

CHAPSO

GHS Safety Data Sheet

version 4.0
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Section 1 - CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME

CHAPSO

OTHER NAMES

C32-H58-N2-O7-S, "N, N-dimethyl-N-(3-sulfopropyl)-3-[[3alpha, 5beta, 7alpha, 12alpha)-3, 7, 12-trihydroxy-24-oxocholan-24-yl]amino]-2-hydroxy-1-propanaminium hydroxide inner salt", "N, N-dimethyl-N-(3-sulfopropyl)-3-[[3alpha, 5beta, 7alpha, 12alpha)-3, 7, 12-trihydroxy-24-oxocholan-24-yl]amino]-2-hydroxy-1-propanaminium hydroxide inner salt", "3-[(3-cholamidopropyl)dimethylammonio]-2-hydroxy-1-propanesulfonate sulfobetaine derivative of choline", "3-[(3-cholamidopropyl)dimethylammonio]-2-hydroxy-1-propanesulfonate sulfobetaine derivative of choline", "zwitterionic detergent"

PRODUCT USE

■ Amphoteric surfactants have dual functional groups (both acidic and basic groups) in the same molecule. They are polar substances that have a high solubility in water but a poor solubility in most organic solvents. They are electrically neutral (zwitterions) but carry positive and negative charges on different atoms in an aqueous solution. They exist mostly as zwitterions in a certain pH range but depending on the pH value, the substances can have anionic or cationic properties outside the zwitterionic range. In the presence of acids, they will accept the hydrogen ions but they will donate hydrogen ions to the solution in the presence of bases, which balances the pH. Such actions make buffer solutions which resist change to the pH. Amphoteric surfactants change their charge according to the pH of the solution; this affects properties such as foaming, wetting and detergency through a surface action that exerts both hydrophilic and hydrophobic properties. In biochemistry amphoteric surfactants are used as detergents for purifying, cleansing and for their antimicrobial effects. Alkylbetaines and amino-oxides are typical amphoteric surfactants. Detergent that solubilises membrane proteins, opioid receptors, opsin, rhodopsin and has value in chiral microcolumn liquid chromatography. Does not denature membrane bound proteins. Sulfobetaine zwitterionic derivative of cholic acid.

SUPPLIER

Company: S D FINE - CHEM LIMITED

Address:

315- 317, T.V.IND.ESTATE,

248 WORLI ROAD,

MUMBAI- 400 030, INDIA

technical@sdfine.com

Telephone: 91- 22 24959898

Telephone: 91- 22 24959899

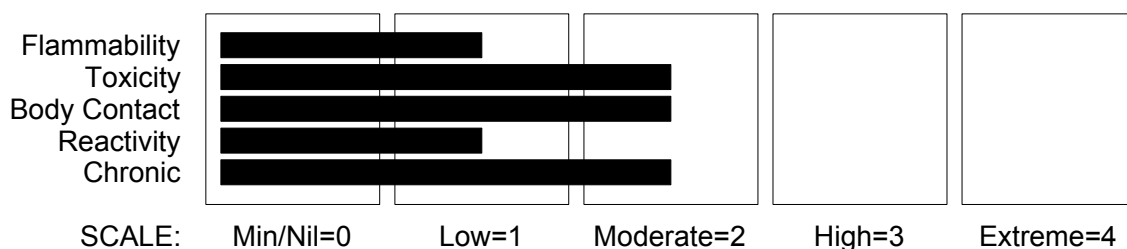
Fax: 91- 22 24937232

Section 2 - HAZARDS IDENTIFICATION

HAZARD RATINGS

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CHAPSO



GHS Classification

Acute Aquatic Hazard Category 2

Eye Irritation Category 2A

Respiratory Irritation Category 3

Skin Corrosion/Irritation Category 2



EMERGENCY OVERVIEW

HAZARD

WARNING

Determined by using GHS criteria:

H335 H315 H319 H401

May cause respiratory irritation

Causes skin irritation

Causes serious eye irritation

Toxic to aquatic life

PRECAUTIONARY STATEMENTS

Prevention

Avoid breathing dust/fume/gas/mist/vapours/spray.

Wash thoroughly after handling.

Use only outdoors or in a well-ventilated area.

Avoid release to the environment.

Wear protective gloves/protective clothing/eye protection/face protection.

Response

IF INHALED: Remove to fresh air and keep at rest in a position comfortable for breathing.

IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.

Call a POISON CENTER or doctor/physician if you feel unwell.

If eye irritation persists: Get medical advice/attention.

Storage

Store in a well-ventilated place. Keep container tightly closed.

Store locked up.

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Section 3 - COMPOSITION / INFORMATION ON INGREDIENTS

NAME	CAS RN	%
CHAPSO	82473-24-3	>98

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 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.
 - Seek medical attention without delay; 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 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.

INHALED

- 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.

NOTES TO PHYSICIAN

- Treat symptomatically.

Section 5 - FIRE FIGHTING MEASURES

EXTINGUISHING MEDIA

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

FIRE FIGHTING

- Alert Fire Brigade and tell them location and nature of hazard.
- Wear breathing apparatus plus protective gloves.

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- 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.

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.
 - 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; - this is because of the inherent difficulty of achieving homogeneous dust clouds at high temperatures (for dusts the LEL is often called the "Minimum Explosible Concentration", MEC)
 - 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 (NO_x), sulfur oxides (SO_x), other pyrolysis products typical of burning organic material.
- May emit poisonous fumes.
- May emit corrosive fumes.

FIRE INCOMPATIBILITY

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

PERSONAL PROTECTION

Glasses:
Chemical goggles.

Respirator:
Particulate

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 Services 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.

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

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.

SUITABLE CONTAINER

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

STORAGE INCOMPATIBILITY

- Avoid strong acids, bases.

- Avoid reaction with oxidising agents.

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



+: May be stored together

O: May be stored together with specific precautions

X: Must not be stored together

Section 8 - EXPOSURE CONTROLS / PERSONAL PROTECTION

EXPOSURE CONTROLS

The following materials had no OELs on our records

- CHAPSO:

CAS:82473- 24- 3

MATERIAL DATA

CHAPSO:

■ 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.

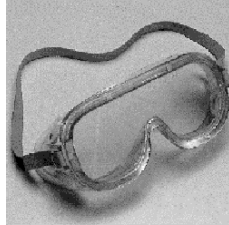
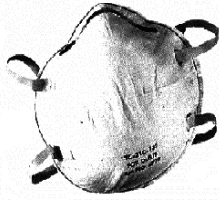
Sensory irritants are chemicals that produce temporary and undesirable side-effects on the eyes, nose or throat. Historically occupational exposure standards for these irritants have been based on observation of workers' responses to various airborne concentrations. Present day expectations require that nearly every individual should be protected against even minor sensory irritation and exposure standards are established using uncertainty factors or safety factors of 5 to 10 or more. On occasion animal no-observable-effect-levels (NOEL) are used to determine these limits where human results are unavailable. An additional approach, typically used by the TLV committee (USA) in determining respiratory standards for this group of chemicals, has been to assign ceiling values (TLV C) to rapidly acting irritants and to assign short-term exposure limits (TLV STELs) when the weight of evidence from irritation, bioaccumulation and other endpoints combine to warrant such a limit. In contrast the MAK Commission (Germany) uses a five-category system based on intensive odour, local irritation, and elimination half-life. However this system is being replaced to be consistent with the European Union (EU) Scientific Committee for Occupational Exposure Limits (SCOEL); this is more closely allied to that of the USA.

OSHA (USA) concluded that exposure to sensory irritants can:

- cause inflammation
- cause increased susceptibility to other irritants and infectious agents
- lead to permanent injury or dysfunction
- permit greater absorption of hazardous substances and
- acclimate the worker to the irritant warning properties of these substances thus increasing the risk of overexposure.

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PERSONAL PROTECTION



EYE

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

HANDS/FEET

■ 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
- fluorocautchouc
- 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 -

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Section 8 - EXPOSURE CONTROLS / PERSONAL PROTECTION

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.

RESPIRATOR

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

* - Negative pressure demand

** - Continuous flow.

The local concentration of material, quantity and conditions of use determine the type of personal protective equipment required. For further information consult your Occupational Health and Safety Advisor.

ENGINEERING CONTROLS

- 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.

Type of Contaminant:

direct spray, spray painting in shallow booths,
drum filling, conveyer loading, crusher dusts,
gas discharge (active generation into zone of
rapid air motion)
grinding, abrasive blasting, tumbling, high
speed wheel generated dusts (released at high
initial velocity into zone of very high rapid
air motion).

Air Speed:

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

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

Within each range the appropriate value depends on:

Lower end of the range

Upper end of the range

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CHAPSO

Section 8 - EXPOSURE CONTROLS / PERSONAL PROTECTION

1: Room air currents minimal or favourable to capture
2: Contaminants of low toxicity or of nuisance value only
3: Intermittent, low production.
4: Large hood or large air mass in motion

1: Disturbing room air currents
2: Contaminants of high toxicity
3: High production, heavy use
4: Small hood- local control only

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

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Section 9 - PHYSICAL AND CHEMICAL PROPERTIES

APPEARANCE

White granular powder; mixes with water.

PHYSICAL PROPERTIES

Solid.

Mixes with water.

State	Divided solid	Molecular Weight	630.89
Melting Range (°C)	184- 186	Viscosity	Not Applicable
Boiling Range (°C)	Not available	Solubility in water (g/L)	Miscible
Flash Point (°C)	Not available	pH (1% solution)	Not available
Decomposition Temp (°C)	Not available	pH (as supplied)	Not applicable
Autoignition Temp (°C)	Not available	Vapour Pressure (kPa)	Negligible
Upper Explosive Limit (%)	Not available.	Specific Gravity (water=1)	Not available
Lower Explosive Limit (%)	Not available	Relative Vapour Density (air=1)	>1
Volatile Component (%vol)	Negligible	Evaporation Rate	Not applicable

Section 10 - CHEMICAL STABILITY AND REACTIVITY INFORMATION

CONDITIONS CONTRIBUTING TO INSTABILITY

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

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

Section 11 - TOXICOLOGICAL INFORMATION

POTENTIAL HEALTH EFFECTS

ACUTE HEALTH EFFECTS

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SWALLOWED

- Accidental ingestion of the material may be damaging to the health of the individual.
- Nausea, vomiting, gastro-intestinal discomfort and diarrhoea have been reported after large doses of choline. Other side effects reported include incontinence or exacerbation of incontinence, depression or exacerbation of depression and an unpleasant fishy odour. [Martindale].

In rare cases, oral ingestion of large amounts of choline up to 20 g/day for 3-4 weeks has been associated with depression. Mild and transient Parkinsonian signs (bradykinesia, tremor, and rigidity) were observed at high doses (12.7 g/day per oral) of choline as a chloride in people with tardive dyskinesia. Mild hepatotoxicity was reported in patients receiving choline magnesium trisalicylate (1,500 mg twice daily for 8 days) and one case of severe hypersensitivity hepatitis after ingestion of choline magnesium trisalicylate. However, it is likely that hepatotoxicity was induced by salicylate rather than by choline. Choline chloride is of very low acute oral toxicity. The oral LD50 in rats was determined to be between 3150 and 5000 mg/kg bw (corrected to 100% choline chloride) in two non-guideline studies. Clinical symptoms after application were restlessness, increased frequency of respiration, hypoactivity, convulsions, ruffled coat, staggered gait and dyspnoea. Some animals had diarrhoea and at necropsy in the high dose groups in one study 3 out of 10 rats had inflamed lungs.

EYE

- This material can cause eye irritation and damage in some persons.

SKIN

- This material can cause inflammation of the skin on contact in some persons.
- The material may accentuate any pre-existing dermatitis condition.
- Skin contact is not thought to have harmful health effects (as classified under EC Directives); the material may still produce health damage following entry through wounds, lesions or abrasions.
- Zwitterionic (amphoteric) surfactants appear to decrease skin barrier function to some extent. It has been suggested that these surfactants (typically betaines and sulfobetaines) may solubilise stratum corneum lipids. Studies confirm that dermal LD50s of certain substances may be reduced in the presence of these surfactants. (Ridout et al; Sciences Vol 16 pp 41-50 - 1990).
- 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 can cause respiratory irritation in some persons. The body's response to such irritation can cause further lung damage.
- 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.

CHRONIC HEALTH EFFECTS

- Long-term exposure to respiratory irritants may result in disease of the airways involving difficult breathing and related systemic problems.

Substance accumulation, in the human body, may occur and may cause some concern following repeated or long-term occupational exposure.

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.

TOXICITY AND IRRITATION

- unless otherwise specified data extracted from RTECS - Register of Toxic Effects of Chemical Substances.
- Asthma-like symptoms may continue for months or even years after exposure to the material ceases. This may be due to a non-allergenic condition known as reactive airways dysfunction syndrome (RADS) which can occur following exposure to high levels of highly irritating compound. Key criteria for the diagnosis of RADS

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include the absence of preceding respiratory disease, in a non-atopic individual, with abrupt onset of persistent asthma-like symptoms within minutes to hours of a documented exposure to the irritant. A reversible airflow pattern, on spirometry, with the presence of moderate to severe bronchial hyperreactivity on methacholine challenge testing and the lack of minimal lymphocytic inflammation, without eosinophilia, have also been included in the criteria for diagnosis of RADS. RADS (or asthma) following an irritating inhalation is an infrequent disorder with rates related to the concentration of and duration of exposure to the irritating substance. Industrial bronchitis, on the other hand, is a disorder that occurs as result of exposure due to high concentrations of irritating substance (often particulate in nature) and is completely reversible after exposure ceases. The disorder is characterised by dyspnea, cough and mucus production. For choline:

In rabbits, choline chloride may lead to a slight irritation of the skin and eye, which is, however, not sufficient to warrant a classification of choline chloride as an irritant under GHS.

No data on sensitization in animals are available. The skin sensitisation potential of choline chloride for humans is regarded as negligible.

Repeated oral administration of 10g/day in patients with Alzheimer's disease produced a slight hypertensive effect, but no other adverse effects; this dose was regarded as a LOAEL;(it is equivalent to 7.5 mg choline per day). The tolerable upper intake level applied for chronic daily use for adults was set at 3.5 g/day.

Inadequate dietary intake decreases choline liver stores and may produce liver abnormalities as indicated by elevated serum alanine aminotransferase levels. As adequate intake for chronic daily use for adult men 550 mg/day of choline is recommended. The adequate intake for adult women is 425 mg/day of choline, during pregnancy 450 mg/day and during lactation 550 mg/day, respectively.

Choline chloride did not produce gene mutations, clastogenicity or DNA damage in in vitro mutagenicity studies; furthermore it has no structural alerts. Choline chloride does not have any genotoxic potential.

In a rat repeated dose study, using a single dose level of approximately 500 mg/kg bw/day given over 72 weeks via feed, with a post-observation period of 30 weeks, no significant effects were observed relative to controls with respect to survival rates, body weights and relative liver weights.

Only limited pathological investigations were carried out at autopsy (gross examination with histological investigation of only the liver and any tissues showing gross abnormalities). No adverse effects were observed.

Prolonged i.p. administration of choline chloride is toxic to the testes and causes damage to the seminiferous tubules. Under the testing protocol employed these lesions were reversible. However, this route of administration is not relevant for assessment of hazard to humans.

Developmental toxic effects have not been observed in the absence of maternal toxicity. Maternal and developmental toxicity started above the lowest dose which was already higher than the limit dose of 1000 mg/kg bw/day (NOAEL Maternal toxicity and developmental toxicity 1250 mg/kg bw/day). At the highest dose tested (20,000 mg/kg bw/day) 100% of the fetuses were resorbed.. No developmental toxic effects were observed in mice after oral doses of 1250 mg/kg bw/day on gestation days 1 to 18. Higher doses, above the levels recommended currently and associated with maternal toxicity, did produce developmental toxic effects, but these were secondary to the maternal toxicity at the excessive doses used. The compound does not produce any significant developmental toxicity in the mouse.

No significant acute toxicological data identified in literature search.

Section 12 - ECOLOGICAL INFORMATION

Refer to data for ingredients, which follows:

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- 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 choline and its salts (typically choline chloride):

Environmental fate:

Choline chloride is a quaternary amine salt, it dissociates in water into the corresponding positively charged quaternary hydroxyl alkylammonium ion and the negatively charged chloride ion. Data using different

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amounts of choline chloride show that the lowest pH value of 4 was determined at 100 mg/L. Even if choline chloride of different specifications was used, choline chloride can be stated to be a weak acid.

Photodegradation: In the air the substance will be rapidly degraded according to the calculated $t_{1/2}$ of about 6.9 hours for OH-radicals using the model AOP v1.90 on the basis of a 12 hours day.

Stability in Water: Choline chloride is a quaternary ammonium salt and dissociates in water. No measured data on the stability of choline chloride in water are available. Hydrolysis at environmental pH conditions is not to be expected due to the chemical structure of choline chloride.

Transport between Environmental Compartments: Releases into the environment may occur during production, further processing and use of choline chloride. Distribution modelling using Mackay Level I V2.11 indicates water to be the main target compartment with 100 % for the pure choline chloride. The amounts of choline chloride in the other compartments air, soil, sediment, suspended sediments, fish and aerosol is negligible ($< 0.0001\%$).

The estimated logKoc using the PCKOCWIN model was 0.37. This indicates that choline chloride will not adsorb on soil and sediments or suspended solids.

The calculated Henry's Law Constant using the HENRYWIN model (bond method) was $2.06 \cdot 10^{-11}$ Pa·m³/mole. This indicates that choline chloride will not rapidly evaporate into the atmosphere.

Biodegradation: Choline chloride was shown to be readily biodegradable according to OECD-criteria (93 % biodegradation within 14 days) in a MITI I-Test (MITI, 1992). The biodegradation was recorded by measuring the BOD. Biodegradation of $>60\%$ in a MITI-I test corresponds to a ready biodegradation. In addition, in a BOD5 test performed according to DIN 38409 part 43 a BOD5/ThOD5 ratio of 75 % obtained, which also confirms a ready biodegradation of choline chloride.

Bioaccumulation: No measured data on bioaccumulation are available. Based on the partition coefficient octanol water (measured logKow = -3.77), and the BCF estimation, $\log BCF = 0.85 \cdot \log Kow - 0.70$ a BCF of 0.59 can be derived and therefore, bioaccumulation is not expected in aquatic organisms. In contrast, using the model BCF v2.14 based on the calculated logKow of -5.155 a BCF of 3.16 can be derived. Both values differ by a factor of 6. Nevertheless, the bioaccumulation potential of choline chloride can be stated to be low.

Ecotoxicity:

Fish LC50 (96 h): *Oryzias latipes* >100 mg/l (nominal and measured, flow through OECD 203); *Leuciscus idus* $>10,000$ mg/l (nominal, static, DIN 38412, part 15); *Limanda limanda* >1000 mg/l (nominal, semistatic, OECD 203)

Daphnia magna EC50 (48 h): >500 mg/l (nominal); NOEC 125 (Directive 79/831 EEC, C2, static)

Algae ErC50 (72 h): *Pseudokirchneriella subcapitata* >1000 mg/l (nominal and measured); NOEC 32 mg/l (growth rate) (OECD 201); *EbC50 Scenedesmus subspicatus* >500 mg/l (nominal); NOEC >500 mg/l (growth rate and biomass) (DIN 38412, part 9, static)

Bacterial EC10 (17 h): *Pseudomonas putida* 113 mg/l; EC50 (17 h): 133 mg/l; EC90 (17 h): 278 mg/l (all nominal) (DIN 38412, part 8 static)

Based on these data choline chloride is considered unlikely to be harmful to aquatic organisms.

NOEC of 30.2 mg/l could also be considered, resulting in a PNECaqua of 3.02 mg/l, which is close to the other value obtained using the acute data.

■ Zwitterionic (amphoteric) substances, such as betaines, sulfobetaines and taurines, may be phytotoxic.

Because they are implicated in the disruption of cell membranes, toxic effects on marine flora and fauna (of secondary nature) may ensue.

■ The primary biodegradability of betaines approaches 100% as, e.g., the loss of surface-activity attained 100% for C12 alkyl betaine, 98% for cocoamidopropyl betaine, and 96 and 100% for C14-15 hydroxysulfobetaine. The results from ultimate biodegradability tests of alkyl betaines show some variation with degradation percentages below and above the pass level for ready biodegradability. However, taken as a whole, both alkyl betaines and cocoalkylamido betaines can be regarded as readily biodegradable. In contrast the hydroxysulfobetaines are probably not readily biodegradable in standard screening tests as indicated by a biodegradability of 40 and 47% of ThOD in the closed bottle test.

The knowledge about the biodegradability of betaines under anoxic conditions is relatively scarce. Literature searches indicates that sulfate-reducing marine bacteria belonging to the genus *Desulfobacterium* are able to grow on betaine with the stoichiometric formation of N,N-dimethylglycine. One study indicated that betaine was anaerobically degraded to methylamine in sewage sludge at a betaine concentration of 2 g/l and a solids concentration of 3.3 g/l. The anaerobic biodegradability of cocoamidopropyl betaine was examined by using the ISO 11734 screening test. Under the methanogenic test conditions, the ultimate biodegradability of cocoamidopropyl betaine attained 45 and 75% of ThGP after 28 and 56 days, respectively, at the applied test concentration of 14.4 mg C/l.

The aquatic toxicity of betaines varies considerably, even within the same species, which is particularly

continued...

evident by evaluating the EC50 values determined for the green alga *Scenedesmus subspicatus*. For this species, the EC50 obtained in tests with cocoamidopropyl betaine are between 0.55 and 48 mg/l. The geometric mean of the EC50 obtained for *S. subspicatus* is 3.1 mg/l, when the values 0.55, 1.84, and 30 mg/l are used. The EC/LC50 of alkyl and cocoamidopropyl betaines towards crustaceans and fish are between 1 and 100 mg/l.

Environmental and Health Assessment of Substances in Household Detergents and Cosmetic Detergent Products, Environment Project, 615, 2001. Torben Madsen et al: Miljoministeriet (Danish Environmental Protection Agency).

■ DO NOT discharge into sewer or waterways.

Section 13 - DISPOSAL CONSIDERATIONS

■ 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 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.
 - Consult manufacturer for recycling options or consult local or regional waste management authority for disposal if no suitable treatment or disposal facility can be identified.
 - Dispose of by: burial in a land-fill specifically licenced to accept chemical and / or pharmaceutical wastes or Incineration in a licenced 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

HAZCHEM:

☐ None

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

Section 15 - REGULATORY INFORMATION

REGULATIONS

No data for CHAPSO (CAS: , 82473-24-3)

Section 16 - OTHER INFORMATION

MSDS SECTION CHANGES

The following table displays the version number of and date on which each section was last changed.

Section Name	Version	Date	Section Name	Version	Date	Section Name	Version	Date
First Aid (eye)	4	2- Jun- 2007	Storage (storage requirement)	4	2- Jun- 2007	Instability Condition	4	2- Jun- 2007
Fire Fighter (extinguishing media)	4	2- Jun- 2007	Storage (suitable container)	4	2- Jun- 2007	Acute Health (eye)	4	2- Jun- 2007
Fire Fighter (fire fighting)	4	2- Jun- 2007	Engineering Control	4	2- Jun- 2007	Acute Health (inhaled)	4	2- Jun- 2007
Fire Fighter (fire incompatibility)	4	2- Jun- 2007	Exposure Standard	4	2- Jun- 2007	Acute Health (skin)	4	2- Jun- 2007
Fire Fighter (fire/explosion hazard)	4	2- Jun- 2007	Personal Protection (eye)	4	2- Jun- 2007	Acute Health (swallowed)	4	2- Jun- 2007
Spills (major)	4	2- Jun- 2007	Personal Protection (hands/feet)	4	2- Jun- 2007	Chronic Health	4	2- Jun- 2007
Spills (minor)	4	2- Jun- 2007	Personal Protection (other)	4	2- Jun- 2007	Environmental	4	2- Jun- 2007
Handling Procedure	4	2- Jun- 2007	Physical Properties	4	2- Jun- 2007	Disposal	4	2- Jun- 2007

■ 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.

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

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