β-Cryptoxanthin

sc-300397

Section 1 - CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME
β-Cryptoxanthin

STATEMENT OF HAZARDOUS NATURE

NFPA

SUPPLIER
Company: Santa Cruz Biotechnology, Inc.
Address:
2145 Delaware Ave
Santa Cruz, CA 95060
Telephone: 800.457.3801 or 831.457.3800
Emergency Tel: CHEMWATCH: From within the US and Canada: 877-715-9305
Emergency Tel: From outside the US and Canada: +800 2436 2255 (1-800-CHEMCALL) or call +613 9573 3112

PRODUCT USE
Red pigment found in paprika. Food colouring, flavouring.

SYNONYMS
C40-H56-O, "beta, beta-caroten-3-ol, (R)-all-trans", "beta, beta-caroten-3-ol, (R)-all-trans", neo-beta-cryptoxanthin, caricaxanthin, (3R)-cryptoxanthin, cryptoxanthe, cryptoxanthol, kryptoxanthin, "xanthophyll 1", carotenoid

Section 2 - HAZARDS IDENTIFICATION

CANADIAN WHMIS SYMBOLS

EMERGENCY OVERVIEW
RISK
POTENTIAL HEALTH EFFECTS
ACUTE HEALTH EFFECTS
SWALLOWED
• Accidental ingestion of the material may be damaging to the health of the individual.
• Retinoid poisoning, as characterised by Vitamin A intoxication, may occur at high doses and is characterised by sedation, headache, irritability, papilloedema (oedema of the optic disk), and a generalised peeling of the skin. Although vitamin A is useful in preventing and treating chemical sensitivity, many chemically sensitive individuals, especially those who exhibit formaldehyde sensitivity, cannot tolerate it following oral administration.

Retinoids are frequently produced, in the organism, as a result of carotenoid metabolism. Retinoids such as etretinate and isotretinoin, taken in therapeutic doses, may produce dryness of the mucus membranes, sometimes with erosion, involving the lips (cheilitis), mouth, conjunctiva (sometimes causing conjunctivitis), and nasal mucosa and epistaxis (rarely causing epistaxis). Other symptoms may include flare-up of acne, peeling of the palms, soles and fingertips, rhinorrhoea, nosebleed, gingival bleeding, nail fragility, easy sunburning, fever and mild headache. Ocular defects may include problems with night vision, and alterations in colour perception. Musculoskeletal effects include aching joints and backache. Neurological symptoms include fatigue, minor depression, and insomnia. Decreased libido and menstrual irregularities have been reported in etretinate therapies. Liver and kidney dysfunction has been suggested after abnormal laboratory tests and following the appearance of calcified tendons and ligaments in the ankles, pelvis, and knees; hepatitis has been reported in a significant number of patients (1.5%). Dryness of the skin may result in scaling, thinning, pruritus, exfoliation, and erythema. Thinning of the hair or alopecia may occur by the fourth week of etretinate treatment. Skeletal hyperostosis, benign intracranial hypertension, musculoskeletal pain, gastrointestinal effects and paronychia have also occurred. Serum levels of hepatic enzymes and triglyceride concentrations may be elevated.

Isotretinoin therapy has produced corneal opacities and premature epiphyseal closure. Such therapy has also been associated with skin infection and an inflammatory bowel syndrome.

EYE
• Although the material is not thought to be an irritant, direct contact with the eye may cause transient discomfort characterized by tearing or conjunctival redness (as with windburn). Slight abrasive damage may also result. The material may produce foreign body irritation in certain individuals.

SKIN
• The material is not thought to produce adverse health effects or skin irritation following contact (as classified 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.
• Open cuts, abraded or irritated skin should not be exposed to this material.
• Entry into the blood-stream, through, for example, cuts, abrasions or lesions, may produce systemic injury with harmful effects. Examine the skin prior to the use of the material and ensure that any external damage is suitably protected.

INHALED
• The material is not thought to produce either adverse health effects or irritation of the respiratory tract following inhalation (as classified using animal models). Nevertheless, adverse effects have been produced following exposure of animals by at least one other route and good hygiene practice requires that exposure be kept to a minimum and that suitable control measures be used in an occupational setting.
• Persons with impaired respiratory function, airway diseases and conditions such as emphysema or chronic bronchitis, may incur further disability if excessive concentrations of particulate are inhaled.

CHRONIC HEALTH EFFECTS
• Limited evidence suggests that repeated or long-term occupational exposure may produce cumulative health effects involving organs or biochemical systems.

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. Prime symptom is breathlessness; lung shadows show on X-ray.

Prolonged overdose of Vitamin A is associated with fatigue, irritability, loss of weight and appetite, mild fever, increased amounts of urine, enlarged liver and spleen, hair loss, bleeding lips, thickening of skin and yellow pigmentation. Bone and joint pain may occur, and growth may be permanently arrested in children. There may be birth defects and loss of bone mineral associated with the material. Other symptoms may include fatigue, minor depression, and insomnia. Decreased libido and menstrual irregularities have been reported in etretinate therapies. Liver and kidney dysfunction has been suggested after abnormal laboratory tests and following the appearance of calcified tendons and ligaments in the ankles, pelvis, and knees; hepatitis has been reported in a significant number of patients (1.5%). Dryness of the skin may result in scaling, thinning, pruritus, exfoliation, and erythema. Thinning of the hair or alopecia may occur by the fourth week of etretinate treatment. Skeletal hyperostosis, benign intracranial hypertension, musculoskeletal pain, gastrointestinal effects and paronychia have also occurred. Serum levels of hepatic enzymes and triglyceride concentrations may be elevated.

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Section 3 - COMPOSITION / INFORMATION ON INGREDIENTS

<table>
<thead>
<tr>
<th>HAZARD RATINGS</th>
<th>Min</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flammability</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Toxicity</td>
<td>2</td>
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<tr>
<td>Body Contact</td>
<td>0</td>
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<td>Reactivity</td>
<td>1</td>
<td></td>
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<tr>
<td>Chronic</td>
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<table>
<thead>
<tr>
<th>NAME</th>
<th>CAS RN</th>
<th>%</th>
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<tbody>
<tr>
<td>cryptoxanthin</td>
<td>472-70-8</td>
<td>&gt;98</td>
</tr>
</tbody>
</table>

Section 4 - FIRST AID MEASURES

SWALLOWED
• If swallowed do NOT induce vomiting.
• If vomiting occurs, lean patient forward or place on left side (head-down position, if possible) to maintain open airway and prevent asal mucosa and epistaxis (rarely causing haemorrhage). Examine the patient...
aspiration.

- Observe the patient carefully.
- Never give liquid to a person showing signs of being sleepy or with reduced awareness; i.e. becoming unconscious.
- Give water to rinse out mouth, then provide liquid slowly and as much as casualty can comfortably drink.
- Seek medical advice.

**EYE**

- If this product comes in contact with the eyes:
  - Wash out immediately with fresh running water.
  - Ensure complete irrigation of the eye by keeping eyelids apart and away from eye and moving the eyelids by occasionally lifting the upper and lower lids.
  - If pain persists or recurs seek medical attention.
  - Removal of contact lenses after an eye injury should only be undertaken by skilled personnel.

**SKIN**

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

**INHALED**

- If fumes or combustion products are inhaled remove from contaminated area.
- Other measures are usually unnecessary.

**NOTES TO PHYSICIAN**

- Treat symptomatically.

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**Section 5 - FIRE FIGHTING MEASURES**

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
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</tr>
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<tr>
<td>Vapour Pressure (mmHG):</td>
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<tr>
<td>Upper Explosive Limit (%):</td>
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</tr>
<tr>
<td>Specific Gravity (water=1):</td>
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</tr>
<tr>
<td>Lower Explosive Limit (%):</td>
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</tr>
</tbody>
</table>

**EXTINGUISHING MEDIA**

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

**FIRE FIGHTING**

- Alert Emergency Responders 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 course.
- 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.

**GENERAL FIRE HAZARDS/HAZARDOUS COMBUSTIBLE PRODUCTS**

- Combustible solid which burns but propagates flame with difficulty.
- Avoid generating dust, particularly clouds of dust in a confined or unventilated space as dusts may form an explosive mixture with air, and any source of ignition, i.e. flame or spark, will cause fire or explosion. Dust clouds generated by the fine grinding of the solid are a particular hazard; accumulations of fine dust may burn rapidly and fiercely if ignited.
- Dry dust can 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.

Combustion products include: carbon monoxide (CO), carbon dioxide (CO2), other pyrolysis products typical of burning organic material. May emit poisonous fumes.

**FIRE INCOMPATIBILITY**

- Avoid contamination with oxidizing agents i.e. nitrates, oxidizing acids, chlorine bleaches, pool chlorine etc. as ignition may result.

**PERSONAL PROTECTION**

- Glasses:
  - Chemical goggles.
- Gloves:
Section 6 - ACCIDENTAL RELEASE MEASURES

MINOR SPILLS
- Remove all ignition sources.
- Clean up all spills immediately.
- Avoid contact with skin and eyes.
- Control personal contact by using protective equipment.
- Use dry clean up procedures and avoid generating dust.
- Place in a suitable, labelled container for waste disposal.

MAJOR SPILLS
- Moderate hazard.
  - CAUTION: Advise personnel in area.
  - Alert Emergency Responders and tell them location and nature of hazard.
  - Control personal contact by wearing protective clothing.
  - Prevent, by any means available, spillage from entering drains or water courses.
  - Recover product wherever possible.
  - IF DRY: Use dry clean up procedures and avoid generating dust. Collect residues and place in sealed plastic bags or other containers for disposal. IF WET: Vacuum/shovel up and place in labelled containers for disposal.
  - ALWAYS: Wash area down with large amounts of water and prevent runoff into drains.
  - If contamination of drains or waterways occurs, advise emergency services.

ACUTE EXPOSURE GUIDELINE LEVELS (AEGL) (in ppm)

AEGL 1: The airborne concentration of a substance above which it is predicted that the general population, including susceptible individuals, could experience notable discomfort, irritation, or certain asymptomatic nonsensory effects. However, the effects are not disabling and are transient and reversible upon cessation of exposure.

AEGL 2: The airborne concentration of a substance above which it is predicted that the general population, including susceptible individuals, could experience irreversible or other serious, long-lasting adverse health effects or an impaired ability to escape.

AEGL 3: The airborne concentration of a substance above which it is predicted that the general population, including susceptible individuals, could experience life-threatening health effects or death.

Section 7 - HANDLING AND STORAGE

PROCEDURE FOR 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 storing and handling recommendations.
- Atmosphere should be regularly checked against established exposure standards to ensure safe working conditions are maintained.
- 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.

RECOMMENDED STORAGE METHODS
- Polyethylene or polypropylene container.
Check all containers are clearly labelled and free from leaks.

**STORAGE REQUIREMENTS**
- Store in original containers.
- Keep containers securely sealed.
- Store in a cool, dry, well-ventilated area.
- Store away from incompatible materials and foodstuff containers.
- Protect containers against physical damage and check regularly for leaks.
- Observe manufacturer’s storing and handling recommendations.

**SAFE STORAGE WITH OTHER CLASSIFIED CHEMICALS**

<table>
<thead>
<tr>
<th>X: Must not be stored together</th>
<th>O: May be stored together with specific preventions</th>
<th>+: May be stored together</th>
</tr>
</thead>
</table>

**Section 8 - EXPOSURE CONTROLS / PERSONAL PROTECTION**

<table>
<thead>
<tr>
<th>Source</th>
<th>Material</th>
<th>TWA ppm</th>
<th>TWA mg/m³</th>
<th>STEL ppm</th>
<th>STEL mg/m³</th>
<th>Peak ppm</th>
<th>Peak mg/m³</th>
<th>TWA F/CC</th>
<th>Notes</th>
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<tbody>
<tr>
<td>Canada - Alberta Occupational Exposure Limits</td>
<td>cryptoxanthin (Turpentine and selected monoterpenes)</td>
<td>20</td>
<td>111</td>
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<tr>
<td>Canada - Saskatchewan Occupational Health and Safety Regulations - Contamination Limits</td>
<td>cryptoxanthin (Turpentine and selected monoterpenes)</td>
<td>20</td>
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<td>US - Oregon Permissible Exposure Limits (Z3)</td>
<td>cryptoxanthin (Inert or Nuisance Dust: (d) Total dust)</td>
<td>10</td>
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<tr>
<td>US OSHA Permissible Exposure Levels (PELs) - Table Z3</td>
<td>cryptoxanthin (Inert or Nuisance Dust: (d) Respirable fraction)</td>
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<td>US OSHA Permissible Exposure Levels (PELs) - Table Z3</td>
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<td>US - Hawaii Air Contaminant Limits</td>
<td>cryptoxanthin (Particulates not otherwise regulated - Total dust)</td>
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<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>US - Hawaii Air Contaminant Limits</td>
<td>cryptoxanthin (Particulates not otherwise regulated - Respirable fraction)</td>
<td>5</td>
<td></td>
<td></td>
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<tr>
<td>US - Oregon Permissible Exposure Limits (Z3)</td>
<td>cryptoxanthin (Inert or Nuisance Dust: (d) Respirable fraction)</td>
<td>5</td>
<td></td>
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<tr>
<td>US - Tennessee Occupational Exposure Limits - Limits For Air Contaminants</td>
<td>cryptoxanthin (Particulates not otherwise regulated Respirable fraction)</td>
<td>5</td>
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<tr>
<td>US - Wyoming Toxic and Hazardous Substances Table Z1 Limits for Air Contaminants</td>
<td>cryptoxanthin (Particulates not otherwise regulated (PNOR)(f)-Respirable fraction)</td>
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<tr>
<td>US - Michigan Exposure Limits for Air Contaminants</td>
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</tbody>
</table>

**MATERIAL DATA**

**CRYPTOXANTHIN:**
- It is the goal of the ACGIH (and other Agencies) to recommend TLVs (or their equivalent) for all substances for which there is evidence of health effects at airborne concentrations encountered in the workplace.
- At this time no TLV has been established, even though this material may produce adverse health effects (as evidenced in animal experiments or clinical experience). Airborne concentrations must be maintained as low as is practically possible and occupational exposure must be kept to a minimum.
- NOTE: The ACGIH occupational exposure standard for Particles Not Otherwise Specified (P.N.O.S) does NOT apply.
PERSONAL PROTECTION

Consult your EHS staff for recommendations

EYE
• Safety glasses with side shields
• Chemical goggles.
• Contact lenses pose a special hazard; soft lenses may absorb irritants and all lenses concentrate them.

HANDS/FEET
• Suitability and durability of glove type is dependent on usage. Important factors in the selection of gloves include: such as:
  • frequency and duration of contact,
  • chemical resistance of glove material,
  • glove thickness and
dexterity
Select gloves tested to a relevant standard (e.g. Europe EN 374, US F739).
• When prolonged or frequently repeated contact may occur, a glove with a protection class of 5 or higher (breakthrough time greater than 240 minutes according to EN 374) is recommended.
• When only brief contact is expected, a glove with a protection class of 3 or higher (breakthrough time greater than 60 minutes according to EN 374) is recommended.
• Contaminated gloves should be replaced.
Gloves must only be worn on clean hands. After using gloves, hands should be washed and dried thoroughly. Application of a non-perfumed moisturiser is recommended.
Experience indicates that the following polymers are suitable as glove materials for protection against undissolved, dry solids, where abrasive particles are not present.
• polychloroprene
• nitrile rubber
• butyl rubber
• fluoroprene rubber
• polyvinyl chloride
Gloves should be examined for wear and/or degradation constantly.

OTHER
• Overalls.
• P.V.C. apron.
• Barrier cream.
• Skin cleansing cream.
• Eye wash unit.
• Respirators may be necessary when engineering and administrative controls do not adequately prevent exposures.
• The decision to use respiratory protection should be based on professional judgment that takes into account toxicity information, exposure measurement data, and frequency and likelihood of the worker's exposure - ensure users are not subject to high thermal loads which may result in heat stress or distress due to personal protective equipment (powered, positive flow, full face apparatus may be an option).
• Published occupational exposure limits, where they exist, will assist in determining the adequacy of the selected respiratory . These may be government mandated or vendor recommended.
• Certified respirators will be useful for protecting workers from inhalation of particulates when properly selected and fit tested as part of a complete respiratory protection program.
• Use approved positive flow mask if significant quantities of dust becomes airborne.
• Try to avoid creating dust conditions.

RESPRESSOR

<table>
<thead>
<tr>
<th>Protection Factor</th>
<th>Half-Face Respirator</th>
<th>Full-Face Respirator</th>
<th>Powered Air Respirator</th>
</tr>
</thead>
<tbody>
<tr>
<td>10 x PEL</td>
<td>P1</td>
<td>-</td>
<td>PAPR-P1</td>
</tr>
<tr>
<td>50 x PEL</td>
<td>Air-line*</td>
<td>P2</td>
<td>PAPR-P2</td>
</tr>
<tr>
<td>100 x PEL</td>
<td>-</td>
<td>P3</td>
<td>-</td>
</tr>
<tr>
<td>100+ x PEL</td>
<td>Air-line**</td>
<td>-</td>
<td>PAPR-P3</td>
</tr>
</tbody>
</table>

* - Negative pressure demand ** - Continuous flow

Explanation of Respirator Codes:
Class 1 low to medium absorption capacity filters.
Class 2 medium absorption capacity filters.
Class 3 high absorption capacity filters.
PAPR Powered Air Purifying Respirator (positive pressure) cartridge.
Type A for use against certain organic gases and vapors.
Type AX for use against low boiling point organic compounds (less than 65°C).
Type B for use against certain inorganic gases and other acid gases and vapors.
Type E for use against sulfur dioxide and other acid gases and vapors.
Type K for use against ammonia and organic ammonia derivatives.
Class P1 intended for use against mechanically generated particulates of sizes most commonly encountered in industry, e.g. asbestos, silica.
Class P2 intended for use against both mechanically and thermally generated particulates, e.g. metal fume.
Class P3 intended for use against all particulates containing highly toxic materials, e.g. beryllium.
The local concentration of material, quantity and conditions of use determine the type of personal protective equipment required.
Use appropriate NIOSH-certified respirator based on informed professional judgement. In conditions where no reasonable estimate of exposure can be made, assume the exposure is in a concentration IDLH and use NIOSH-certified full face pressure demand SCBA with a minimum service life of 30 minutes, or a combination full facepiece pressure demand SAR with auxiliary self-contained air supply. Respirators provided only for escape from IDLH atmospheres shall be NIOSH-certified for escape from the atmosphere in which they will be used.

ENGINEERING CONTROLS

- 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.

<table>
<thead>
<tr>
<th>Type of Contaminant</th>
<th>Air Speed:</th>
</tr>
</thead>
<tbody>
<tr>
<td>direct spray, spray painting in shallow booths, drum filling,</td>
<td>1-2.5 m/s (200-500 f/min.)</td>
</tr>
<tr>
<td>conveyor loading, crusher dusts, gas discharge (active generation into zone of rapid air motion)</td>
<td></td>
</tr>
<tr>
<td>grinding, abrasive blasting, tumbling, high speed wheel generated dusts (released at high initial velocity into zone of very high rapid air motion)</td>
<td>2.5-10 m/s (500-2000 f/min.)</td>
</tr>
</tbody>
</table>

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 favorable 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 extraction fan, for example, should be a minimum of 4-10 m/s (800-2000 f/min) for extraction of crusher dusts generated 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.

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**Section 9 - PHYSICAL AND CHEMICAL PROPERTIES**

**PHYSICAL PROPERTIES**

<table>
<thead>
<tr>
<th>State</th>
<th>Divided Solid</th>
<th>Molecular Weight</th>
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<tbody>
<tr>
<td>Melting Range (°F)</td>
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<td>Viscosity</td>
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</tr>
<tr>
<td>Boiling Range (°F)</td>
<td>Not Available</td>
<td>Solubility in water (g/L)</td>
<td>Partly Miscible</td>
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<tr>
<td>Flash Point (°F)</td>
<td>Not Available</td>
<td>pH (1% solution)</td>
<td>Not Available</td>
</tr>
<tr>
<td>Decomposition Temp (°F)</td>
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<td>pH (as supplied)</td>
<td>Not Available</td>
</tr>
<tr>
<td>Autoignition Temp (°F)</td>
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<td>Vapour Pressure (mmHG)</td>
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</tr>
<tr>
<td>Upper Explosive Limit (%)</td>
<td>Not Available</td>
<td>Specific Gravity (water=1)</td>
<td>Not Available</td>
</tr>
<tr>
<td>Lower Explosive Limit (%)</td>
<td>Not Available</td>
<td>Relative Vapor Density (air=1)</td>
<td>Not Applicable</td>
</tr>
</tbody>
</table>
APPEARANCE
Red powder; does not mix well with water.

Section 10 - CHEMICAL STABILITY

CONDITIONS CONTRIBUTING TO INSTABILITY
- Presence of incompatible materials.
- Product is considered stable.
- Hazardous polymerization will not occur.

STORAGE INCOMPATIBILITY
- The very feature which confers the important properties on carotenoids (antioxidants) also makes them unstable. The structures break down with attack by free radicals, such as singlet molecular oxygen and other reactive species. The common degradation pathways are isomerisation, oxidation and fragmentation of the carotenoid molecules. Heat, light and acids promote isomerisation of the trans-form of carotenoids to the cis-form. Light, enzymes, pro-oxidant metals and co-oxidation with unsaturated lipids, on the other hand, induce oxidation. Pyrolysis occurs under intense heat with expulsion of low molecular weight molecules.

During carotene oxidation a catalytic agent is formed which causes accelerated deterioration. A strong smell of ionine develops upon the auto-oxidation (the end-rings of the carotene molecule split off). Avoid reaction with oxidizing agents.

For incompatible materials - refer to Section 7 - Handling and Storage.

Section 11 - TOXICOLOGICAL INFORMATION

cryptoxanthin

TOXICITY AND IRRITATION
- No significant acute toxicological data identified in literature search.

Section 12 - ECOLOGICAL INFORMATION

Refer to data for ingredients, which follows:
CRYPTOXANTHIN:
- Retinoids, low molecular weight lipophilic derivatives of vitamin A, can have profound effects upon the development of various embryonic systems especially amphibians in which retinoic acid receptors have been hypothesized to play a role in frog deformities. Although naturally occurring, retinoids have been used for a number of years for a wide array of medical conditions. Although retinoids and retinoic acids would also be expected to be photolabile (and therefore not persistent), their products may also still possess receptor activity. For example, methoprene, an insecticidal synthetic retinoic acid mimic, is photolabile and yields numerous photo-products, some of which also elicit strong retinoic acid activity.
- Substances containing unsaturated carbons are ubiquitous in indoor environments. They result from many sources (see below). Most are reactive with environmental ozone and many produce stable products which are thought to adversely affect human health. The potential for surfaces in an enclosed space to facilitate reactions should be considered.

<table>
<thead>
<tr>
<th>Source of unsaturated substances</th>
<th>Unsaturated substances (Reactive Emissions)</th>
<th>Major Stable Products produced following reaction with ozone</th>
</tr>
</thead>
<tbody>
<tr>
<td>Occupants (exhaled breath, ski oils, personal care products)</td>
<td>Isoprene, nitric oxide, squalene, unsaturated sterols, oleic acid and other unsaturated fatty acids, unsaturated oxidation products</td>
<td>Methacrolein, methyl vinyl ketone, nitrogen dioxide, acetone, 6MHQ, geranyl acetone, 4OPA, formaldehyde, nonanol, decanal, 9-oxo-nonanoic acid, azelaic acid, nonanoic acid.</td>
</tr>
<tr>
<td>Soft woods, wood flooring, including cypress, cedar and silver fir boards, houseplants</td>
<td>Isoprene, limonene, alpha-pinene, other terpenes and sesquiterpenes</td>
<td>Formaldehyde, 4-AMC, pinoaldehyde, pinic acid, pinonic acid, formic acid, methacrolein, methyl vinyl ketone, SOAs including ultrafine particles</td>
</tr>
<tr>
<td>Carpets and carpet backing</td>
<td>4-Phenylcyclohexene, 4-vinylcyclohexene, styrene, 2-ethylhexyl acrylate, unsaturated fatty acids and esters</td>
<td>Formaldehyde, acetaldehyde, benzaldehyde, hexanal, nonanal, 2-nonenal</td>
</tr>
<tr>
<td>Linoleum and paints/polishes containing linseed oil</td>
<td>Linoleic acid, linolenic acid</td>
<td>Propanal, hexanal, nonanal, 2-heptenal, 2-nonenal, 2-decenal, 1-pentene-3-one, propionic acid, n-butyric acid</td>
</tr>
<tr>
<td>Latex paint</td>
<td>Residual monomers</td>
<td>Formaldehyde</td>
</tr>
<tr>
<td>Certain cleaning products, polishes, waxes, air fresheners</td>
<td>Limonene, alpha-pinene, terpinolene, alpha-terpineol, linalool, linalyl acetate and other terpenoids, longifolene and other sesquiterpenes</td>
<td>Formaldehyde, acetaldehyde, glycoaldehyde, formic acid, acetic acid, hydrogen and organic peroxides, acetone, benzaldehyde, 4-hydroxy-4-methyl-5-hexen-1-ol, 5-ethenyl-dihydro-5-methyl[2(3H)]furanone, 4-AMC, SOAs including ultrafine particles</td>
</tr>
<tr>
<td>----------------------------------------------------------</td>
<td>--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
<td>--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Natural rubber adhesive</td>
<td>Isoprene, terpenes</td>
<td>Formaldehyde, methacrolein, methyl vinyl ketone</td>
</tr>
<tr>
<td>Photocopier toner, printed paper, styrene polymers</td>
<td>Styrene</td>
<td>Formaldehyde, benzaldehyde</td>
</tr>
<tr>
<td>Environmental tobacco smoke</td>
<td>Styrene, acrolein, nicotine</td>
<td>Formaldehyde, benzaldehyde, hexanal, glyoxal, N-methylformamide, nicotinaldehyde, cotinine</td>
</tr>
<tr>
<td>Soiled clothing, fabrics, bedding</td>
<td>Squalene, unsaturated sterols, oleic acid and other saturated fatty acids</td>
<td>Acetone, geranyl acetone, 6MHQ, 40PA, formaldehyde, nonanal, decanal, 9-oxo-nonanoic acid, azelaic acid, nonanoic acid</td>
</tr>
<tr>
<td>Soiled particle filters</td>
<td>Unsaturated fatty acids from plant waxes, leaf litter, and other vegetative debris; soot; diesel particles</td>
<td>Formaldehyde, nonanal, and other aldehydes; azelaic acid; nonanoic acid; 9-oxo-nonanoic acid and other oxo-acids; compounds with mixed functional groups (=O, -OH, and -COOH)</td>
</tr>
<tr>
<td>Ventilation ducts and duct liners</td>
<td>Unsaturated fatty acids and esters, unsaturated oils, neoprene</td>
<td>C5 to C10 aldehydes</td>
</tr>
<tr>
<td>&quot;Urban grime&quot;</td>
<td>Polycyclic aromatic hydrocarbons</td>
<td>Oxidized polycyclic aromatic hydrocarbons</td>
</tr>
<tr>
<td>Perfumes, colognes, essential oils (e.g. lavender, eucalyptus, tea tree)</td>
<td>Limonene, alpha-pinene, linalool, linalyl acetate, terpinene-4-ol, gamma-terpinene</td>
<td>Formaldehyde, 4-AMC, acetone, 4-hydroxy-4-methyl-5-hexen-1-ol, 5-ethenyl-dihydro-5-methyl[2(3H)]furanone, SOAs including ultrafine particles</td>
</tr>
<tr>
<td>Overall home emissions</td>
<td>Limonene, alpha-pinene, styrene</td>
<td>Formaldehyde, 4-AMC, pinonaldehyde, acetone, pinic acid, pinonic acid, formic acid, benzaldehyde, SOAs including ultrafine particles</td>
</tr>
</tbody>
</table>

Abbreviations: 4-AMC, 4-acetyl-1-methylcyclohexene; 6MHQ, 6-methyl-5-heptene-2-one, 40PA, 4-oxopentanal, SOA, Secondary Organic Aerosols
Reference: Charles J Weschler; Environmental Health Perspectives, Vol 114, October 2006.

• DO NOT discharge into sewer or waterways.

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**Section 13 - DISPOSAL CONSIDERATIONS**

Disposal Instructions
All waste must be handled in accordance with local, state and federal regulations.
• 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. Shelf 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.
DO NOT allow wash water from cleaning equipment to enter drains. Collect all wash water for treatment before disposal.
- Recycle wherever possible.
- Consult manufacturer for recycling options or consult Waste Management Authority for disposal if no suitable treatment or disposal facility can be identified.
- Dispose of by: Burial in a licensed land-fill or Incineration in a licensed apparatus (after admixture with suitable combustible material)
- Decontaminate empty containers. Observe all label safeguards until containers are cleaned and destroyed.

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**Section 14 - TRANSPORTATION INFORMATION**

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

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**Section 15 - REGULATORY INFORMATION**

cryptoxanthin (CAS: 472-70-8,24480-38-4) is found on the following regulatory lists;
"Canada - Alberta Occupational Exposure Limits","Canada National Pollutant Release Inventory (NPRI)"
LIMITED EVIDENCE

• Ingestion may produce health damage*.
• Cumulative effects may result following exposure*.
* (limited evidence).

Ingredients with multiple CAS Nos

<table>
<thead>
<tr>
<th>Ingredient Name</th>
<th>CAS</th>
</tr>
</thead>
<tbody>
<tr>
<td>cryptoxanthin</td>
<td>472-70-8, 24480-38-4</td>
</tr>
</tbody>
</table>

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• Classification of the mixture 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. A list of reference resources used to assist the committee may be found at: www.chemwatch.net/references.
• The (M)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.

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Issue Date: Sep-22-2008
Print Date: Jun-23-2010