area.
- Lay patient down. Keep warm and rested.
- 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, without delay.
- Generally not applicable.

**Ingestion**
- IF SWALLOWED, REFER FOR MEDICAL ATTENTION, WHERE POSSIBLE, WITHOUT DELAY.
  - For advice, contact a Poisons Information Centre or a doctor.
  - Urgent hospital treatment is likely to be needed.
  - In the mean time, qualified first-aid personnel should treat the patient following observation and employing supportive measures as indicated by the patient’s condition.
  - If the services of a medical officer or medical doctor are readily available, the patient should be placed in his/her care and a copy of the SDS should be provided. Further action will be the responsibility of the medical specialist.
  - If medical attention is not available on the worksite or surroundings send the patient to a hospital together with a copy of the SDS.
  - Generally not applicable.

#### 4.2 Most important symptoms and effects, both acute and delayed

See Section 11

#### 4.3. Indication of any immediate medical attention and special treatment needed

For exposures to quaternary ammonium compounds:
- For ingestion of concentrated solutions (10% or higher): Swallow promptly a large quantity of milk, egg whites / gelatin solution. If not readily available, a slurry of activated charcoal may be useful. Avoid alcohol. Because of probable mucosal damage omit gastric lavage and emetic drugs.
- For dilute solutions (2% or less): If little or no emesis appears spontaneously, administer syrup of Ipecac or perform gastric lavage.
- If hypotension becomes severe, institute measures against circulatory shock.
- If respiration laboured, administer oxygen and support breathing mechanically. Oropharyngeal airway may be inserted in absence of gag reflex. Epiglottic or laryngeal edema may necessitate a tracheotomy.
- Persistent convulsions may be controlled by cautious intravenous injection of diazepam or short-acting barbiturate drugs. [Gosselin et al, Clinical Toxicology of Commercial Products]

#### SECTION 5 FIREFIGHTING MEASURES

**5.1. Extinguishing media**
- Foam.
- Dry chemical powder.
- BCF (where regulations permit).
- Carbon dioxide.
- Water spray or fog - Large fires only.

**5.2. Special hazards arising from the substrate or mixture**
- Fire Incompatibility: Avoid contamination with oxidising agents i.e. nitrates, oxidising acids, chlorine bleaches, pool chlorine etc. as ignition may result.

**5.3. Advice for firefighters**
- 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.
- Use water delivered as a fine spray to control fire and cool adjacent area.
- DO NOT approach containers suspected to be hot.
- Cool fire exposed containers with water spray from a protected location.
- If safe to do so, remove containers from path of fire.
- Equipment should be thoroughly decontaminated after use.
- Slight hazard when exposed to heat, flame and oxidisers.

**Fire/Explosion Hazard**
- Combustible. Will burn if ignited.
- Combustion products include:
  - carbon monoxide (CO)
  - carbon dioxide (CO₂)
  - hydrogen chloride
  - phosgene
  - nitrogen oxides (NOx)
  - other pyrolysis products typical of burning organic material.
May emit poisonous fumes.
May emit corrosive fumes.
Articles and manufactured articles may constitute a fire hazard where polymers form their outer layers or where combustible packaging remains in place.
Certain substances, found throughout their construction, may degrade or become volatile when heated to high temperatures. This may create a secondary hazard.

SECTION 6 ACCIDENTAL RELEASE MEASURES

6.1. Personal precautions, protective equipment and emergency procedures
See section 8

6.2. Environmental precautions
See section 12

6.3. Methods and material for containment and cleaning up

| Minor Spills | Clean up all spills immediately.  
| Secure load if safe to do so  
| Bundle/collect recoverable product.  
| Collect remaining material in containers with covers for disposal. |

| 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.  
| Stop leak if safe to do so.  
| Contain spill with sand, earth or vermiculite.  
| Collect recoverable product into labelled containers for recycling.  
| Neutralise/decontaminate residue (see Section 13 for specific agent).  
| Collect solid residues and seal in labelled drums for disposal.  
| Wash area 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. |

6.4. Reference to other sections
Personal Protective Equipment advice is contained in Section 8 of the SDS.

SECTION 7 HANDLING AND STORAGE

7.1. Precautions for safe handling

| Safe handling | Avoid all personal contact, including inhalation.  
| Wear protective clothing when risk of exposure occurs.  
| Use in a well-ventilated area.  
| Prevent concentration in hollows and sumps.  
| DO NOT enter confined spaces until atmosphere has been checked.  
| DO NOT allow material to contact humans, exposed food or food utensils.  
| Avoid contact with incompatible materials.  
| When handling, DO NOT eat, drink or smoke.  
| Keep containers securely sealed when not in use.  
| Avoid physical damage to containers.  
| Always wash hands with soap and water after handling.  
| Work clothes should be laundered separately. Launder contaminated clothing before re-use.  
| Use good occupational work practice.  
| Observe manufacturer's storage and handling recommendations contained within this SDS.  
| Atmosphere should be regularly checked against established exposure standards to ensure safe working conditions are maintained. |

| Fire and explosion protection | See section 5 |

| Other information | Store away from incompatible materials. |

7.2. Conditions for safe storage, including any incompatibilities

| Suitable container | Generally packaging as originally supplied with the article or manufactured item is sufficient to protect against physical hazards. If repackaging is required ensure the article is intact and does not show signs of wear. As far as is practicably possible, reuse the original packaging or |
something providing a similar level of protection to both the article and the handler.

### Storage incompatibility

- Avoid reaction with oxidising agents

#### 7.3. Specific end use(s)

See section 1.2

### SECTION 8 EXPOSURE CONTROLS / PERSONAL PROTECTION

#### 8.1. Control parameters

| DERIVED NO EFFECT LEVEL (DNEL) | Not Available |
| PREDICTED NO EFFECT LEVEL (PNEC) | Not Available |
| OCCUPATIONAL EXPOSURE LIMITS (OEL) | Not Available |

#### INGREDIENT DATA

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<thead>
<tr>
<th>Source</th>
<th>Ingredient</th>
<th>Material name</th>
<th>TWA</th>
<th>STEL</th>
<th>Peak</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
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<td>Not Available</td>
<td>Not Available</td>
<td>Not Available</td>
<td>Not Available</td>
<td>Not Available</td>
<td>Not Available</td>
</tr>
</tbody>
</table>

#### EMERGENCY LIMITS

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>Material name</th>
<th>TEEL-1</th>
<th>TEEL-2</th>
<th>TEEL-3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acetyl (N) L-Carnitine</td>
<td>Not Available</td>
<td>Not Available</td>
<td>Not Available</td>
<td>Not Available</td>
</tr>
<tr>
<td>acetyl-L-carnitine hydrochloride</td>
<td>Original IDLH</td>
<td>Revised IDLH</td>
<td>Not Available</td>
<td>Not Available</td>
</tr>
</tbody>
</table>

#### 8.2. Exposure controls

Articles or manufactured items, in their original condition, generally don't require engineering controls during handling or in normal use. Exceptions may arise following extensive use and subsequent wear, during recycling or disposal operations where substances, found in the article, may be released to the environment.

Engineering controls are used to remove a hazard or place a barrier between the worker and the hazard. Well-designed engineering controls can be highly effective in protecting workers and will typically be independent of worker interactions to provide this high level of protection.

The basic types of engineering controls are:

- **Process controls** which involve changing the way a job activity or process is done to reduce the risk.
- **Enclosure and/or isolation of emission source** which keeps a selected hazard "physically" away from the worker and ventilation that strategically "adds" and "removes" air in the work environment. Ventilation can remove or dilute an air contaminant if designed properly. The design of a ventilation system must match the particular process and chemical or contaminant in use.
- Employers may need to use multiple types of controls to prevent employee overexposure.

General exhaust is adequate under normal operating conditions. Local exhaust ventilation may be required in special circumstances. If risk of overexposure exists, wear approved respirator. Supplied-air type respirator may be required in special circumstances. Correct fit is essential to ensure adequate protection. Provide adequate ventilation in warehouses and enclosed storage areas. Air contaminants generated in the workplace possess varying "escape" velocities which, in turn, determine the "capture velocities" of fresh circulating air required to effectively remove the contaminant.

**Type of Contaminant:**

- **solvent, vapours, degreasing etc., evaporating from tank (in still air).**
  - Air Speed: 0.25-0.5 m/s (50-100 f/min)
- **aerosols, fumes from pouring operations, intermittent container filling, low speed conveyor transfers, welding, spray drift, plating acid fumes, pickling (released at low velocity into zone of active generation)**
  - Air Speed: 0.5-1 m/s (100-200 f/min.)
- **direct spray, spray painting in shallow booths, drum filling, conveyor loading, crusher dusts, gas discharge (active generation into zone of rapid air motion)**
  - Air Speed: 1-2.5 m/s (200-500 f/min.)
- **grinding, abrasive blasting, tumbling, high speed wheel generated dusts (released at high initial velocity into zone of very high rapid air motion)**
  - Air Speed: 2.5-10 m/s (500-2000 f/min.)

Within each range the appropriate value depends on:

<table>
<thead>
<tr>
<th>Lower end of the range</th>
<th>Upper end of the range</th>
</tr>
</thead>
<tbody>
<tr>
<td>1: Room air currents minimal or favourable to capture</td>
<td>1: Disturbing room air currents</td>
</tr>
<tr>
<td>2: Contaminants of low toxicity or of nuisance value only</td>
<td>2: Contaminants of high toxicity</td>
</tr>
<tr>
<td>3: Intermittent, low production.</td>
<td>3: High production, heavy use</td>
</tr>
<tr>
<td>4: Large hood or large air mass in motion</td>
<td>4: Small hood-local control only</td>
</tr>
</tbody>
</table>

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 exit fan, for example, should be a minimum of 1-2 m/s (200-400 f/min) for extraction of solvents generated in a tank 2 meters 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.

#### 8.2.2. Personal protection

Continued...
Safety glasses with side shields.
Chemical goggles. Contact lenses may pose a special hazard; soft contact lenses may absorb and concentrate irritants. A written policy document, describing the wearing of lenses 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], [AS/NZS 1336 or national equivalent]

No special equipment required due to the physical form of the product.

### Skin protection

See Hand protection below

### Hands/feet protection

- Wear chemical protective gloves, e.g. PVC.
- Wear safety footwear or safety gumboots, e.g. Rubber

No special equipment required due to the physical form of the product.

### Body protection

See Other protection below

### Other protection

- Overalls.
- P.V.C. apron.
- Barrier cream.
- Skin cleansing cream.
- Eye wash unit.

### Thermal hazards

Not Available

### Respiratory protection

Respiratory protection not normally required due to the physical form of the product.

#### 8.2.3. Environmental exposure controls

See section 12

### SECTION 9 PHYSICAL AND CHEMICAL PROPERTIES

#### 9.1. Information on basic physical and chemical properties

<table>
<thead>
<tr>
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<td>Relative density (Water = 1)</td>
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<tr>
<td>Odour</td>
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</tr>
<tr>
<td>Partition coefficient n-octanol / water</td>
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<tr>
<td>Odour threshold</td>
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<tr>
<td>Auto-ignition temperature (°C)</td>
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<tr>
<td>pH (as supplied)</td>
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<tr>
<td>Decomposition temperature</td>
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<td>Melting point / freezing point (°C)</td>
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<td>Viscosity (cSt)</td>
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<td>Molecular weight (g/mol)</td>
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<tr>
<td>Flash point (°C)</td>
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<tr>
<td>Taste</td>
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</tr>
<tr>
<td>Evaporation rate</td>
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<tr>
<td>Explosive properties</td>
<td>Not Available</td>
</tr>
<tr>
<td>Flammability</td>
<td>Not Available</td>
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<tr>
<td>Oxidising properties</td>
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<tr>
<td>Upper Explosive Limit (%)</td>
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<tr>
<td>Surface Tension (dyn/cm or mN/m)</td>
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<tr>
<td>Lower Explosive Limit (%)</td>
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<td>Vapour pressure (kPa)</td>
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<td>Gas group</td>
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<tr>
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<tr>
<td>VOC g/L</td>
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#### 9.2. Other information

Not Available

### SECTION 10 STABILITY AND REACTIVITY

#### 10.1. Reactivity

See section 7.2

#### 10.2. Chemical stability

Product is considered stable and hazardous polymerisation will not occur.

#### 10.3. Possibility of hazardous reactions

See section 7.2

#### 10.4. Conditions to avoid

See section 7.2

#### 10.5. Incompatible materials

See section 7.2

#### 10.6. Hazardous decomposition products

See section 5.3

### SECTION 11 TOXICOLOGICAL INFORMATION

#### 11.1. Information on toxicological effects

**Inhaled**

The material can cause respiratory irritation in some persons. The body's response to such irritation can cause further lung damage.
Acetyl (N) L-Carnitine

**ACETYL-L-CARNITINE HYDROCHLORIDE**

Asthma-like symptoms may continue for months or even years after exposure to the material ends. This may be due to a non-allergic condition known as reactive airways dysfunction syndrome (RADS) which can occur after exposure to high levels of highly irritating compound. Main criteria for diagnosing RADS include the absence of previous airways disease in a non-atopic individual, with sudden onset of persistent asthma-like symptoms within minutes to hours of a documented exposure to the irritant. Other criteria for diagnosis of RADS include a reversible airflow pattern on lung function tests, moderate to severe bronchial hyperreactivity on methacholine challenge testing, and the lack of minimal lymphocytic inflammation, without eosinophilia. RADS (or asthma) following an irritating inhalation is an infrequent disorder with rates related to the concentration and duration of exposure to the irritating substance. On the other hand, industrial bronchitis is a disorder that occurs as a result of exposure due to high concentrations of irritating substance (often particles) and is completely reversible after exposure ceases. The disorder is characterized by difficulty breathing, cough and mucus production. Most undiluted cationic surfactants satisfy the criteria for classification as Harmful (Xn) with R22 and as Irritant (Xi) for skin and eyes with R38 and R41. For quaternary ammonium compounds (QACs): Quaternary ammonium compounds are synthetically made surfactants. Studies show that its solubility, toxicity and irritation depend on chain length and bond type while effect on histamine depends on concentration. QACs may cause muscle paralysis with no brain involvement. There is a significant association between the development of asthma symptoms and the use of QACs as disinfectant.

<table>
<thead>
<tr>
<th>Acute Toxicity</th>
<th>Carcinogenicity</th>
<th>Reproductivity</th>
<th>STOT - Single Exposure</th>
<th>STOT - Repeated Exposure</th>
<th>Aspiration Hazard</th>
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</thead>
<tbody>
<tr>
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<td>✅</td>
<td>✅</td>
<td>▼</td>
<td>▼</td>
<td>▼</td>
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</table>

**SECTION 12 ECOLOGICAL INFORMATION**

### 12.1. Toxicity

<table>
<thead>
<tr>
<th>Endpoint Test</th>
<th>Duration (HR)</th>
<th>Species</th>
<th>Value</th>
<th>Source</th>
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</thead>
<tbody>
<tr>
<td>Acetyl (N) L-Carnitine</td>
<td>Not Available</td>
<td>Not Available</td>
<td>Not Available</td>
<td>Not Available</td>
</tr>
<tr>
<td>Acetyl-L-carnitine hydrochloride</td>
<td>Not Available</td>
<td>Not Available</td>
<td>Not Available</td>
<td>Not Available</td>
</tr>
</tbody>
</table>

**Legend:**

- ✅: Data available
- ❌: Data not available
- ▼: Data available to make classification
- X: Data available but does not fill the criteria for classification

Toxic to aquatic organisms.

Do NOT allow product to come in contact with surface waters or to intertidal areas below the mean high water mark. Do not contaminate water when cleaning equipment or disposing of equipment wash-waters.

Wastes resulting from use of the product must be disposed of on site or at approved waste sites.

For Quaternary Ammonium Compounds (QACs): QAC’s are white, crystalline powders. Low molecular weight QACs are very soluble in water, but slightly or not at all soluble in solvents such as ether, petrol and benzene. As the molecular weight and chain lengths increases, the solubility in polar solvents (e.g. water) decreases and the solubility in non-polar solvents increases.

Environmental Fate: A major part of the QACs is discharged into wastewater and removed in the biological processes of sewage treatment, however; the aerobic and anaerobic biodegradability of QACs is not well investigated. Only sparse data are available concerning stability, solubility and biodegradability. In general, it seems that the biodegradability decreases with increasing numbers.
of alkyl chains. Within each category the biodegradability seems inversely proportional to the alkyl chain length. Heterocyclic QACs are less degradable than the non-cyclic.

**Ecotoxicity:** Significant bioaccumulation is not expected.

**Aquatic Fate:** The toxicity of QAC’s is known to be greatly reduced in the environment because of preferential binding to dissolved organics in surface water.

For Chloride: Although inorganic chloride ions are not normally considered toxic they can exist in effluents at acutely toxic levels. Incidental exposure to inorganic chloride may occur in occupational settings where chemicals management policies are improperly applied. The toxicity of chloride salts depends on the counter-ion (cation) present; that of chloride itself is unknown. Chloride toxicity has not been observed in humans except in the special case of impaired sodium chloride metabolism, e.g. in congestive heart failure. Healthy individuals can tolerate the intake of large quantities of chloride provided that there is an intake of fresh water following ingestion. Although excessive intake of drinking-water containing sodium chloride at concentrations above 2.5 g/L has been reported to produce hypertension, this effect is believed to be related to the sodium ion concentration. Chloride concentrations in excess of about 250 mg/L can give rise to detectable taste in water. Consumers can, however, become accustomed to concentrations in excess of 250 mg/L. No health-based guideline value is proposed for chloride in drinking-water. Chloride is almost completely absorbed in normal individuals. In metal pipes, chloride reacts with metal ions to form soluble salts thus increasing levels of metals in drinking water. Chloride enhances galvanic corrosion in lead pipes and can also increase the rate of pitting corrosion of metal pipes.

**Aquatic Fate:** Inorganic chlorine eventually finds its way into aquatic systems and becomes bio-available. Chloride increases the electrical conductivity of water and thus increases its corrosivity.

**Ecotoxicity:** When excessive inorganic chloride ions are introduced to aquatic environments, the resulting salinity can exceed the tolerances of most freshwater organisms.

DO NOT discharge into sewer or waterways.

### 12.2. Persistence and degradability

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>Persistence: Water/Soil</th>
<th>Persistence: Air</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No Data available for all ingredients</td>
<td>No Data available for all ingredients</td>
</tr>
</tbody>
</table>

### 12.3. Bioaccumulative potential

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>Bioaccumulation</th>
</tr>
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<tbody>
<tr>
<td></td>
<td>No Data available for all ingredients</td>
</tr>
</tbody>
</table>

### 12.4. Mobility in soil

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>Mobility</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No Data available for all ingredients</td>
</tr>
</tbody>
</table>

### 12.5. Results of PBT and vPvB assessment

<table>
<thead>
<tr>
<th>Relevant available data</th>
<th>P</th>
<th>B</th>
<th>T</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Not Available</td>
<td>Not Available</td>
<td>Not Available</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>PBT Criteria fulfilled?</th>
<th>P</th>
<th>B</th>
<th>T</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Not Available</td>
<td>Not Available</td>
<td>Not Available</td>
</tr>
</tbody>
</table>

### 12.6. Other adverse effects

No data available

### SECTION 13 DISPOSAL CONSIDERATIONS

#### 13.1. Waste treatment methods

**Product / Packaging disposal**

- Recycle wherever possible or consult manufacturer for recycling options.
- Consult State Land Waste Management Authority for disposal.
  - DO NOT allow wash water from cleaning or process equipment to enter drains.
  - It may be necessary to collect all wash water for treatment before disposal.
  - In all cases disposal to sewer may be subject to local laws and regulations and these should be considered first.
  - Where in doubt contact the responsible authority.
  - Recycle wherever possible or consult manufacturer for recycling options.
  - Consult State Land Waste Authority for disposal.
  - Bury or incinerate residue at an approved site.
  - Recycle containers if possible, or dispose of in an authorised landfill.

<table>
<thead>
<tr>
<th>Waste treatment options</th>
<th>Not Available</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sewage disposal options</td>
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</tr>
</tbody>
</table>

### SECTION 14 TRANSPORT INFORMATION

#### Labels Required

| Marine Pollutant | NO |
| HAZCHEM         | Not Applicable |

**Land transport (ADR): NOT REGULATED FOR TRANSPORT OF DANGEROUS GOODS**

| 14.1. UN number | Not Applicable |
| 14.2. UN proper shipping name | Not Applicable |
| 14.3. Transport hazard class(es) | Class: Not Applicable |
|                  | Subrisk: Not Applicable |
| 14.4. Packing group | Not Applicable |
| 14.5. Environmental hazard | Not Applicable |
| 14.6. Special precautions for user | Hazard identification (Kemler): Not Applicable |
|                  | Classification code: Not Applicable |
Air transport (ICAO-IATA / DGR): NOT REGULATED FOR TRANSPORT OF DANGEROUS GOODS

14.1. UN number Not Applicable
14.2. UN proper shipping name Not Applicable
14.3. Transport hazard class(es) ICAO/IATA Class Not Applicable
      ICAO / IATA Subrisk Not Applicable
      ERG Code Not Applicable
14.4. Packing group Not Applicable
14.5. Environmental hazard Not Applicable
14.6. Special precautions for user Special provisions Not Applicable
      Cargo Only Packing Instructions Not Applicable
      Cargo Only Maximum Qty / Pack Not Applicable
      Passenger and Cargo Packing Instructions Not Applicable
      Passenger and Cargo Maximum Qty / Pack Not Applicable
      Passenger and Cargo Limited Quantity Packing Instructions Not Applicable
      Passenger and Cargo Limited Maximum Qty / Pack Not Applicable

Sea transport (IMDG-Code / GGVSee): NOT REGULATED FOR TRANSPORT OF DANGEROUS GOODS

14.1. UN number Not Applicable
14.2. UN proper shipping name Not Applicable
14.3. Transport hazard class(es) IMDG Class Not Applicable
      IMDG Subrisk Not Applicable
14.4. Packing group Not Applicable
14.5. Environmental hazard Not Applicable
14.6. Special precautions for user EMS Number Not Applicable
      Special provisions Not Applicable
      Limited Quantities Not Applicable

Inland waterways transport (ADM): NOT REGULATED FOR TRANSPORT OF DANGEROUS GOODS

14.1. UN number Not Applicable
14.2. UN proper shipping name Not Applicable
14.3. Transport hazard class(es) Not Applicable
14.4. Packing group Not Applicable
14.5. Environmental hazard Not Applicable
14.6. Special precautions for user Classification code Not Applicable
      Special provisions Not Applicable
      Limited quantity Not Applicable
      Equipment required Not Applicable
      Fire cones number Not Applicable

14.7. Transport in bulk according to Annex II of MARPOL and the IBC code
Not Applicable

SECTION 15 REGULATORY INFORMATION

15.1. Safety, health and environmental regulations / legislation specific for the substance or mixture
ACETYL-L-CARNITINE HYDROCHLORIDE (5080-50-2) IS FOUND ON THE FOLLOWING REGULATORY LISTS
Not Applicable

This safety data sheet is in compliance with the following EU legislation and its adaptations - as far as applicable - : 59/24/EC, 92/85/EC, 94/33/EC, 91/689/EEC, 1999/13/EC, Commission Regulation (EU) 2015/830, Regulation (EC) No 1272/2008 and their amendments

15.2. Chemical safety assessment
For further information please look at the Chemical Safety Assessment and Exposure Scenarios prepared by your Supply Chain if available.
### ECHA SUMMARY

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>CAS number</th>
<th>Index No</th>
<th>ECHA Dossier</th>
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<tbody>
<tr>
<td>acetyl-L-carnitine hydrochloride</td>
<td>5080-50-2</td>
<td>Not Available</td>
<td>Not Available</td>
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</table>

<table>
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<tr>
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<th>Hazard Class and Category Code(s)</th>
<th>Pictograms Signal Word Code(s)</th>
<th>Hazard Statement Code(s)</th>
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<td>1</td>
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<td>GHS07; Wng</td>
<td>H315; H319; H335</td>
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<td>2</td>
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<td>GHS07; Dgr</td>
<td>H315; H319; H335</td>
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<tr>
<td>1</td>
<td>Skin Irrit. 2; Eye Irrit. 2</td>
<td>GHS07; Wng</td>
<td>H315; H319</td>
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<tr>
<td>2</td>
<td>Skin Irrit. 2; Eye Irrit. 2</td>
<td>GHS07; Wng</td>
<td>H315; H319</td>
</tr>
</tbody>
</table>

Harmonisation Code 1 = The most prevalent classification. Harmonisation Code 2 = The most severe classification.

<table>
<thead>
<tr>
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<th>Status</th>
<th>Ingredients status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Australia - AICS</td>
<td>N</td>
<td>N (acetyl-L-carnitine hydrochloride)</td>
</tr>
<tr>
<td>Canada - DSL</td>
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</tr>
<tr>
<td>Canada - NDSL</td>
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<td>N (acetyl-L-carnitine hydrochloride)</td>
</tr>
<tr>
<td>China - IEGSC</td>
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<td>Y (acetyl-L-carnitine hydrochloride)</td>
</tr>
<tr>
<td>Europe - EINEC / ELINCS / NLP</td>
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<td>N (acetyl-L-carnitine hydrochloride)</td>
</tr>
<tr>
<td>Japan - ENCS</td>
<td>N</td>
<td>N (acetyl-L-carnitine hydrochloride)</td>
</tr>
<tr>
<td>Korea - KECI</td>
<td>N</td>
<td>N (acetyl-L-carnitine hydrochloride)</td>
</tr>
<tr>
<td>New Zealand - NZIoC</td>
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<td>Y (acetyl-L-carnitine hydrochloride)</td>
</tr>
<tr>
<td>Philippines - PICCS</td>
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<td>N (acetyl-L-carnitine hydrochloride)</td>
</tr>
<tr>
<td>USA - TSCA</td>
<td>N</td>
<td>N (acetyl-L-carnitine hydrochloride)</td>
</tr>
</tbody>
</table>

**Legend:**
- Y = All ingredients are on the inventory
- N = Not determined or one or more ingredients are not on the inventory and are not exempt from listing (see specific ingredients in brackets)

### SECTION 16 OTHER INFORMATION

**Full text Risk and Hazard codes**

**Other information**

Classification of the preparation and its individual components has drawn on official and authoritative sources as well as independent review by the Chemwatch Classification committee using available literature references.

The SDS is a Hazard Communication tool and should be used to assist in the Risk Assessment. Many factors determine whether the reported Hazards are Risks in the workplace or other settings. Risks may be determined by reference to Exposures Scenarios. Scale of use, frequency of use and current or available engineering controls must be considered.

For detailed advice on Personal Protective Equipment, refer to the following EU CEN Standards:
- EN 166 Personal eye-protection
- EN 340 Protective clothing
- EN 374 Protective gloves against chemicals and micro-organisms
- EN 13632 Footwear protecting against chemicals
- EN 133 Respiratory protective devices

**Definitions and abbreviations**

- PC – TWA: Permissible Concentration-Time Weighted Average
- PC – STEL: Permissible Concentration-Short Term Exposure Limit
- IARC: International Agency for Research on Cancer
- ACGIH: American Conference of Governmental Industrial Hygienists
- STEL: Short Term Exposure Limit
- TEEL: Temporary Emergency Exposure Limit,
- IDLH: Immediately Dangerous to Life or Health Concentrations
- OSF: Odour Safety Factor
- NOAEL: No Observed Adverse Effect Level
- LOAEL: Lowest Observed Adverse Effect Level
- TLV: Threshold Limit Value
- LOD: Limit Of Detection
- OTV: Odour Threshold Value
- BCF: BioConcentration Factors
- BEI: Biological Exposure Index

Powered by AuthorITe, from Chemwatch.
This Information provided in this document is subject to change and the batch specific Certificate of Analysis should always be referenced.

To be used as per local legislation.

Change History

<table>
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<th>Version</th>
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<td>2</td>
<td>The format has been updated and the Production Flow Chart has been added.</td>
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<td>No</td>
</tr>
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</table>
| 3       | EINECS and ATC Number, molecular structure, ID method and compliance with French Decree added. Below changes have been made, due supplier updated specification:  
- Amended bulk density from 0.52-0.54 to 0.3-0.7 and tapped density from 0.66-0.68 to 0.5-0.9  
- Specific Rotation changed from -26° to -27  
- Particle Size from 40 to 20 Mesh passed through 100%  
- Coliforms removed  
- Source of the material is S.R-epichlorohydrine | Yes                              |          |
| 4       | A specification for D-Carnitine was added.  
The E. coli and Salmonella parameter were modified, the Staphylococcus Aureus parameter, the EP, USP and CP Pharmacopeia was removed.  
Lastly the allergen and additive table were reformatted. |                                | Yes      |
| 5       | Added approximate L-carnitine range  
Updated allergen statement and MSDS General reformat |                                | Yes      |

Document Approval

<table>
<thead>
<tr>
<th>Originator Job Title</th>
<th>QC Team Leader</th>
<th>Approver Job Title</th>
<th>Quality Specialist</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ash Bean (Apr 30, 2018)</td>
<td></td>
<td>Matthew Vincent</td>
<td></td>
</tr>
</tbody>
</table>
"P03157-N-Acetyl L-Carnitine-Technical Dossier" History

Document uploaded by Ash Bean (ash.bean@c-c-l.com) from Acrobat
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