



Potassium O-ethyl carbonodithioate

Apollo Scientific

Chemwatch Hazard Alert Code: 2

Part Number: OR59885

Version No: 2.2

Safety Data Sheet

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S.GHS.GB-NIR.EN

SECTION 1 Identification of the substance / mixture and of the company / undertaking

Product Identifier

Product name	Potassium O-ethyl carbonodithioate
Chemical Name	potassium ethyl xanthate
Synonyms	Not Available
Proper shipping name	XANTHATES
Chemical formula	C3H6OS2.K
Other means of identification	Not Available
CAS number	140-89-6*

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

Relevant identified uses	Not Available
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Details of the manufacturer or supplier of the safety data sheet

Registered company name	Apollo Scientific	Apollo Scientific Ltd
Address	Whitefield Road, Bredbury SK62QR United Kingdom	Whitefield Road, Bredbury Cheshire SK6 2QR United Kingdom (NI)
Telephone	01614060505	+44(0) 161 406 0505
Fax	0161 406 0506	Not Available
Website	http://www.apolloscientific.co.uk/	apolloscientific.co.uk
Email	sales@apolloscientific.co.uk	sales@apolloscientific.co.uk

Emergency telephone number

Association / Organisation	Not Available
Emergency telephone numbers	Not Available
Other emergency telephone numbers	Not Available

SECTION 2 Hazards identification

Classification of the substance or mixture

Classification according to regulation (EC) No 1272/2008 [CLP] and	H252 - Self-Heating Substances and Mixtures Category 2, H332 - Acute Toxicity (Inhalation) Category 4, H335 - Specific Target Organ Toxicity - Single Exposure (Respiratory Tract Irritation) Category 3, H302 - Acute Toxicity (Oral) Category 4, H315 - Skin Corrosion/Irritation Category 2, H319 - Serious Eye Damage/Eye Irritation Category 2, H410 - Hazardous to the Aquatic
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Potassium O-ethyl carbonodithioate

amendments ^[1]	Environment Long-Term Hazard Category 1, H228 - Flammable Solids Category 2
Legend:	1. Classified by Chemwatch; 2. Classification drawn from Regulation (EU) No 1272/2008 - Annex VI

Label elements

Hazard pictogram(s)	
Signal word	Warning

Hazard statement(s)

H252	Self-heating in large quantities; may catch fire.
H332	Harmful if inhaled.
H335	May cause respiratory irritation.
H302	Harmful if swallowed.
H315	Causes skin irritation.
H319	Causes serious eye irritation.
H410	Very toxic to aquatic life with long lasting effects.
H228	Flammable solid.

Precautionary statement(s) Prevention

P210	Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking.
P235	Keep cool.
P271	Use only outdoors or in a well-ventilated area.
P240	Ground and bond container and receiving equipment.
P241	Use explosion-proof electrical/ventilating/lighting/intrinsically safe equipment.
P261	Avoid breathing dust/fumes.
P264	Wash all exposed external body areas thoroughly after handling.
P270	Do not eat, drink or smoke when using this product.
P273	Avoid release to the environment.
P280	Wear protective gloves, protective clothing, eye protection and face protection.

Precautionary statement(s) Response

P370+P378	In case of fire: Use alcohol resistant foam or normal protein foam to extinguish.
P305+P351+P338	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P337+P313	If eye irritation persists: Get medical advice/attention.
P391	Collect spillage.
P301+P312	IF SWALLOWED: Call a POISON CENTER/doctor/physician/first aider if you feel unwell.
P302+P352	IF ON SKIN: Wash with plenty of water.
P304+P340	IF INHALED: Remove person to fresh air and keep comfortable for breathing.
P330	Rinse mouth.
P332+P313	If skin irritation occurs: Get medical advice/attention.
P362+P364	Take off contaminated clothing and wash it before reuse.

Precautionary statement(s) Storage

P405	Store locked up.
P407	Maintain air gap between stacks or pallets.
P410	Protect from sunlight.
P403+P233	Store in a well-ventilated place. Keep container tightly closed.
P413	Store bulk masses greater than ... kg/...lbs at temperatures not exceeding ...°C/...°F.
P420	Store separately.

Potassium O-ethyl carbonodithioate

Precautionary statement(s) Disposal

P501	Dispose of contents/container to authorised hazardous or special waste collection point in accordance with any local regulation.
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SECTION 3 Composition / information on ingredients

Substances

CAS No	%[weight]	Name	Classification according to regulation (EC) No 1272/2008 [CLP] and amendments	SCL / M-Factor
140-89-6*	100	<u>Potassium O-ethyl carbonodithioate</u>	Self-Heating Substances and Mixtures Category 2, Acute Toxicity (Inhalation) Category 4, Specific Target Organ Toxicity - Single Exposure (Respiratory Tract Irritation) Category 3 , Acute Toxicity (Oral) Category 4, Skin Corrosion/Irritation Category 2, Serious Eye Damage/Eye Irritation Category 2, Hazardous to the Aquatic Environment Long-Term Hazard Category 1, Flammable Solids Category 2; H252, H332, H335, H302, H315, H319, H410, H228, EUH029 ^[1]	Not Available

Legend: 1. Classified by Chemwatch; 2. Classification drawn from Regulation (EU) No 1272/2008 - Annex VI; 3. Classification drawn from C&L; * EU IOELVs available; [e] Substance identified as having endocrine disrupting properties

Mixtures

See section above for composition of Substances

SECTION 4 First aid measures

Description of first aid measures

Eye Contact	<ul style="list-style-type: none"> ▶ If in eyes, hold eyelids apart and flush the eye continuously with running water. ▶ Continue flushing until advised to stop by the Poisons Information Centre or a doctor, or for at least 15 minutes. ▶ 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. <p>For THERMAL burns:</p> <ul style="list-style-type: none"> ▶ Do NOT remove contact lens ▶ Lay victim down, on stretcher if available and pad BOTH eyes, make sure dressing does not press on the injured eye by placing thick pads under dressing, above and below the eye. ▶ Seek urgent medical assistance, or transport to hospital.
Skin Contact	<p>If skin or hair contact occurs:</p> <ul style="list-style-type: none"> ▶ Immediately flush body and clothes with large amounts of water, using safety shower if available. ▶ Quickly remove all contaminated clothing, including footwear. ▶ Wash skin and hair with running water. Continue flushing with water until advised to stop by the Poisons Information Centre. ▶ Transport to hospital, or doctor. <p>In case of burns:</p> <ul style="list-style-type: none"> ▶ Immediately apply cold water to burn either by immersion or wrapping with saturated clean cloth. ▶ DO NOT remove or cut away clothing over burnt areas. DO NOT pull away clothing which has adhered to the skin as this can cause further injury. ▶ DO NOT break blister or remove solidified material. ▶ Quickly cover wound with dressing or clean cloth to help prevent infection and to ease pain. ▶ For large burns, sheets, towels or pillow slips are ideal; leave holes for eyes, nose and mouth. ▶ DO NOT apply ointments, oils, butter, etc. to a burn under any circumstances. ▶ Water may be given in small quantities if the person is conscious. ▶ Alcohol is not to be given under any circumstances. ▶ Reassure. ▶ Treat for shock by keeping the person warm and in a lying position. ▶ Seek medical aid and advise medical personnel in advance of the cause and extent of the injury and the estimated time of arrival of the patient.
Inhalation	<ul style="list-style-type: none"> ▶ If fumes, aerosols or combustion products are inhaled remove from contaminated area. ▶ Other measures are usually unnecessary.
Ingestion	<ul style="list-style-type: none"> ▶ Immediately give a glass of water. ▶ First aid is not generally required. If in doubt, contact a Poisons Information Centre or a doctor.

Indication of any immediate medical attention and special treatment needed

Treat symptomatically.

Potassium O-ethyl carbonodithioate

- ▶ Carbon disulfide intoxication results in severe debilitating CNS symptoms (irritability, mania, hallucinations, tremors, memory loss).
- ▶ Chronic industrial exposures may cause neuropsychiatric changes, peripheral neuropathies and accelerated atherogenic changes.
- ▶ Peak blood concentrations appear 2 hours after inhalation. Plasma elimination half-life is about 1 hour. Metabolic products seen in urine include thiourea, 2-mercapto-2-thiazolin-5-one and 2-thiothiazolidine-4-carboxylic acid (TTCA). The iodine-azide test identifies these.
- ▶ Initial management of severe inhalation poisoning requires careful attention to airway, breathing and circulation. Treatment involves symptomatic care.

BIOLOGICAL EXPOSURE INDEX - BEI

These represent the determinants observed in specimens collected from a healthy worker exposed at the Exposure Standard (ES or TLV):

Determinant	Index	Sampling Time	Comments
2-Thiothiazolidine-4-carboxylic acid (TTCA) in urine	5mg/gm creatinine	End of shift	

SECTION 5 Firefighting measures**Extinguishing media**

For **SMALL FIRES**:

- ▶ Dry chemical, CO₂, water spray or foam.

For **LARGE FIRES**:

- ▶ Foam, fog or water spray
- ▶ **DO NOT** use water jets.

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
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Advice for firefighters

Fire Fighting	<ul style="list-style-type: none"> ▶ Wear SCBA and fully-encapsulating, gas-tight suits when handling these substances. ▶ Always wear thermal protective clothing when handling molten substances. ▶ Structural fire fighter's uniform will only provide limited protection. ▶ Alert Fire Brigade and tell them location and nature of hazard. ▶ Wear full body protective clothing with breathing apparatus. ▶ Prevent, by any means available, spillage from entering drains or water course. ▶ Consider evacuation (or protect in place). ▶ Fight fire from a safe distance, with adequate cover. ▶ If safe, switch off electrical equipment until vapour fire hazard removed. ▶ Use water delivered as a fine spray to control fire and cool adjacent area. ▶ Avoid spraying water onto liquid pools. ▶ 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	<ul style="list-style-type: none"> ▶ May ignite on contact with air leading to spontaneous combustion ▶ May decompose explosively when heated or involved in fire. ▶ May REIGNITE after fire is extinguished. ▶ Gases generated in fire may be poisonous, corrosive or irritating. ▶ Containers may explode on heating. ▶ Runoff may create multiple fire or explosion hazard. <p>Xanthates present of significant hazard when exposed to heat or flame. Heat produces decomposition resulting in the release of highly flammable and toxic carbon disulfide, hydrogen sulfide, carbonyl sulfide, the corresponding alkyl alcohol and a sulfide salt.</p>

SECTION 6 Accidental release measures**Personal precautions, protective equipment and emergency procedures**

See section 8

Environmental precautions

See section 12

Methods and material for containment and cleaning up

Minor Spills	<ul style="list-style-type: none"> ▶ Eliminate all ignition sources. ▶ Cover with WET earth, sand or other non-combustible material. ▶ Use clean, non-sparking tools to collect absorbed material ▶ Wear gloves and safety glasses as appropriate.
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Potassium O-ethyl carbonodithioate

Major Spills	<ul style="list-style-type: none"> ▶ Clear area of personnel and move upwind. ▶ Alert Fire Brigade and tell them location and nature of hazard. ▶ Eliminate all ignition sources (no smoking, flares, sparks or flames) ▶ Stop leak if safe to do so; prevent entry into waterways, drains or confined spaces. ▶ May be violently or explosively reactive. ▶ DO NOT walk through spilled material. ▶ DO NOT touch damaged containers or spilled material unless wearing appropriate protective clothing. ▶ Cover with WET earth, sand or other non-combustible material. ▶ Use clean, non-sparking tools to collect absorbed material and place into loosely-covered metal or plastic containers ready for disposal. ▶ Alternately, the spill may be contained using WET earth, sand, or vermiculite and then covered with a high boiling point mineral oil. ▶ Recover the liquid using non-sparking appliances and place in labelled, sealable container. ▶ Water spray may be used to knock down vapours or divert vapour clouds. ▶ Wash area with water and dike for later disposal; ▶ After clean up operations, decontaminate and launder all protective clothing and equipment before storing and re-using. ▶ If contamination of drains or waterways occurs, advise emergency services.
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Personal Protective Equipment advice is contained in Section 8 of the SDS.

SECTION 7 Handling and storage

Precautions for safe handling

Safe handling	<ul style="list-style-type: none"> ▶ For large scale or continuous use, spark-free, earthed ventilation system venting directly to the outside and separate from usual ventilation systems ▶ Provide dust collectors with explosion vents. ▶ Avoid all personal contact, including inhalation. ▶ Wear protective clothing when risk of overexposure occurs. ▶ Use in a well-ventilated area. ▶ Avoid smoking, naked lights or ignition sources. ▶ 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 and before re-use ▶ Use good occupational work practice. ▶ Observe manufacturer's storage and handling recommendations contained within this SDS. ▶ Atmosphere should be regularly checked against established exposure standards to ensure safe working conditions are maintained. <p>NOTE: The material may remove oxygen from the air thus producing a severe hazard to workers inside enclosed or confined spaces where the material might accumulate. Before entry to such areas, sampling and test procedures for low oxygen levels should be undertaken; control conditions should be established to ensure the availability of adequate oxygen supply.</p>
Other information	<ul style="list-style-type: none"> ▶ Store under an inert gas, e.g. argon or nitrogen. <p>FOR MINOR QUANTITIES:</p> <ul style="list-style-type: none"> ▶ Store in an indoor fireproof cabinet or in a room of noncombustible construction. ▶ Provide adequate portable fire-extinguishers in or near the storage area. <p>FOR PACKAGE STORAGE:</p> <ul style="list-style-type: none"> ▶ Store in original containers in approved flame-proof area. ▶ No smoking, naked lights, heat or ignition sources. ▶ DO NOT store in pits, depressions, basements or areas where vapours may be trapped. ▶ Keep containers securely sealed. ▶ Store away from incompatible materials in a cool, dry, well ventilated area. ▶ Protect containers against physical damage and check regularly for leaks. ▶ Protect containers from exposure to weather and from direct sunlight unless: (a) the packages are of metal or plastic construction; (b) the packages are securely closed are not opened for any purpose while in the area where they are stored and (c) adequate precautions are taken to ensure that rain water, which might become contaminated by the dangerous goods, is collected and disposed of safely. ▶ Ensure proper stock-control measures are maintained to prevent prolonged storage of dangerous goods. ▶ Observe manufacturer's storage and handling recommendations contained within this SDS. ▶ Bulk xanthate storages should be blanketed with nitrogen and equipped with absorptive type breather valve(s) to prevent vapour emission. ▶ WARNING: Gradual decomposition in strong, sealed containers may lead to gradual but significant buildup of pressure and subsequent explosion.

Conditions for safe storage, including any incompatibilities

Suitable container	For low viscosity materials and solids:
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Potassium O-ethyl carbonodithioate

Drums and jerricans must be of the non-removable head type.
Where a can is to be used as an inner package, the can must have a screwed enclosure.
For materials with a viscosity of at least 2680 cSt. (23 deg. C):

- Removable head packaging and
- cans with friction closures may be used.

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Where combination packages are used, there must be sufficient inert absorbent material to absorb completely any leakage that may occur, unless the outer packaging is a close fitting moulded plastic box and the substances are not incompatible with the plastic.

All combination packages for Packing group I and II must contain cushioning material.

- Xanthate in pellet or powder form may be supplied in 110, 120 kg steel drums with an inner polyethylene liner. The inner lining is tied off while the drum lids are secured by ring clamps. The quality of the packaging of the chemical varies from batch to batch. It is imperative that quality control standards are imposed before shipment of such containers - exposure to the environment may introduce significant risks
- Xanthates may be stored and transported in certain composite Intermediate Bulk Carriers (IBCs), subject to the approval of a competent Authority
- Bulk packaging of xanthates, in plastic bulker bags containing 500, 700 kg, is common. The packaging consists of a polyethylene inner bag containing the xanthate enclosed in an outer hessian bag. The inner bag is manually tied. The hessian bag is a support for the inner bag and has lifting straps for transport. The hessian bag is not sealed. Difficulties in subsequent handling and exposure of the xanthate to the environment make this mode of packaging potentially hazardous
- Some bulker bags have been modified to include a double lined inner plastic bag enclosed in an outer polyethylene bag and the inner bag is heat sealed.

Storage incompatibility

- Avoid reaction with oxidising agents
- Xanthate derivatives are hazardous as dusts, forming explosive suspensions in air.
- The lower alkyl salts are explosive in the solid state when dry.
- Diazonium salts of the xanthates are explosive and sensitive to shock, heat and radiation.

BREITHERICK L.: Handbook of Reactive Chemical Hazards

- Xanthates should not be stored with oxidisers, combustible materials, acids, phosgene or sulfur chlorides.
- Contact with acids or oxidising material may cause fire and explosion due to very rapid decomposition.
- Contact with water and the salts of alkyl xanthates, produces the corresponding alkyl alcohol, a carbonate salt, trithiocarbonate and toxic, highly flammable carbon disulfide.
- Solid forms should be kept away from water and heat sources.
- A combination of water and hot weather can cause the material to spontaneously ignite. One of the factors involved in the formation of carbon disulfide is the moisture content of the product. Sodium ethyl xanthate powder and pellets, for example, contain up to 7% moisture. Damage to the packaging or inadequate packaging can lead to absorption of additional moisture and release of carbon disulfide. Defective packaging has resulted in damage to the drums and the lids working loose during transport. Bulker bags are more prone to puncture during transport and also during filling of the bags at the manufacturing site. In addition, both drum liners and inner bulker bags are usually manually tied and not sealed.
- Another significant risk during transport and storage is the potential of spontaneous combustion. Spontaneous combustion depends on the heat of the reaction involved, moisture content, ambient temperature and the size of the packaging. The larger the packaging size is the greater the risk of spontaneous combustion, hence bulker bags present a greater risk than steel drums. The risk is also increased due to the conditions in which the xanthate is stored. High temperatures in the holds of ships and storage areas on mining sites in hotter climates can lead to increased release of carbon disulfide.
- Decomposition of xanthate solutions is accelerated by the presence of metal salts, such as copper, iron, lead and zinc. Metal salts are often present in flotation tanks when xanthates are used.
- The rate of decomposition, in solution, decreases with the age of the solution. Decomposition is greatest during the first hour and then the rate decreases. The decrease in the rate of decomposition is due to the accumulation of reaction products which inhibit further decomposition. At mining sites, xanthate solutions are generally stored for one day.

Carbon disulfide:

- may decompose explosively when subject to shock, friction or concussion
- may ignite spontaneously on contact with air, or with hot surfaces releasing toxic and flammable hydrogen sulfide gas
- vapours may be ignited by contact with an ordinary light bulb, a warm steam pipe or a hot exhaust pipe
- the vapour or liquid may ignite in contact with hot steam pipes, particularly if rusted
- may release hydrogen sulfide on contact with acids or acid fumes
- contact with metal oxides may lower ignition point
- reacts with zinc with incandescence
- is incompatible with chemically active metals (sodium, potassium, aluminium, magnesium)
- ignites or reacts violently with alkali metals, strong oxidisers, reducing agents, including hydrides, nitrides and sulfides, alkali metals, nitrogen oxide
- vapour may cause ignition or explosion of finely divided aluminium, dichlorine oxide, fluorine, chlorine, phosphorus oxychloride
- mixtures with potassium-sodium alloy, potassium, sodium or lithium are capable of detonation by shock (the explosive power decreases in that order), though not by heating
- explosively reacts with azides, active metals, metal oxides, metal azides, amines, imines, halogens, nitrogen oxides, permanganates and sulfuric acid.
- aqueous solutions with metal azides produce metal azodithioformates, most of which are explosive with varying degrees of power and sensitivity to shock or heat
- forms impact-sensitive explosive with potassium azide
- is incompatible with aliphatic amines, alkanolamines, carbon monoxide, chlorine monoxide, ethylene, diamine, ethyleneimine, halogens, organic amines
- attacks some forms of plastic, rubber and coatings

Potassium O-ethyl carbonodithioate

- flow or agitation may generate electrostatic charges
- Light sensitive
- Moisture sensitive
- Store under argon

SECTION 8 Exposure controls / personal protection

Control parameters

Occupational Exposure Limits (OEL)

INGREDIENT DATA

Not Available

Emergency Limits

Ingredient	TEEL-1	TEEL-2	TEEL-3
Potassium O-ethyl carbonodithioate	Not Available	Not Available	Not Available

Ingredient	Original IDLH	Revised IDLH
Potassium O-ethyl carbonodithioate	Not Available	Not Available

Occupational Exposure Banding

Ingredient	Occupational Exposure Band Rating	Occupational Exposure Band Limit
Potassium O-ethyl carbonodithioate	E	≤ 0.01 mg/m ³

Notes: Occupational exposure banding is a process of assigning chemicals into specific categories or bands based on a chemical's potency and the adverse health outcomes associated with exposure. The output of this process is an occupational exposure band (OEB), which corresponds to a range of exposure concentrations that are expected to protect worker health.

Exposure controls

<p>Appropriate engineering controls</p>	<p>Engineering controls which have been generally implemented at mining sites include:</p> <ul style="list-style-type: none"> ▸ enclosure and automation of the transfer and mixing process; ▸ enclosure of the cabin of the fork-lift or crane used for drum tipping; ▸ extraction ventilation systems above the area where drum contents are discharged into the mixing tank; ▸ local exhaust ventilation system with a water scrubber system above the mixing tank to absorb dust and gases or exhaust vents to the atmosphere via a short stack; ▸ bunding the area around the mixing tank so as to contain 100% of the tank volume; ▸ remote controlled dosing pumps; ▸ good general ventilation of the plant; and storage of solid sodium ethyl xanthate in well ventilated areas. <p>The engineering controls vary at the different mine sites and all the listed controls are not present at all the sites. 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.</p> <p>The basic types of engineering controls are:</p> <p>Process controls which involve changing the way a job activity or process is done to reduce the risk.</p> <p>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.</p> <ul style="list-style-type: none"> ▸ 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: <ul style="list-style-type: none"> (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. <p>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.</p>		
	<table border="1" style="width: 100%;"> <tr> <td style="width: 80%;">Type of Contaminant:</td> <td style="width: 20%;">Air Speed:</td> </tr> </table>	Type of Contaminant:	Air Speed:
Type of Contaminant:	Air Speed:		

Potassium O-ethyl carbonodithioate

direct spray, spray painting in shallow booths, drum filling, conveyer loading, crusher dusts, gas discharge (active generation into zone of rapid air motion)	1-2.5 m/s (200-500 ft/min)
grinding, abrasive blasting, tumbling, high speed wheel generated dusts (released at high initial velocity into zone of very high rapid air motion).	2.5-10 m/s (500-2000 ft/min)

Within each range the appropriate value depends on:

Lower end of the range	Upper end of the range
1: Room air currents minimal or favourable to capture	1: Disturbing room air currents
2: Contaminants of low toxicity or of nuisance value only	2: Contaminants of high toxicity
3: Intermittent, low production.	3: High production, heavy use
4: Large hood or large air mass in motion	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 ft/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.

Individual protection measures, such as personal protective equipment



Eye and face protection

- ▶ Safety glasses with side shields.
- ▶ Chemical goggles. [AS/NZS 1337.1, EN166 or national equivalent]
- ▶ Contact lenses may pose a special hazard; soft contact lenses may absorb and concentrate irritants. A written policy document, describing the wearing of lenses or restrictions on use, should be created for each workplace or task. This should include a review of lens absorption and adsorption for the class of chemicals in use and an account of injury experience. Medical and first-aid personnel should be trained in their removal and suitable equipment should be readily available. In the event of chemical exposure, begin eye irrigation immediately and remove contact lens as soon as practicable. Lens should be removed at the first signs of eye redness or irritation - lens should be removed in a clean environment only after workers have washed hands thoroughly. [CDC NIOSH Current Intelligence Bulletin 59].

Skin protection

See Hand protection below

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 moisturiser 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
- dexterity

Select gloves tested to a relevant standard (e.g. Europe EN 374, US F739, AS/NZS 2161.1 or national equivalent).

- 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, AS/NZS 2161.10.1 or national equivalent) 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, AS/NZS 2161.10.1 or national equivalent) is recommended.

· Some glove polymer types are less affected by movement and this should be taken into account when considering gloves for long-term use.

· Contaminated gloves should be replaced.

As defined in ASTM F-739-96 in any application, gloves are rated as:

- Excellent when breakthrough time > 480 min
- Good when breakthrough time > 20 min
- Fair when breakthrough time < 20 min
- Poor when glove material degrades

For general applications, gloves with a thickness typically greater than 0.35 mm, are recommended.

It should be emphasised that glove thickness is not necessarily a good predictor of glove resistance to a specific chemical, as the permeation efficiency of the glove will be dependent on the exact composition of the glove material. Therefore, glove selection should also be based on consideration of the task requirements and knowledge of breakthrough times.

Glove thickness may also vary depending on the glove manufacturer, the glove type and the glove model. Therefore, the manufacturers technical data should always be taken into account to ensure selection of the most appropriate glove for the task.

Note: Depending on the activity being conducted, gloves of varying thickness may be required for specific tasks. For example:

- Thinner gloves (down to 0.1 mm or less) may be required where a high degree of manual dexterity is needed. However, these

Potassium O-ethyl carbonodithioate

	<p>gloves are only likely to give short duration protection and would normally be just for single use applications, then disposed of.</p> <ul style="list-style-type: none"> Thicker gloves (up to 3 mm or more) may be required where there is a mechanical (as well as a chemical) risk i.e. where there is abrasion or puncture potential <p>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.</p> <ul style="list-style-type: none"> Fire resistant/ heat resistant gloves where practical, otherwise Heavy-duty chemically resistant gloves capable of providing short-term protection against spontaneous ignition.
Body protection	See Other protection below
Other protection	<p>Wear protective clothing appropriate for the work situation.</p> <p>For large scale or continuous use, when handling dry powder, wear :</p> <ul style="list-style-type: none"> tight-weave, non-static, noncombustible or flameproof clothing without cuffs, metallic fasteners, pockets, or laps in which powder may collect. non-sparking safety or conductive footwear. Conductive footwear describes a boot or shoe with a sole made from a conductive compound chemically bound to the bottom components, for permanent control to electrically ground the foot and shall dissipate static electricity from the body to reduce the possibility of ignition of volatile compounds. Electrical resistance must range between 0 to 500,000 ohms. Conductive shoes should be stored in lockers close to the room in which they are worn. Personnel who have been issued conductive footwear should not wear them from their place of work to their homes and return.

Respiratory protection

Type -P Filter of sufficient capacity. (AS/NZS 1716 & 1715, EN 143:2000 & 149:2001, ANSI Z88 or national equivalent)

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

* - Negative pressure demand ** - Continuous flow

A(All classes) = Organic vapours, B AUS or B1 = Acid gasses, B2 = Acid gas or hydrogen cyanide(HCN), B3 = Acid gas or hydrogen cyanide(HCN), E = Sulfur dioxide(SO₂), G = Agricultural chemicals, K = Ammonia(NH₃), Hg = Mercury, NO = Oxides of nitrogen, MB = Methyl bromide, AX = Low boiling point organic compounds(below 65 degC)

- 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 protection. 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.
- Where protection from nuisance levels of dusts are desired, use type N95 (US) or type P1 (EN143) dust masks. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU)
- Use approved positive flow mask if significant quantities of dust becomes airborne.
- Try to avoid creating dust conditions.

SECTION 9 Physical and chemical properties

Information on basic physical and chemical properties

Appearance	Material is hygroscopic, absorbs moisture from surrounding air.		
Physical state	Solid	Relative density (Water = 1)	Not Available
Odour	Not Available	Partition coefficient n-octanol / water	Not Available
Odour threshold	Not Available	Auto-ignition temperature (°C)	Not Available
pH (as supplied)	Not Available	Decomposition temperature (°C)	Not Available
Melting point / freezing point (°C)	210	Viscosity (cSt)	Not Available

Potassium O-ethyl carbonodithioate

Initial boiling point and boiling range (°C)	Not Available	Molecular weight (g/mol)	Not Available
Flash point (°C)	Not Available	Taste	Not Available
Evaporation rate	Not Available	Explosive properties	Not Available
Flammability	Not Available	Oxidising properties	Not Available
Upper Explosive Limit (%)	Not Available	Surface Tension (dyn/cm or mN/m)	Not Applicable
Lower Explosive Limit (%)	Not Available	Volatile Component (%vol)	Not Available
Vapour pressure (kPa)	Not Available	Gas group	Not Available
Solubility in water	Not Available	pH as a solution (1%)	Not Available
Vapour density (Air = 1)	Not Available	VOC g/L	Not Available

SECTION 10 Stability and reactivity

Reactivity	See section 7
Chemical stability	<ul style="list-style-type: none"> ▸ May heat spontaneously ▸ Identify and remove sources of ignition and heating. ▸ Incompatible material, especially oxidisers, and/or other sources of oxygen may produce unstable product(s). ▸ Hazardous polymerization will not occur.
Possibility of hazardous reactions	See section 7
Conditions to avoid	See section 7
Incompatible materials	See section 7
Hazardous decomposition products	See section 5

SECTION 11 Toxicological information

Information on toxicological effects

Inhaled	<p>The material can cause respiratory irritation in some persons. The body's response to such irritation can cause further lung damage.</p> <p>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.</p> <p>Acute inhalation of carbon disulfide produces rapid onset of both local irritation and central nervous system symptoms, ranging from inflammation of the pharynx, nausea, vomiting, dizziness, fatigue, headache, mood changes, lethargy and blurred vision, to agitations, uncontrollable anger, suicidal tendencies, delirium, hallucinations, convulsions, coma, and death.</p>
Ingestion	<p>The material has NOT been classified by EC Directives or other classification systems as "harmful by ingestion". This is because of the lack of corroborating animal or human evidence.</p> <p>Ingestion of small amounts of carbon disulfide may result in headache, nausea, dizziness, abdominal pain, vomiting, diarrhoea, burns to the mouth and oesophagus, numbness of the limbs, shortness of breath, dizziness, intermittent tremor, hyperactive tendon reflexes, sensitivity to pain, irregular heart beat, hallucinations, prostration, peripheral vascular collapse, hypothermia, cyanosis, dilated pupils, convulsions, coma, and death within a few hours from paralysis of breathing. Non-fatal exposures may produce delayed effects, include motor agitation, disorientation, psychic disturbances, sleepiness, delirium, loss of reflexes, dilated pupils and permanent damage to the peripheral nervous system.</p>
Skin Contact	<p>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.</p> <p>Concentrated solutions of carbon disulfide may cause skin pain, redness, and sloughing. Second or third degree burns can occur after only a few minutes of contact.</p>
Eye	This material can cause eye irritation and damage in some persons.
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.

Potassium O-ethyl carbonodithioate

Long-term exposure to carbon disulfide (CS₂) may cause serious damage to the central nervous system (degeneration of the peripheral nerves), vision problems, liver and kidney damage, anaemia, fatigue and debility. Other symptoms of chronic exposure include insomnia, nightmares, memory deficits and impotence.

Exposure for four hours daily at a concentration of 150 ppm will cause chronic intoxication within months; at 100-150ppm, within a year or more, while 50-100ppm occasionally causes chronic intoxication.

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

Acute Toxicity	✓	Carcinogenicity	✗
Skin Irritation/Corrosion	✓	Reproductivity	✗
Serious Eye Damage/Irritation	✓	STOT - Single Exposure	✓
Respiratory or Skin sensitisation	✗	STOT - Repeated Exposure	✗
Mutagenicity	✗	Aspiration Hazard	✗

Legend: ✗ – Data either not available or does not fill the criteria for classification
 ✓ – Data available to make classification

SECTION 12 Ecological information

Toxicity

Legend: Extracted from 1. IUCLID Toxicity Data 2. Europe ECHA Registered Substances - Ecotoxicological Information - 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

Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

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.

Environmental Fate: Xanthates, when released in water, may persist for several days and slowly hydrolyzes under neutral condition. Xanthates are unstable compounds that produce by-products that are highly toxic to aquatic organisms.

Ecotoxicity: Toxicity tests conducted on various aquatic fauna show that xanthates exhibits high toxicity to aquatic organisms, but other xanthates are practically non-toxic.

for carbon disulfide:

log Kow : 1.70-4.16

Koc : 63

Henry's atm m³ /mol: 0.0014

Bioaccumulation : not sig

BCF : 7-9

Environmental Fate:

Releases of carbon disulfide (CS₂) to the environment as a result of industrial activity are expected to be primarily to the atmosphere. Any carbon disulfide released to surface waters in effluent streams is expected to partition rapidly to the atmosphere. Hydrolysis is not a significant removal mechanism since the evaporation half-life from a saturated solution is estimated to be 11 minutes. CS₂ is stable to hydrolysis in the pH region of environmental concern (pH 4-10). At pH 13, CS₂ has a hydrolysis half-life at of about 1 hour at 25 deg C; by extrapolation, at pH 9, CS₂ has a half-life of 1.1 years. In oxygenated seawater, CS₂ was found to be stable for over 10 days.

CS₂ is not expected to be removed significantly from the aquatic phase through adsorption. CS₂ is likely to be highly mobile in soil, but will be less mobile in soils with a high organic content.

CS₂ released to soils in spills should rapidly volatilise to the atmosphere, but a portion of the compound remaining on soil surfaces could be transported into groundwater since it does not have much affinity for soil particles. CS₂ will not significantly bioaccumulate in aquatic organisms.

CS₂ reacts with hydroxyl radicals in the troposphere to produce carbonyl sulfide. The lifetime of CS₂ in the troposphere is expected to be around 73 days (uncertain); other estimates (assuming different reaction rate constants) range from less than 1 week to more than 10 weeks. The photo-oxidation products of carbon disulfide in the laboratory were identified as carbon monoxide, carbonyl sulfide, sulfur dioxide, and a polymer that adhered to the sides of the reaction vessel. Direct photolysis of CS₂ in the atmosphere does not appear to be significant. Available information indicates that CS₂ is relatively persistent in the atmosphere. For the atmospheric oxidation of CS₂ to sulfur dioxide, carbonyl sulfide, and carbon monoxide, the half-life was estimated to be about 12 days. This is too short a time to reach the stratosphere. Removal was suggested to occur by a hydroxyl radical reaction, or an oxygen atom reaction but not by dissociation.

Ecotoxicity:

Carbon disulfide has moderate acute toxicity to aquatic organisms; acute toxicity values range between >1 mg/l and 100 mg/l.

Fish LC50 (96 h): Poecilia reticulata (guppy) 3-5.8 mg/l; Alburnus 45.0-94.0 mg/l; Gambusia affinis (mosquito-fish) 135 mg/l Daphnia magna (water flea) LC50 (48 h): 1.9-2.2 mg/l .

Algae EC50 (96 h): Chlorella pyrenoidosa 21.0 mg/l (growth)

Persistence and degradability

Ingredient	Persistence: Water/Soil	Persistence: Air
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Potassium O-ethyl carbonodithioate

Ingredient	Persistence: Water/Soil	Persistence: Air
Potassium O-ethyl carbonodithioate	HIGH	HIGH

Bioaccumulative potential

Ingredient	Bioaccumulation
Potassium O-ethyl carbonodithioate	LOW (LogKOW = 0.8673)

Mobility in soil

Ingredient	Mobility
Potassium O-ethyl carbonodithioate	HIGH (KOC = 1)



SECTION 13 Disposal considerations

Waste treatment methods

Product / Packaging disposal	<ul style="list-style-type: none"> ▶ 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 licensed to accept chemical and / or pharmaceutical wastes 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 Transport information

Labels Required

	
Marine Pollutant	

Land transport (ADR-RID)

UN number or ID number	3342	
UN proper shipping name	XANTHATES	
Transport hazard class(es)	Class	4.2
	Subsidiary risk	Not Applicable
Packing group	III	
Environmental hazard	Environmentally hazardous	
Special precautions for user	Hazard identification (Kemler)	40
	Classification code	S2
	Hazard Label	4.2
	Special provisions	Not Applicable
	Limited quantity	0
	Tunnel Restriction Code	3 (E)

Air transport (ICAO-IATA / DGR)

UN number	3342
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Potassium O-ethyl carbonodithioate

UN proper shipping name	Xanthates	
Transport hazard class(es)	ICAO/IATA Class	4.2
	ICAO / IATA Subrisk	Not Applicable
	ERG Code	4L
Packing group	III	
Environmental hazard	Environmentally hazardous	
Special precautions for user	Special provisions	A3 A803
	Cargo Only Packing Instructions	471
	Cargo Only Maximum Qty / Pack	100 kg
	Passenger and Cargo Packing Instructions	469
	Passenger and Cargo Maximum Qty / Pack	25 kg
	Passenger and Cargo Limited Quantity Packing Instructions	Forbidden
	Passenger and Cargo Limited Maximum Qty / Pack	Forbidden

Sea transport (IMDG-Code / GGVSee)

UN number	3342	
UN proper shipping name	XANTHATES	
Transport hazard class(es)	IMDG Class	4.2
	IMDG Subrisk	Not Applicable
Packing group	III	
Environmental hazard	Marine Pollutant	
Special precautions for user	EMS Number	F-A, S-J
	Special provisions	223
	Limited Quantities	0

Inland waterways transport (ADN)

UN number	3342	
UN proper shipping name	XANTHATES	
Transport hazard class(es)	4.2	Not Applicable
Packing group	III	
Environmental hazard	Environmentally hazardous	
Special precautions for user	Classification code	S2
	Special provisions	Not Applicable
	Limited quantity	0
	Equipment required	PP
	Fire cones number	0

Transport in bulk according to Annex II of MARPOL and the IBC code

Not Applicable

Transport in bulk in accordance with MARPOL Annex V and the IMSBC Code

Product name	Group
Potassium O-ethyl carbonodithioate	Not Available

Transport in bulk in accordance with the IGC Code

Product name	Ship Type
Potassium O-ethyl	Not Available

Potassium O-ethyl carbonodithioate

Product name	Ship Type
carbonodithioate	

SECTION 15 Regulatory information

Safety, health and environmental regulations / legislation specific for the substance or mixture

Potassium O-ethyl carbonodithioate is found on the following regulatory lists

Europe EC Inventory

European Union - European Inventory of Existing Commercial Chemical Substances (EINECS)

National Inventory Status

National Inventory	Status
Australia - AIIIC / Australia Non-Industrial Use	Yes
Canada - DSL	Yes
Canada - NDSL	No (Potassium O-ethyl carbonodithioate)
China - IECSC	Yes
Europe - EINEC / ELINCS / NLP	Yes
Japan - ENCS	Yes
Korea - KECI	Yes
New Zealand - NZIoC	No (Potassium O-ethyl carbonodithioate)
Philippines - PICCS	Yes
USA - TSCA	Yes
Taiwan - TCSI	Yes
Mexico - INSQ	Yes
Vietnam - NCI	Yes
Russia - FBEPH	Yes
Legend:	Yes = All CAS declared ingredients are on the inventory No = One or more of the CAS listed ingredients are not on the inventory. These ingredients may be exempt or will require registration.

SECTION 16 Other information

Revision Date	06/07/2023
Initial Date	06/07/2023

SDS Version Summary

Version	Date of Update	Sections Updated
1.2	06/07/2023	Physical and chemical properties - Appearance, CAS Number, Hazards identification - Classification, Ecological Information - Environmental, Firefighting measures - Fire Fighter (fire/explosion hazard), Composition / information on ingredients - Ingredients, Korean MSDS Number, Identification of the substance / mixture and of the company / undertaking - Supplier Information, Identification of the substance / mixture and of the company / undertaking - Synonyms

Other information

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

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

For detailed advice on Personal Protective Equipment, refer to the following EU CEN Standards:

EN 166 Personal eye-protection

EN 340 Protective clothing

EN 374 Protective gloves against chemicals and micro-organisms

EN 13832 Footwear protecting against chemicals

EN 133 Respiratory protective devices

Potassium O-ethyl carbonodithioate**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
 ES: Exposure Standard
 OSF: Odour Safety Factor
 NOAEL :No Observed Adverse Effect Level
 LOAEL: Lowest Observed Adverse Effect Level
 TLV: Threshold Limit Value
 LOD: Limit Of Detection
 OTV: Odour Threshold Value
 BCF: BioConcentration Factors
 BEI: Biological Exposure Index
 AIIIC: Australian Inventory of Industrial Chemicals
 DSL: Domestic Substances List
 NDSL: Non-Domestic Substances List
 IECSC: Inventory of Existing Chemical Substance in China
 EINECS: European INventory of Existing Commercial chemical Substances
 ELINCS: European List of Notified Chemical Substances
 NLP: No-Longer Polymers
 ENCS: Existing and New Chemical Substances Inventory
 KECI: Korea Existing Chemicals Inventory
 NZIoC: New Zealand Inventory of Chemicals
 PICCS: Philippine Inventory of Chemicals and Chemical Substances
 TSCA: Toxic Substances Control Act
 TCSI: Taiwan Chemical Substance Inventory
 INSQ: Inventario Nacional de Sustancias Químicas
 NCI: National Chemical Inventory
 FBEPH: Russian Register of Potentially Hazardous Chemical and Biological Substances

Classification and procedure used to derive the classification for mixtures according to Regulation (EC) 1272/2008 [CLP]

Classification according to regulation (EC) No 1272/2008 [CLP] and amendments	Classification Procedure
Self-Heating Substances and Mixtures Category 2, H252	On basis of test data
Acute Toxicity (Inhalation) Category 4, H332	Expert judgement
Specific Target Organ Toxicity - Single Exposure (Respiratory Tract Irritation) Category 3 , H335	Expert judgement
Acute Toxicity (Oral) Category 4, H302	Expert judgement
Skin Corrosion/Irritation Category 2, H315	Expert judgement
Serious Eye Damage/Eye Irritation Category 2, H319	Expert judgement
Hazardous to the Aquatic Environment Long-Term Hazard Category 1, H410	Calculation method
, EUH029	Calculation method
Flammable Solids Category 2, H228	Expert judgement