PRODUCT TECHNICAL DOSSIER

VITAMIN B5 (CALCIUM D-PANTOTHENATE)

Product Code: P22105

Raw Material Full Name:
D-Calcium Pantothenate (Vitamin B5)

This material is Food Grade

Limit/Range/Specification:
98.0% - 101.0%

Active Content
90.17 – 92.93% Pantothenic Acid

CAS Number:
137-08-6

EC/EINECS Number:
205-278-9

Molecular Formula for the raw material:
C_{18}H_{32}CaN_{2}O_{10}

Average Molecular weight:
476.53

Solubility in Water:
Easy to Dissolve in Water

Solubility in Alcohol:
Slightly Soluble in Alcohol

Particle Size:
40 Mesh

Percentage passed through:
100%

Specific Rotation:
+25.0° - +27.5°
Identification:
Positive Reaction

Nitrogen Content:
5.7% - 6.0%

Calcium Content:
8.2% - 8.6%

Loss on Drying:
Max 5.0%

Ordinary Impurities:
Max 1.00%

Alkalinity:
No Pink Colour is Produced Within 5 Seconds

pH:
6.8 – 8.0

Country of Origin:
China

Country of Origin of the Manufacture:
China

Base Source/Start Material:
Acrylonitrile & Calcium Salts

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

Material is:
100%

Compound Ingredients:
None

Shelf Life from Date of Manufacture:
Min 3 Years

Storage Conditions:
This material is to be stored in a tightly sealed bag/container and to be kept in a cool place away from moisture and direct sunlight
Appearance:
Free Flowing Hygroscopic Powder

Colour:
White/Off White

Flavour/Taste:
Characteristic

Texture:
Powder

Odour:
Characteristic

Microbiological Test

Total Viable Count:
Max 1,000cfu/g

Yeast & Moulds:
Max 100cfu/g

E. coli:
Absent in 25g

Salmonella:
Absent in 25g

Metals

Heavy Metals:
Max 20ppm

Pharmacopeia Standard Used:
USP

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>No</td>
<td>No</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>No</td>
<td>No</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>No</td>
<td>No</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>
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<tr>
<td>Polyols (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>No</td>
<td>No</td>
<td></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>
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 NANDROLONE 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".
PRODUCT FLOW CHART

Acrylonitrile & Ammonia
↓
Synthetic reaction
↓
Removing ammonia
↓
Vacuum distillation
↓
β-Aminopropionitrile
↓
Hydrolysis
↓
Neutralization
↓
Removing water
↓
Cooling
↓
Centrifugation
↓
Drying
↓
β-Alanine
↓
Calcify (Calcium Salts)
↓
Discoloring/filter
↓
Acylation
↓
Filtration
↓
Cooling and crystallization
↓
Centrifugation
↓
Waterish product
↓
Drying
↓
Sieve
↓
Mixture
↓
Testing
↓
Packing
↓
Finished product
↓
Warehouse
SECTION 1 IDENTIFICATION OF THE SUBSTANCE / MIXTURE AND OF THE COMPANY / UNDERTAKING

1.1. Product Identifier

<table>
<thead>
<tr>
<th>Product name</th>
<th>D-PANTOTHENIC ACID, CALCIUM SALT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chemical Name</td>
<td>D-pantothenic acid, calcium salt</td>
</tr>
<tr>
<td>Synonyms</td>
<td>(+)-pantothenic acid, (+)-N-(2,4-Dihydroxy-3,3-dimethylbutyryl)-beta-alanine, (HOCH2C(CH3)2CHOHCONH(CH2)2COO)2Ca, (R)-N-(2,4-dihydroxy-3,3-dimethyl-1-oxobutylyl)-beta-alanine calcium, C18-H32-Ca-N2-O10, Calcium pantothenate, Calpanate, D(+)-N-(2,4-dihydroxy-3,3-dimethylbutyryl) beta-alanine calcium, D(+)-N-(2,4-dihydroxy-3,3-dimethylbutyryl) beta-alanine hemicalcium salt, D(+)-pantothenic acid hemicalcium salt, D(+)-calcium pantothenate, D-N-(2,4-dihydroxy-3,3-dimethylbutyryl)-beta-alanine calcium, D-calcium pantothenate, D-calcium pantothenate calcium salt, D-pantothenic acid calcium salt, D-pantothenic acid hemicalcium salt, D-pantothenic acid, D-vitamin B calcium salt, DL-N-(2,4-dihydroxy-3,3-dimethylbutyryl) beta-alanine, D-vitamin B calcium salt, DL-N-(2,4-dihydroxy-3,3-dimethylbutyryl) B-alanine, DL-vitamin B calcium salt, D(+)-N-(2,4-dihydroxy-3,3-dimethylbutyryl) B-alanine, D(+)-N-(2,4-dihydroxy-3,3-dimethylbutyryl) B-alanine hemicalcium salt, Pancal, Panthoject, Pantholin, calcium (+)-pantothenate, calcium D(+)-N-(alpha, gamma-dihydroxy-beta,beta-dimethylbutyryl)-beta-alanine, calcium D(+)-pantothenate, calcium D-pantothenate calcium D-pantothenate hydrate (CAS RN: 305608-23-5), calcium DL-pantothenate (1:2) CAS RN: 7693-17-6, calcium pantothenate, calcium pantothenate, dextro calcium pantothenate, vitamin B3, vitamin B5</td>
</tr>
<tr>
<td>Chemical formula</td>
<td>C9H17NO5.1/2Ca</td>
</tr>
<tr>
<td>Other means of identification</td>
<td>P22105</td>
</tr>
<tr>
<td>CAS number</td>
<td>137-08-6</td>
</tr>
<tr>
<td>EC number</td>
<td>205-278-9</td>
</tr>
</tbody>
</table>

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

| Relevant identified uses | The free acid is present in living tissues and commonly considered a member of the vitamin B group. Used as a nutritional supplement (enzyme co-factor vitamin). The calcium salt is preferred due to the unstable hygroscopic nature of the free acid. Although pantothenic acid has no accepted therapeutic uses in human medicine it has been used with variable results in a variety of conditions including streptomycin intoxication, postoperative ileus and rheumatoid conditions. Only the D-isomer is biologically active. The racemic salt has one-half the activity of the D-isomer. A component of coenzyme A which is essential for the metabolism of carbohydrates, fat and protein. |
| 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 |
| Other emergency telephone numbers | Not Available |

SECTION 2 HAZARDS IDENTIFICATION

2.1. Classification of the substance or mixture

| Classification according to | Not Applicable |
2.2. Label elements

<table>
<thead>
<tr>
<th>Hazard pictogram(s)</th>
<th>Not Applicable</th>
</tr>
</thead>
<tbody>
<tr>
<td>SIGNAL WORD</td>
<td>NOT APPLICABLE</td>
</tr>
</tbody>
</table>

Hazard statement(s)
Not Applicable

Supplementary statement(s)
Not Applicable

Precautionary statement(s) Prevention
Not Applicable

Precautionary statement(s) Response
Not Applicable

Precautionary statement(s) Storage
Not Applicable

Precautionary statement(s) Disposal
Not Applicable

2.3. Other hazards
REACH - Art.57-59: The mixture does not contain Substances of Very High Concern (SVHC) at the SDS print date.

SECTION 3 COMPOSITION / INFORMATION ON INGREDIENTS

3.1. Substances

<table>
<thead>
<tr>
<th>CAS No</th>
<th>EC No</th>
<th>Index No</th>
<th>REACH No</th>
<th>% [weight]</th>
<th>Name</th>
<th>Classification according to regulation (EC) No 1272/2008 [CLP]</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.137-08-6</td>
<td>2.205-278-9</td>
<td>Not Available</td>
<td>Not Available</td>
<td>&gt;99</td>
<td>D-pantothenic acid, calcium salt</td>
<td>Not Applicable</td>
</tr>
</tbody>
</table>

Legend:

3.2. Mixtures
See ‘Information on ingredients’ in section 3.1

SECTION 4 FIRST AID MEASURES

4.1. Description of first aid measures

**Eye Contact**
If this product comes in contact with eyes:
- Wash out immediately with water.
- If irritation continues, seek medical attention.
- Removal of contact lenses after an eye injury should only be undertaken by skilled personnel.

**Skin Contact**
If skin or hair contact occurs:
- Flush skin and hair with running water (and soap if available).
- Seek medical attention in event of irritation.

**Inhalation**
If dust is inhaled, remove from contaminated area.
- Encourage patient to blow nose to ensure clear passage of breathing.
- If irritation or discomfort persists seek medical attention.

**Ingestion**
Immediately give a glass of water.
- First aid is not generally required. If in doubt, contact a Poisons Information Centre or a doctor.

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
Treat symptomatically.
Readily absorbed from gastrointestinal tract. Widely distributed in body tissues and appears in breast milk. About 70% is excreted unchanged in the urine and 30% in the faeces.

SECTION 5 FIREFIGHTING MEASURES

5.1. Extinguishing media
- Water spray or fog.
- Foam.
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

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.
- Use water delivered as a fire 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.

Fire/Explosion Hazard
- Combustible solid which burns but propagates flame with difficulty; it is estimated that most organic dusts are combustible (circa 70%) - according to the circumstances under which the combustion process occurs, such materials may cause fires and/or dust explosions.
- Organic powders when finely divided over a range of concentrations regardless of particulate size or shape and suspended in air or some other oxidising medium may form explosive dust-air mixtures and result in a fire or dust explosion (including secondary explosions).
- 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 (420 micron or less) may burn rapidly and fiercely if ignited - particles exceeding this limit will generally not form flammable dust clouds; once initiated, however, larger particles up to 1400 microns diameter will contribute to the propagation of an explosion.
- In the same way as gases and vapours, dusts in the form of a cloud are only ignitable over a range of concentrations; in principle, the concepts of lower explosive limit (LEL) and upper explosive limit (UEL) are applicable to dust clouds but only the LEL is of practical use; i.e. this is because of the inherent difficulty of achieving homogeneous dust clouds at high temperatures (for dusts the LEL is often called the 'Minimum Explosive Concentration', MEC).
- When processed with flammable liquids/vapours/mists, ignitable (hybrid) mixtures may be formed with combustible dusts. Ignitable mixtures will increase the rate of explosion pressure rise and the Minimum Ignition Energy (the minimum amount of energy required to ignite dust clouds - MIE) will be lower than the pure dust in air mixture. The Lower Explosive Limit (LEL) of the vapour/dust mixture will be lower than the individual LELs for the vapours/mists or dusts.
- A dust explosion may release of large quantities of gaseous products; this in turn creates a subsequent pressure rise of explosive force capable of damaging plant and buildings and injuring people.
- Usually the initial or primary explosion takes place in a confined space such as plant or machinery, and can be of sufficient force to damage or rupture the plant. If the shock wave from the primary explosion enters the surrounding area, it will disturb any settled dust layers, forming a second dust cloud, and often initiate a much larger secondary explosion. All large scale explosions have resulted from chain reactions of this type.
- Dry dust can 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-meter/sec.
- A sudden release of statically charged materials from storage or process equipment, particularly at elevated temperatures and/or pressure, may result in ignition especially in the absence of an apparent ignition source. One important effect of the particulate nature of powders is that the surface area and surface structure (and often moisture content) can vary widely from sample to sample, depending of how the powder was manufactured and handled; this means that it is virtually impossible to use flammability data published in the literature for dusts (in contrast to that published for gases and vapours).
- Autoignition temperatures are often quoted for dust clouds (minimum ignition temperature (MIT)) and dust layers (layer ignition temperature (LIT)); LIT generally falls as the thickness of the layer increases.
- Combustion products include:
  - carbon monoxide (CO)
  - carbon dioxide (CO2)
  - nitrogen oxides (NOx)
  - other pyrolysis products typical of burning organic material.

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.
- Avoid contact with skin and eyes.
- Wear impervious gloves and safety glasses.
- Use dry clean up procedures and avoid generating dust.
- Vacuum up (consider explosion-proof machines designed to be grounded during storage and use).
- Do NOT use air hoses for cleaning.
- 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.
- Control personal contact with the substance, by using protective equipment and dust respirator.
- Prevent spillage from entering drains, sewers or water courses.
- Avoid generating dust.
- Sweep, shovel up. Recover product wherever possible.
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

- Limit all unnecessary personal contact.
- Wear protective clothing when risk of exposure occurs.
- Use in a well-ventilated area.
- 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.
- 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.
- Organic powders when finely divided over a range of concentrations regardless of particulate size or shape and suspended in air or some other oxidising medium may form explosive dust-air mixtures and result in a fire or dust explosion (including secondary explosions).
- Minimise airborne dust and eliminate all ignition sources. Keep away from heat, hot surfaces, sparks, and flame.
- Establish good housekeeping practices.
- Remove dust accumulations on a regular basis by vacuuming or gentle sweeping to avoid creating dust clouds.
- Use continuous suction at points of dust generation to capture and minimise the accumulation of dusts. Particular attention should be given to overhead and hidden horizontal surfaces to minimise the probability of a "secondary" explosion. According to NFPA Standard 654, dust layers 1/32 in. (0.8 mm) thick can be sufficient to warrant immediate cleaning of the area.
- Do not use air hoses for cleaning.
- Minimise dry sweeping to avoid generation of dust clouds. Vacuum dust-accumulating surfaces and remove to a chemical disposal area. Vacuums with explosion-proof motors should be used.
- Control sources of static electricity. Dusts or their packages may accumulate static charges, and static discharge can be a source of ignition.
- Solids handling systems must be designed in accordance with applicable standards (e.g. NFPA including 654 and 77) and other national guidance.
- Do not empty directly into flammable solvents or in the presence of flammable vapors.
- The operator, the packaging container and all equipment must be grounded with electrical bonding and grounding systems. Plastic bags and plastics cannot be grounded, and antistatic bags do not completely protect against development of static charges. Empty containers may contain residual dust which has the potential to accumulate following settling. Such dusts may explode in the presence of an appropriate ignition source.
- DO NOT cut, drill, grind or weld such containers.
- In addition ensure such activity is not performed near full, partially empty or empty containers without appropriate workplace safety authorisation or permit.

7.2. Conditions for safe storage, including any incompatibilities

- Material is hygroscopic, i.e. absorbs moisture from the air. Keep containers well sealed in storage.
- Store in original containers.
- Keep containers securely sealed.
- Store in a cool, dry area protected from environmental extremes.
- Store away from incompatible materials and foodstuff containers.
- Protect containers against physical damage and check regularly for leaks.
- Observe manufacturer's storage and handling recommendations contained within this SDS.

For major quantities:
- Consider storage in bunded areas - ensure storage areas are isolated from sources of community water (including stormwater, ground water, lakes and streams).
- Ensure that accidental discharge to air or water is the subject of a contingency disaster management plan; this may require consultation with local authorities.
- Air and light sensitive.

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) | |
| INGREDIENT DATA | |

Continued...
8.2. Exposure controls

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.

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

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- 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.

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.

8.2.2. Personal protection

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. Lenses should be removed at the first signs of eye redness or irritation - lenses 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].

Eye and face protection

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. Lenses should be removed at the first signs of eye redness or irritation - lenses 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].

Skin protection

See Hand protection below

The selection of suitable gloves does not only depend on the material, but also on further marks of quality which vary from manufacturer to manufacturer. Where the chemical is a preparation of several substances, the resistance of the glove material can not be calculated in advance and has therefore to be checked prior to the application.

The exact break through time for substances has to be obtained from the manufacturer of the protective gloves and has to be observed when making a final choice.

Personal hygiene is a key element of effective hand care. Gloves must only be worn on clean hands. After using gloves, hands should be washed and dried thoroughly. Application of a non-perfumed moisturizer is recommended. Suitability and durability of glove type is dependent on usage. Important factors in the selection of gloves include:
- frequency and duration of contact,
- chemical resistance of glove material,
- glove thickness and

Hands/feet protection

The selection of suitable gloves does not only depend on the material, but also on further marks of quality which vary from manufacturer to manufacturer. Where the chemical is a preparation of several substances, the resistance of the glove material can not be calculated in advance and has therefore to be checked prior to the application.

The exact break through time for substances has to be obtained from the manufacturer of the protective gloves and has to be observed when making a final choice.

Personal hygiene is a key element of effective hand care. Gloves must only be worn on clean hands. After using gloves, hands should be washed and dried thoroughly. Application of a non-perfumed moisturizer is recommended. Suitability and durability of glove type is dependent on usage. Important factors in the selection of gloves include:
- frequency and duration of contact,
Required Minimum Protection Factor | Half-Face Respirator | Full-Face Respirator | Powered Air Respirator
--- | --- | --- | ---
up to 10 x ES | P1 | - | PAPR-P1
up to 50 x ES | Air-line* | P2 | PAPR-P2
up to 100 x ES | - | P3 | -
100+ x ES | Air-line* | - | PAPR-P3

* - Negative pressure demand ** - Continuous flow

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>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Appearance</td>
<td>White, odourless, slightly hygroscopic powder with sweetish taste and slightly bitter after-taste; soluble in water (1:2.8), glycerol, methanol, acetone.</td>
</tr>
<tr>
<td>Physical state</td>
<td>Divided Solid</td>
</tr>
<tr>
<td>Relative density (Water = 1)</td>
<td>0.69 g/cc bulk</td>
</tr>
<tr>
<td>Odour</td>
<td>Not Available</td>
</tr>
<tr>
<td>Partition coefficient n-octanol / water</td>
<td>Not Available</td>
</tr>
<tr>
<td>Odour threshold</td>
<td>Not Available</td>
</tr>
<tr>
<td>Auto-ignition temperature (°C)</td>
<td>Not available.</td>
</tr>
<tr>
<td>pH (as supplied)</td>
<td>Not Applicable</td>
</tr>
<tr>
<td>Decomposition temperature</td>
<td>195-196</td>
</tr>
</tbody>
</table>
SECTION 11 TOXICOLOGICAL INFORMATION

11.1. Information on toxicological effects

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. If prior damage to the circulatory or nervous systems has occurred or if kidney damage has been sustained, proper screenings should be conducted on individuals who may be exposed to further risk if handling and use of the material result in excessive exposures.

Although ingestion is not thought to produce harmful effects (as classified under EC Directives), the material may still be damaging to the health of the individual, following ingestion, especially where pre-existing organ (e.g. liver, kidney) damage is evident. Pantothenic Acid, also known as vitamin B5, is one of eight vitamins that comprise the B complex. Pantothenic acid is part of coenzyme A (CoA), an essential metabolite the body uses to produce energy from food (fats, carbohydrates and proteins). The FDA's reference daily intakes (RDI) for Pantothenic acid is 10 mg.

If prior damage to the circulatory or nervous systems has occurred or if kidney damage has been sustained, proper screenings should be conducted on individuals who may be exposed to further risk if handling and use of the material result in excessive exposures.

Skin Contact: 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.

Eye: Although the material is not thought to be an irritant (as classified by EC Directives), direct contact with the eye may cause transient discomfort characterised by tearing or conjunctival redness (as with windsburn). Slight abrasive damage may also result.

Chronic: Long-term exposure to the product is not thought to produce chronic effects adverse to the health (as classified by EC Directives using animal models); nevertheless exposure by all routes should be minimised as a matter of course. Long term exposure to high dust concentrations may cause changes in lung function i.e. pneumoconiosis, caused by particles less than 0.5 micron penetrating and remaining in the lung.

<table>
<thead>
<tr>
<th>D-PANTOTHENIC ACID, CALCIUM SALT</th>
<th>TOXICITY</th>
<th>IRRITATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oral (rat) LD50: &gt;10000 mg/kg[2]</td>
<td>Not Available</td>
<td>Not Available</td>
</tr>
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</table>

Legend: 1. Value obtained from Europe ECHA Registered Substances - Acute toxicity 2. Value obtained from manufacturer's SDS. Unless otherwise specified data extracted from RTECS - Register of Toxic Effect of chemical Substances.
### SECTION 12 ECOLOGICAL INFORMATION

#### 12.1. Toxicity

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>Endpoint Test Duration (HR)</th>
<th>Species</th>
<th>Value</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>D-pantothenic acid, calcium salt</td>
<td>Not Available</td>
<td>Not Available</td>
<td>Not Available</td>
<td>Not Available</td>
</tr>
</tbody>
</table>

**Legend:**
- Extracted from 1. IUCLID Toxicity Data
- 2. Europe ECHA Registered Substances - Ecotoxicological Information
- 3. Aquatic Toxicity
- 4. US EPA, Ecotox database - Aquatic Toxicity Data
- 5. ECETOC Aquatic Hazard Assessment Data
- 6. NITE (Japan) - Bioconcentration Data
- 7. METI (Japan) - Bioconcentration Data
- 8. Vendor Data

#### 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>D-pantothenic acid, calcium salt</td>
<td>LOW</td>
<td>LOW</td>
</tr>
</tbody>
</table>

#### 12.3. Bioaccumulative potential

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>Bioaccumulation</th>
</tr>
</thead>
<tbody>
<tr>
<td>D-pantothenic acid, calcium salt</td>
<td>LOW (LogKOW = -1.6942)</td>
</tr>
</tbody>
</table>

#### 12.4. Mobility in soil

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>Mobility</th>
</tr>
</thead>
<tbody>
<tr>
<td>D-pantothenic acid, calcium salt</td>
<td>LOW (KOC = 10)</td>
</tr>
</tbody>
</table>

#### 12.5. Results of PBT and vPvB assessment

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

#### 12.6. Other adverse effects

No data available

### SECTION 13 DISPOSAL CONSIDERATIONS

#### 13.1. Waste treatment methods

<table>
<thead>
<tr>
<th>Product / Packaging disposal</th>
<th>Legislation addressing waste disposal requirements may differ by country, state and/ or territory. Each user must refer to laws operating in their area. In some areas, certain wastes must be tracked. A Hierarchy of Controls seems to be common - the user should investigate: Reduction Reuse Recycling Disposal (if all else fails) This material may be recycled if unused, or if it has not been contaminated so as to make it unsuitable for its intended use. Shell life considerations should also be applied in making decisions of this type. Note that properties of a material may change in use, and recycling or reuse may not always be appropriate. In most instances the supplier of the material should be consulted. 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.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Waste treatment options</td>
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</tr>
<tr>
<td>Sewage disposal options</td>
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### SECTION 14 TRANSPORT INFORMATION

#### Labels Required

<table>
<thead>
<tr>
<th>Marine Pollutant</th>
<th>HAZCHEM</th>
</tr>
</thead>
<tbody>
<tr>
<td>NO</td>
<td>Not Applicable</td>
</tr>
</tbody>
</table>
### Land transport (ADR): NOT REGULATED FOR TRANSPORT OF DANGEROUS GOODS

<table>
<thead>
<tr>
<th>Section</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>14.1. UN number</td>
<td>Not Applicable</td>
</tr>
<tr>
<td>14.2. UN proper shipping name</td>
<td>Not Applicable</td>
</tr>
<tr>
<td>14.3. Transport hazard class(es)</td>
<td>Class: Not Applicable</td>
</tr>
<tr>
<td></td>
<td>Subrisk: Not Applicable</td>
</tr>
<tr>
<td>14.4. Packing group</td>
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</tr>
<tr>
<td>14.5. Environmental hazard</td>
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<tr>
<td>14.6. Special precautions for user</td>
<td>Hazard identification (Kentener): Not Applicable</td>
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<td>Classification code: Not Applicable</td>
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<td>Special provisions: Not Applicable</td>
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<tr>
<td></td>
<td>Limited quantity: Not Applicable</td>
</tr>
</tbody>
</table>

### Air transport (ICAO-IATA / DGR): NOT REGULATED FOR TRANSPORT OF DANGEROUS GOODS

<table>
<thead>
<tr>
<th>Section</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
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</tr>
<tr>
<td>14.2. UN proper shipping name</td>
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<td>14.3. Transport hazard class(es)</td>
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<td></td>
<td>ICAO / IATA Subrisk: Not Applicable</td>
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<td>ERG Code: Not Applicable</td>
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<td>14.5. Environmental hazard</td>
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</tr>
<tr>
<td>14.6. Special precautions for user</td>
<td>Special provisions: Not Applicable</td>
</tr>
<tr>
<td></td>
<td>Cargo Only Packing Instructions: Not Applicable</td>
</tr>
<tr>
<td></td>
<td>Cargo Only Maximum Qty / Pack: Not Applicable</td>
</tr>
<tr>
<td></td>
<td>Passenger and Cargo Packing Instructions: Not Applicable</td>
</tr>
<tr>
<td></td>
<td>Passenger and Cargo Maximum Qty / Pack: Not Applicable</td>
</tr>
<tr>
<td></td>
<td>Passenger and Cargo Limited Quantity Packing Instructions: Not Applicable</td>
</tr>
<tr>
<td></td>
<td>Passenger and Cargo Limited Maximum Qty / Pack: Not Applicable</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Section</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>14.1. UN number</td>
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</tr>
<tr>
<td>14.2. UN proper shipping name</td>
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</tr>
<tr>
<td>14.3. Transport hazard class(es)</td>
<td>IMDG Class: Not Applicable</td>
</tr>
<tr>
<td></td>
<td>IMDG Subrisk: Not Applicable</td>
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<tr>
<td>14.4. Packing group</td>
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<tr>
<td>14.5. Environmental hazard</td>
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</tr>
<tr>
<td>14.6. Special precautions for user</td>
<td>EMS Number: Not Applicable</td>
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<td></td>
<td>Special provisions: Not Applicable</td>
</tr>
<tr>
<td></td>
<td>Limited Quantities: Not Applicable</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Section</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>14.1. UN number</td>
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</tr>
<tr>
<td>14.2. UN proper shipping name</td>
<td>Not Applicable</td>
</tr>
<tr>
<td>14.3. Transport hazard class(es)</td>
<td>Not Applicable</td>
</tr>
<tr>
<td></td>
<td>Not Applicable</td>
</tr>
<tr>
<td>14.4. Packing group</td>
<td>Not Applicable</td>
</tr>
<tr>
<td>14.5. Environmental hazard</td>
<td>Not Applicable</td>
</tr>
<tr>
<td>14.6. Special precautions for user</td>
<td>Classification code: Not Applicable</td>
</tr>
<tr>
<td></td>
<td>Special provisions: Not Applicable</td>
</tr>
<tr>
<td></td>
<td>Limited quantity: Not Applicable</td>
</tr>
<tr>
<td></td>
<td>Equipment required: Not Applicable</td>
</tr>
<tr>
<td></td>
<td>Fire cones number: Not Applicable</td>
</tr>
</tbody>
</table>

### 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

D-PANTOTHENIC ACID, CALCIUM SALT (137-08-6) IS FOUND ON THE FOLLOWING REGULATORY LISTS

- EU REACH Regulation (EC) No 1907/2006 - Annex IV - Exemptions from the Obligation to Register in Accordance with Article 2(7)(a) (English)
- European Customs Inventory of Chemical Substances ECICS (English)
- European Union - European Inventory of Existing Commercial Chemical Substances (EINECS) (English)

This safety data sheet is in compliance with the following EU legislation and its adaptations - as far as applicable - : 98/24/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>
</tr>
</thead>
<tbody>
<tr>
<td>D-pantothenic acid, calcium salt</td>
<td>137-08-6</td>
<td>Not Available</td>
<td>Not Available</td>
</tr>
</tbody>
</table>

Harmonisation (C&L Inventory) | Hazard Class and Category Code(s) | Pictograms Signal Word Code(s) | Hazard Statement Code(s)
---|---|---|---|
1 | Not Classified | Not Available | Not Available |
2 | Not Classified | Not Available | Not Available |

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

National Inventory Status

<table>
<thead>
<tr>
<th>National Inventory</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Australia - AICS</td>
<td>Y</td>
</tr>
<tr>
<td>Canada - DSL</td>
<td>Y</td>
</tr>
<tr>
<td>Canada - NDSL</td>
<td>N (D-pantothenic acid, calcium salt)</td>
</tr>
<tr>
<td>China - IECSC</td>
<td>Y</td>
</tr>
<tr>
<td>Europe - EINEC / ELINCS / NLP</td>
<td>Y</td>
</tr>
<tr>
<td>Japan - ENCS</td>
<td>Y</td>
</tr>
<tr>
<td>Korea - KECI</td>
<td>Y</td>
</tr>
<tr>
<td>New Zealand - NZIoC</td>
<td>Y</td>
</tr>
<tr>
<td>Philippines - PICCS</td>
<td>Y</td>
</tr>
<tr>
<td>USA - TSCA</td>
<td>Y</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

Ingredients with multiple cas numbers

<table>
<thead>
<tr>
<th>Name</th>
<th>CAS No</th>
</tr>
</thead>
<tbody>
<tr>
<td>D-pantothenic acid, calcium salt</td>
<td>137-08-6, 63409-48-3, 331748-07-3, 305808-23-5, 7693-17-6</td>
</tr>
</tbody>
</table>

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
Change History

<table>
<thead>
<tr>
<th>Version</th>
<th>Change</th>
<th>Customer Notification required</th>
<th>Yes / No</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>First Issue</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Reformatted and corrected EU regulation regarding irradiation to 1999/3</td>
<td></td>
<td>No</td>
</tr>
<tr>
<td>3</td>
<td>Change to Pharmacopeia Standard Used</td>
<td></td>
<td>Yes</td>
</tr>
<tr>
<td>4</td>
<td>Addition of Active Content of Pantothenic Acid</td>
<td></td>
<td>No</td>
</tr>
<tr>
<td>5</td>
<td>Nanoparticle Statement has been added</td>
<td></td>
<td>No</td>
</tr>
<tr>
<td>6</td>
<td>Added Kosher Status and Symbol</td>
<td></td>
<td>No</td>
</tr>
<tr>
<td>7</td>
<td>Updated to latest format.</td>
<td></td>
<td>No</td>
</tr>
<tr>
<td>8</td>
<td>Changed pharmacopeia standard used from EP to USP.</td>
<td></td>
<td>Yes</td>
</tr>
<tr>
<td>9</td>
<td>Changed Particle Size from 80 Mesh to 40 mesh. Changed Percentage passed through from Min 95% to 100%. remove organic volatile impurities Updated MSDS</td>
<td></td>
<td>Yes</td>
</tr>
</tbody>
</table>

Document Approval

<table>
<thead>
<tr>
<th>Originator Job Title</th>
<th>QC Technician</th>
<th>Approver Job Title</th>
<th>Assistant Quality Manager</th>
</tr>
</thead>
<tbody>
<tr>
<td>Francesca Bailey Tait</td>
<td>QC Technician</td>
<td>Assistant Quality Manager</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Richard Cecil</td>
<td></td>
</tr>
</tbody>
</table>
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