

Potassium Ethyl Xanthogenate

sc-212575

Material Safety Data Sheet



The Power to Question

Hazard Alert Code Key: **EXTREME** **HIGH** **MODERATE** **LOW**

Section 1 - CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

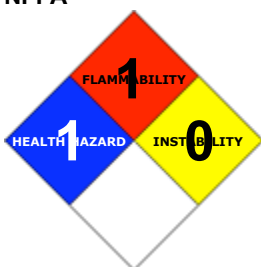
PRODUCT NAME

Potassium Ethyl Xanthogenate

STATEMENT OF HAZARDOUS NATURE

CONSIDERED A HAZARDOUS SUBSTANCE ACCORDING TO OSHA 29 CFR 1910.1200.

NFPA



SUPPLIER

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EMERGENCY

ChemWatch
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SYNONYMS

C3-H5-O-S2-K, CH3-CH2-O-CS-S-K, "carbonic acid, dithio-, O-ethyl ester, potassium salt", "carbonodithioic acid, O-ethyl ester, potassium salt", "potassium ethylxanthogenate", "potassium-O-ethyl carbonodithioate", "potassium-O-ethyl dithiocarbonate", "Aeroxanthate 303", PEX, Z3, "ethylxanthic acid, potassium salt", "potassium xanthate", "potassium xanthogenate", "potassium ethylxanthate"

Section 2 - HAZARDS IDENTIFICATION

CHEMWATCH HAZARD RATINGS

	Min	Max
Flammability:	3	
Toxicity:	2	
Body Contact:	3	
Reactivity:	2	
Chronic:	2	

Min/Nil=0
Low=1
Moderate=2
High=3
Extreme=4



CANADIAN WHMIS SYMBOLS



EMERGENCY OVERVIEW

RISK

Spontaneously flammable in air.

Harmful if swallowed.

Contact with water liberates toxic, extremely flammable gas.

Irritating to eyes, respiratory system and skin.

Highly flammable.

May cause fire.

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

POTENTIAL HEALTH EFFECTS

ACUTE HEALTH EFFECTS

SWALLOWED

■ Accidental ingestion of the material may be harmful; animal experiments indicate that ingestion of less than 150 gram may be fatal or may produce serious damage to the health of the individual.

■ 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, dyspnea, dizziness, spasmodic terror, hyperactive tendon reflexes, hyperaesthesia, cardiac arrhythmias, hallucinations, prostration, peripheral vascular collapse, hypothermia, cyanosis, mydriasis, convulsions, coma, and death within a few hours, from respiratory paralysis.

Non-fatal exposures may produce delayed effects including motor agitation, disorientation, psychic disturbances, narcosis, delirium, areflexia, mydriasis and permanent damage to the peripheral nervous system.

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 with the material may damage the health of the individual; systemic effects may result following absorption.

■ Solution of material in moisture on the skin, or perspiration, may increase irritant effects.

■ 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.

■ 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.

■ Inhalation of dusts, generated by the material during the course of normal handling, may be damaging to the health of the individual.

■ 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.

■ Acute inhalation of carbon disulfide produces rapid onset of both local irritation and central nervous system symptoms ranging from pharyngitis, nausea, vomiting, dizziness, fatigue, headache, mood changes, lethargy and blurred vision, to agitation, uncontrollable anger, suicidal tendencies, delirium, hallucinations, convulsions, coma and death.

Carbon disulfide inhalation can result in local irritation and pharyngitis and central nervous system effects.

CHRONIC HEALTH EFFECTS

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

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

There is limited evidence that, skin contact with this product is more likely to cause a sensitization reaction in some persons compared to the general population.

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.

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, defective memory and impotency. Coronary heart disease has also been significantly linked to CS₂ exposure.

A daily four hour exposure at concentrations exceeding 150 ppm produces chronic intoxication after a few months; 100-150 ppm is thought to produce chronic poisoning after a year or more whilst 50-100 ppm produces sporadic cases of mild intoxication.

Exposure to 144-321 ppm (445-1000 mg/m³) for 5 years or longer resulted in polyneuritis in 88 of 100 workers. Encephalopathy was

observed in 43 cases. Also seen were tremors, vertigo, psychosis, and myopathy. Polyneuritis has been reported following exposure to 5 ppm (15.6 mg/m³), and reductions in nerve fiber conduction velocity have been reported after exposure to 1.0-7.6 ppm for an average of about 12 years

Persons with pre-existing central nervous system, gastrointestinal tract, liver, kidneys, skin and blood disorders are potentially more susceptible to symptoms of exposure and should be excluded from all forms of exposure. The toxic effects of carbon disulfide, particularly on the nervous system, can be intensified by consumption of alcohol or simultaneous exposure to hydrogen sulfide.

Concentrations as low as 20 ppm may produce neurological damage - women appear to be more susceptible to the neurological effects of carbon disulfide. These effects include headache, apprehension, lethargy, sleepiness, hearing and position sense loss, paraesthesias, muscle pain, tremors, ataxia, staggering gait, weakness, loss of lower extremity reflexes, and paralysis. Visual disturbances include decreased visual acuity, impaired recognition of red and green, nystagmus, diplopia, disturbed pupillary reaction to light - optic nerve atrophy may also occur. A decrease in corneal reflex may be an indication of chronic intoxication.

Psychiatric symptoms may include loss of memory, nightmares leading to loss of sleep, mental deterioration, acoustic and visual hallucinations, rapid mood changes ranging from irritability to manic-depressive psychoses, and suicidal tendencies. Disturbances to the libido and impotence (with effects on sperm) have also been recorded. Menstrual and ovarian function disorders and an increased risk of spontaneous abortion may also occur.

Liver damage may be indicated by a palpable, tender liver and minor derangement of liver function. Chronic renal dysfunction may occur at concentrations not sufficiently great to produce neurological damage. Gastric or duodenal ulcers may also be produced as a result of chronic exposure.

Coronary heart disease has been significantly linked to carbon disulfide. A series of studies in Finland showed a significant excess mortality from cardiovascular disease in workers exposed to carbon disulfide for at least 5 years to concentrations estimated to range from 20-40 ppm in the 1950's and 10-30 ppm in the 1960's. Most workers, however, had been exposed repeatedly to far higher concentrations at various times.

Nutritional factors may account for variations in response shown amongst workers. Experimental rabbit diets reinforced with a high mineral mixture, especially copper and zinc, permitted daily exposures at 1100 ppm CS₂ without the observed effects seen in the controls (body weight loss, serum lipoprotein and total cholesterol increase, adrenal hypertrophy and pathological changes to the brain and spinal cord).

Epidemiology studies revealed no definitive increased risk for cancer among workers who were exposed to carbon disulfide for up to 15 years. Other studies reported no association between occupational exposure to carbon disulfide and cancer mortality. In some cases mortality due to cancer was less in the carbon disulfide population than in the control group.

Prolonged inhalation exposure to low levels of carbon disulfide can cause adverse reproductive system effects in humans. An increased incidence of fetal resorptions has been reported in rabbits exposed to carbon disulfide. Inhalation exposure does not appear to damage the developing offspring of laboratory animals.

A number of epidemiological studies have reported that inhalation exposure to 13-77 ppm carbon disulfide resulted in changes in sperm morphology, decreased hormone levels, and decreased libido in males; and menstrual irregularities in females. One report indicated increased menstrual disorders and greater incidence of toxemia in pregnancy after occupational exposure to about 12-18 ppm carbon disulfide. An increase in spontaneous abortions was reported in one study following occupational exposure to about 9 ppm. There are no data that indicate an increase in congenital malformations in children born to mothers exposed by any route to carbon disulfide

Foetal resorption was reported in rabbits exposed orally to 25 mg/kg/day during gestation, but was not seen in rats exposed to 100 mg/kg/day. The 25 mg/kg/day dose was a frank-effect-level (FEL) for fetal resorption in rabbits. Inhalation experiments failed to show any effects on foetal development in rats or rabbits exposed to 62.3 or 124.6 mg/m³ (5 and 10 mg/kg/day, rats; 11, 22 mg/kg/day, rabbits) given from 34 weeks before breeding through the entire gestation period. The highest no-observed- adverse effect level (NOAEL) for the study was 22 mg/kg/day; however, this NOAEL was close to the FEL seen in the previous experiment.

Section 3 - COMPOSITION / INFORMATION ON INGREDIENTS

NAME	CAS RN	%
potassium ethyl xanthate	140-89-6	> 90
NOTE: product degrades to give		
carbon disulfide	75-15-0	
(CS ₂)		

Section 4 - FIRST AID MEASURES

SWALLOWED

· IF SWALLOWED, REFER FOR MEDICAL ATTENTION, WHERE POSSIBLE, WITHOUT DELAY. · Where Medical attention is not immediately available or where the patient is more than 15 minutes from a hospital or unless instructed otherwise:

EYE

· If in eyes, hold eyelids apart and flush the eye continuously with running water. · Continue flushing until advised to stop by the Poisons Information Center or a doctor, or for at least 15 minutes. For THERMAL burns: · 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

■ If skin or hair contact occurs: · Immediately flush body and clothes with large amounts of water, using safety shower if available. · Quickly remove all contaminated clothing, including footwear. In case of burns: · 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.

INHALED

· If fumes or combustion products are inhaled remove from contaminated area. · Lay patient down. Keep warm and rested.

NOTES TO PHYSICIAN

· 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.

Section 5 - FIRE FIGHTING MEASURES

Vapor Pressure (mmHG):	Not applicable.
Upper Explosive Limit (%):	50.0 (CS ₂)
Specific Gravity (water=1):	Not available.
Lower Explosive Limit (%):	1.3 (CS ₂)

EXTINGUISHING MEDIA

■ For SMALL FIRES:

· Dry chemical, CO₂, water spray or foam.

For LARGE FIRES:

· Foam, fog or water spray.

FIRE FIGHTING

· 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 Emergency Responders and tell them location and nature of hazard.

· Wear full body protective clothing with breathing apparatus.

When any large container (including road and rail tankers) is involved in a fire, consider evacuation by 800 metres in all directions.

GENERAL FIRE HAZARDS/HAZARDOUS COMBUSTIBLE PRODUCTS

· May ignite on contact with air leading to spontaneous combustion and burning rapidly.

· May decompose explosively when heated or involved in fire.

Combustion products include:

Combustible. Will burn if ignited, carbon monoxide (CO), carbon dioxide (CO₂), sulfur oxides (SO_x), metal oxides, other pyrolysis products typical of burning organic material.

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.

FIRE INCOMPATIBILITY

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

PERSONAL PROTECTION

Glasses:

Chemical goggles.

Gloves:

Respirator:

Type A-P Filter of sufficient capacity

Section 6 - ACCIDENTAL RELEASE MEASURES

MINOR SPILLS

· 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.

MAJOR SPILLS

· Clear area of personnel and move upwind.

· Alert Emergency Responders and tell them location and nature of hazard.

Section 7 - HANDLING AND STORAGE

PROCEDURE FOR HANDLING

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

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.

Empty containers may contain residual dust which has the potential to accumulate following settling. Such dusts may explode in the presence of an appropriate ignition source.

- Do NOT cut, drill, grind or weld such containers.
- In addition ensure such activity is not performed near full, partially empty or empty containers without appropriate workplace safety authorisation or permit.

RECOMMENDED STORAGE METHODS

- 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.

For low viscosity materials and solids: 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.

STORAGE REQUIREMENTS

- Material is hygroscopic, i.e. absorbs moisture from the air. Keep containers well sealed in storage.

Store under an inert gas, e.g. argon or nitrogen.

Bulk xanthate storages should be blanketed with nitrogen and equipped with absorptive type breather valve(s) to prevent vapor emission.

WARNING: Gradual decomposition in strong, sealed containers may lead to gradual but significant buildup of pressure and subsequent explosion.

FOR MINOR QUANTITIES:

- Store in an indoor fireproof cabinet or in a room of noncombustible construction
- Provide adequate portable fire-extinguishers in or near the storage area.

Section 8 - EXPOSURE CONTROLS / PERSONAL PROTECTION

EXPOSURE CONTROLS

Source	Material	TWA ppm	TWA mg/m ³	STEL ppm	STEL mg/m ³	Peak ppm	Peak mg/m ³	TWA F/CC	Notes
US - Minnesota Permissible Exposure Limits (PELs)	carbon disulfide (Carbon disulfide)	4	12	12	36				
US ATSDR Minimal Risk Levels for Hazardous	carbon disulfide (CARBON DISULFIDE)	0.3							

Substances (MRLs)						
Canada - British Columbia Occupational Exposure Limits	carbon disulfide (Carbon disulfide)	4		12		Skin
US ACGIH Threshold Limit Values (TLV)	carbon disulfide (Carbon disulfide)	1				TLV Basis: peripheral nervous system impairment
US NIOSH Recommended Exposure Limits (RELs)	carbon disulfide (Carbon disulfide)	1	3	10	30	[skin]
Canada - Alberta Occupational Exposure Limits	carbon disulfide (Carbon disulfide)	1	3.1			
US - Tennessee Occupational Exposure Limits - Limits For Air Contaminants	carbon disulfide (Carbon disulfide)	4	12	12	36	
US - Vermont Permissible Exposure Limits Table Z-1-A Transitional Limits for Air Contaminants	carbon disulfide (Carbon disulfide)		See Table Z-2			
US - Vermont Permissible Exposure Limits Table Z-1-A Final Rule Limits for Air Contaminants	carbon disulfide (Carbon disulfide*)	4	12	12	36	30
US - Idaho - Acceptable Maximum Peak Concentrations	carbon disulfide (Carbon disulfide (Z37.3-1968))	20				30
US - California Permissible Exposure Limits for Chemical Contaminants	carbon disulfide (Carbon disulfide)	4	12	12	36	30
US - Idaho - Limits for Air Contaminants	carbon disulfide (Carbon disulfide)		[2]			
US OSHA Permissible Exposure Levels (PELs) - Table Z2	carbon disulfide (Carbon disulfide (Z37.3-1968))					30
US - Alaska Limits for Air Contaminants	carbon disulfide (Carbon disulfide)	4	12	12	36	
US - Michigan Exposure Limits for Air Contaminants	carbon disulfide (Carbon disulfide)	4	12	12	36	
US - Hawaii Air Contaminant Limits	carbon disulfide (Carbon disulfide)	4	12	12	36	

Canada - Yukon Permissible Concentrations for Airborne Contaminant Substances	carbon disulfide (Carbon disulphide - Skin)	20	60	30	90	
US - Washington Permissible exposure limits of air contaminants	carbon disulfide (Carbon disulfide)	4		12		
Canada - Saskatchewan Occupational Health and Safety Regulations - Contamination Limits	carbon disulfide (Carbon disulphide)	10		15		Skin
Canada - Northwest Territories Occupational Exposure Limits (English)	carbon disulfide (Carbon disulfide - Skin)	10	31	20	62	
US - Wyoming Toxic and Hazardous Substances Table Z-2 Acceptable ceiling concentration, Acceptable maximum peak above the acceptable ceiling concentration for an 8-hr shift	carbon disulfide (Carbon disulfide (Z37.3-1968))	20			30	
Canada - Quebec Permissible Exposure Values for Airborne Contaminants (English)	carbon disulfide (Carbon disulfide)	4	12	12	36	
US - Oregon Permissible Exposure Limits (Z-2)	carbon disulfide (Carbon disulfide (Z37.3-1968))	20			30	
Canada - Nova Scotia Occupational Exposure Limits	carbon disulfide (Carbon disulfide)	1				TLV Basis: peripheral nervous system impairment
Canada - Prince Edward Island Occupational Exposure Limits	carbon disulfide (Carbon disulfide)	1				TLV Basis: peripheral nervous system impairment

ENDOELTABLE

PERSONAL PROTECTION



RESPIRATOR

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

EYE

- Safety glasses with side shields.
- Chemical goggles.

HANDS/FEET

■ NOTE: The material may produce skin sensitization in predisposed individuals. Care must be taken, when removing gloves and other protective equipment, to avoid all possible skin contact.

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.

• 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.

- Fire resistant/ heat resistant gloves where practical, otherwise
- Heavy-duty chemically resistant gloves capable of providing short-term protection against spontaneous ignition.

OTHER

■ Wear protective clothing appropriate for the work situation.

For large scale or continuous use, when handling dry powder, wear :

- non-sparking safety footwear,
- tight-weave, non-static, noncombustible or flameproof clothing without cuffs, metallic fasteners, pockets, or laps in which powder may collect.
- Protective overalls, closely fitted at neck and wrist.
- Eye-wash unit.

IN CONFINED SPACES:

- Non-sparking protective boots
- Static-free clothing.
- Ensure availability of lifeline.

Staff should be trained in all aspects of rescue work.

Rescue gear: Two sets of SCUBA breathing apparatus Rescue Harness, lines etc.

ENGINEERING CONTROLS

■ Engineering controls which have been generally implemented at mining sites include:

- 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.

The engineering controls vary at the different mine sites and all the listed controls are not present at all the sites.

• 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.

Section 9 - PHYSICAL AND CHEMICAL PROPERTIES

PHYSICAL PROPERTIES

Solid.

Mixes with water.

State	Divided solid	Molecular Weight	160.30
Melting Range (°F)	410	Viscosity	Not Applicable
Boiling Range (°F)	Not applicable.	Solubility in water (g/L)	Miscible
Flash Point (°F)	-20(CS2)	pH (1% solution)	>7
Decomposition Temp (°F)	410	pH (as supplied)	Not applicable
Autoignition Temp (°F)	194 (CS2)	Vapor Pressure (mmHG)	Not applicable.
Upper Explosive Limit (%)	50.0 (CS2)	Specific Gravity (water=1)	Not available.
Lower Explosive Limit (%)	1.3 (CS2)	Relative Vapor Density (air=1)	Not applicable.
Volatile Component (%vol)	Not available.	Evaporation Rate	Not available

APPEARANCE

■ Material is hygroscopic, absorbs moisture from surrounding air. Solid with an unpleasant odor. Very soluble in water. Soluble in alcohols, ketones, pyridine and acetonitrile. The hydrolysis of xanthate solutions is accelerated by acidic pH. Solids and solutions tend to release carbon disulfide (CS2) which may accumulate.

log Kow 1.70-4.16 Estimated bioconcentration factor (BCF) values (equal to 2.94×10^3) were calculated from solubility and Kow, (log Kow is 2.16) data. The calculated values, 6.8 and 25.8 respectively for solubility and Kow data, indicate that CS2 will not significantly bioaccumulate in aquatic organisms.

Material	Value
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Section 10 - CHEMICAL STABILITY

CONDITIONS CONTRIBUTING TO INSTABILITY

- May heat spontaneously
- Identify and remove sources of ignition and heating.

STORAGE INCOMPATIBILITY

- Contact with water liberates highly flammable gases.
- Avoid any contamination of this material as it is very reactive and any contamination is potentially hazardous.

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
 - vapors may be ignited by contact with an ordinary light bulb, a warm steam pipe or a hot exhaust pipe
 - the vapor 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
 - vapor 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
 - flow or agitation may generate electrostatic charges.
- Avoid reaction with oxidizing agents.
- Xanthate derivatives are hazardous as dusts, forming explosive suspensions in air.
 - The lower alkyl salts are explosive in the solid state when dry.

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

Section 11 - TOXICOLOGICAL INFORMATION

potassium ethyl xanthate

TOXICITY AND IRRITATION

■ unless otherwise specified data extracted from RTECS - Register of Toxic Effects of Chemical Substances.

POTASSIUM ETHYL XANTHATE:

■ 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 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.

CARBON DISULFIDE:

TOXICITY	IRRITATION
Oral (human) LDLo: 14 mg/kg	Nil Reported
Oral (human) TLo: 40 mg/m ³	
Oral (rat) LD50: 3188 mg/kg	
Inhalation (human) LLo: 4000 ppm/30 min	
Inhalation (human) LLo: 2000 ppm/5 min	
Inhalation (rat) LC50: 25000 mg/m ³ /2 h	
Inhalation (Human) LC: 10000 mg/m ³ /4h	
Inhalation (Human) TLo: 0.08 mg/m ³ /4h	
Oral (Rat) LD50: 1200 mg/kg	
Intraperitoneal (Guinea pig) LD: 400 mg/kg	
Oral (Mouse) LD50: 2780 mg/kg	
Oral (Guinea pig) LD50: 2125 mg/kg	
Oral (Rabbit) LD50: 2550 mg/kg	
Inhalation (Mouse) LC50: 10000 mg/m ³ /4h	
Inhalation (Rat) LC50: 25000 mg/m ³ /4h	

■ NOTE: Substance has been shown to be mutagenic in at least one assay, or belongs to a family of chemicals producing damage or change to cellular DNA.

Exposure to the material for prolonged periods may cause physical defects in the developing embryo (teratogenesis).

Fatty liver degeneration, paternal effects, effects on fertility,

foetotoxicity, effects on newborn recorded.

CARCINOGEN

Carbon disulfide	US ACGIH Threshold Limit Values (TLV) - Carcinogens	Carcinogen Category	A4
carbon disulfide	US - Rhode Island Hazardous Substance List	IARC	
TWAPPM~	US - Maine Chemicals of High Concern List	Carcinogen	A4
VPVB_(VERY~	US - Maine Chemicals of High Concern List	Carcinogen	

REPROTOXIN

carbon disulfide	ILO Chemicals in the electronics industry that have toxic effects on reproduction	Reduced fertility or sterility	H A si
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SKIN

carbon disulfide	US - Vermont Permissible Exposure Limits Table Z-1-A Final Rule Limits for Air Contaminants - Skin	Skin Designation	X
carbon disulfide	US - Washington Permissible exposure limits of air contaminants - Skin	Skin	X
carbon disulfide	US ACGIH Threshold Limit Values (TLV) - Skin	Skin Designation	Yes
carbon disulfide	US AIHA Workplace Environmental Exposure Levels (WEELs) - Skin	Notes	TLV Basis: peripheral nervous system impairment
carbon disulfide	US NIOSH Recommended Exposure Limits (RELs) - Skin	Skin	Yes

carbon disulfide	US - California OEHHA/ARB - Acute Reference Exposure Levels and Target Organs (RELs) - Skin	Skin	X
carbon disulfide	US - California OEHHA/ARB - Chronic Reference Exposure Levels and Target Organs (CRELs) - Skin	Skin	X
carbon disulfide	US - Tennessee Occupational Exposure Limits - Limits For Air Contaminants - Skin	Skin Designation	X
carbon disulfide	Canada - British Columbia Occupational Exposure Limits - Skin	Notation	Skin
carbon disulfide	US - Minnesota Permissible Exposure Limits (PELs) - Skin	Skin Designation	X
carbon disulfide	US - Hawaii Air Contaminant Limits - Skin Designation	Skin Designation	X
carbon disulfide	US OSHA Permissible Exposure Levels (PELs) - Skin	Skin Designation	X
carbon disulfide	US - Oregon Permissible Exposure Limits (Z2) - Skin	Skin	X
carbon disulfide	US - California Permissible Exposure Limits for Chemical Contaminants - Skin	Skin	X
carbon disulfide	US - California Permissible Exposure Limits for Chemical Contaminants - Skin	Skin	S
carbon disulfide	Canada - Alberta Occupational Exposure Limits - Skin	Substance Interaction	1

Section 12 - ECOLOGICAL INFORMATION

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

This material and its container must be disposed of as hazardous waste.

Avoid release to the environment.

Refer to special instructions/ safety data sheets.

Section 13 - DISPOSAL CONSIDERATIONS

US EPA Waste Number & Descriptions

A. General Product Information

Reactivity characteristic: use EPA hazardous waste number D003 (waste code R).

B. Component Waste Numbers

When carbon disulfide is present as a solid waste as a discarded commercial chemical product, off-specification species, as a container residue, or a spill residue, use EPA waste number P022 (waste code T).

Disposal Instructions

All waste must be handled in accordance with local, state and federal regulations.

! Puncture containers to prevent re-use and bury at an authorized landfill.

Legislation addressing waste disposal requirements may differ by country, state and/ or territory. Each user must refer to laws operating in their area. In some areas, certain wastes must be tracked.

A Hierarchy of Controls seems to be common - the user should investigate:

- Reduction
- Reuse
- Recycling
- Disposal (if all else fails)

This material may be recycled if unused, or if it has not been contaminated so as to make it unsuitable for its intended use. Shelf life considerations should also be applied in making decisions of this type. Note that properties of a material may change in use, and recycling or reuse may not always be appropriate.

DO NOT allow wash water from cleaning equipment to enter drains. Collect all wash water for treatment before disposal.

- Recycle wherever possible or consult manufacturer for recycling options.
- Consult Waste Management Authority for disposal.

Section 14 - TRANSPORTATION INFORMATION



DOT:

Symbols: None Hazard class or Division: 4.2

Identification Numbers: UN3342 PG: II

Label Codes: 4.2 Special provisions: IB6, IP2, T3, TP33

Packaging: Exceptions: None Packaging: Non- bulk: 212

Packaging: Exceptions: None Quantity limitations: 15 kg

Passenger aircraft/rail:

Quantity Limitations: Cargo 50 kg Vessel stowage: Location: D aircraft only:

Vessel stowage: Other: 40

Hazardous materials descriptions and proper shipping names:

Xanthates

Air Transport IATA:

UN/ID Number: 3342 Packing Group: II

Special provisions: A3

Cargo Only

Packing Instructions: 470 Maximum Qty/Pack: 50 kg

Passenger and Cargo Passenger and Cargo

Packing Instructions: Forbidden Maximum Qty/Pack: 15 kg

Passenger and Cargo Limited Quantity Passenger and Cargo Limited Quantity

Packing Instructions: 467 Maximum Qty/Pack: Forbidden

■ Air transport may be forbidden if this material is flammable, corrosive or toxic gases may be released under normal conditions of transport.

Shipping Name: XANTHATES

Maritime Transport IMDG:

IMDG Class: 4.2 IMDG Subrisk: None

UN Number: 3342 Packing Group: II

EMS Number: F-A,S-J Special provisions: None

Limited Quantities: 0 Marine Pollutant: Yes

Shipping Name: XANTHATES

Section 15 - REGULATORY INFORMATION

potassium ethyl xanthate (CAS: 140-89-6) is found on the following regulatory lists;

"Canada Domestic Substances List (DSL)", "Canada Toxicological Index Service - Workplace Hazardous Materials Information System - WHMIS (English)", "US - Pennsylvania - Hazardous Substance List", "US Toxic Substances Control Act (TSCA) - Chemical Substance Inventory"

Regulations for ingredients

carbon disulfide (CAS: 75-15-0) is found on the following regulatory lists;

"Canada - Alberta Ambient Air Quality Objectives", "Canada - Alberta Occupational Exposure Limits", "Canada - British Columbia Occupational Exposure Limits", "Canada - Northwest Territories Occupational Exposure Limits (English)", "Canada - Nova Scotia Occupational Exposure Limits", "Canada - Prince Edward Island Occupational Exposure Limits", "Canada - Prince Edward Island Occupational Exposure Limits - Carcinogens", "Canada - Quebec Permissible Exposure Values for Airborne Contaminants (English)", "Canada - Saskatchewan Occupational Health and Safety Regulations - Contamination Limits", "Canada - Yukon Permissible Concentrations for Airborne Contaminant Substances", "Canada Domestic Substances List (DSL)", "Canada Ingredient Disclosure List (SOR/88-64)", "Canada National Pollutant Release Inventory (NPRI)", "Canada Priority Substances List (PSL1, PSL 2)", "Canada Toxicological Index Service - Workplace Hazardous Materials Information System - WHMIS (English)", "GESAMP/EHS Composite List - GESAMP Hazard Profiles", "IMO IBC Code Chapter 17: Summary of minimum requirements", "IMO MARPOL 73/78 (Annex II) - List of Noxious Liquid Substances Carried in Bulk", "International Council of Chemical Associations (ICCA) - High Production Volume List", "US - Alaska Limits for Air Contaminants", "US - California Air Toxics ""Hot Spots"" List (Assembly Bill 2588) Substances for which emissions must be quantified", "US - California Occupational Safety and Health Regulations (CAL/OSHA) - Hazardous Substances List", "US - California OEHHA/ARB - Acute Reference Exposure Levels and Target Organs (RELs)", "US - California OEHHA/ARB - Chronic Reference Exposure Levels and Target Organs (CRELs)", "US - California Permissible Exposure Limits for Chemical Contaminants", "US - California Proposition 65 - Priority List for the Development of MADLs for Chemicals Causing Reproductive Toxicity", "US - California Proposition 65 - Reproductive Toxicity", "US - California Toxic Air Contaminant List Category II", "US - Connecticut Hazardous Air Pollutants", "US - Hawaii Air Contaminant Limits", "US - Idaho - Acceptable Maximum Peak Concentrations", "US - Idaho - Limits for Air Contaminants", "US - Maine Chemicals of High Concern List", "US - Massachusetts Oil & Hazardous Material List", "US - Michigan Exposure Limits for Air Contaminants", "US - Minnesota Hazardous Substance List", "US - Minnesota Permissible Exposure Limits (PELs)", "US - New Jersey Right to Know Hazardous Substances", "US - Oregon Permissible Exposure Limits (Z-1)", "US - Oregon Permissible Exposure Limits (Z-2)", "US - Pennsylvania - Hazardous Substance List", "US - Rhode Island Hazardous Substance List", "US

- Tennessee Occupational Exposure Limits - Limits For Air Contaminants", "US - Vermont Hazardous Constituents", "US - Vermont Hazardous Waste - Acutely Hazardous Wastes", "US - Vermont Permissible Exposure Limits Table Z-1-A Final Rule Limits for Air Contaminants", "US - Vermont Permissible Exposure Limits Table Z-1-A Transitional Limits for Air Contaminants", "US - Washington Dangerous waste constituents list", "US - Washington Discarded Chemical Products List - ""P"" Chemical Products", "US - Washington Permissible exposure limits of air contaminants", "US - Wyoming Toxic and Hazardous Substances Table Z1 Limits for Air Contaminants", "US - Wyoming Toxic and Hazardous Substances Table Z-2 Acceptable ceiling concentration, Acceptable maximum peak above the acceptable ceiling concentration for an 8-hr shift", "US ACGIH Threshold Limit Values (TLV)", "US ACGIH Threshold Limit Values (TLV) - Carcinogens", "US ATSDR Minimal Risk Levels for Hazardous Substances (MRLs)", "US CAA (Clean Air Act) - HON Rule - Organic HAPs (Hazardous Air Pollutants)", "US CERCLA Priority List of Hazardous Substances", "US Clean Air Act - Hazardous Air Pollutants", "US CWA (Clean Water Act) - List of Hazardous Substances", "US CWA (Clean Water Act) - Reportable Quantities of Designated Hazardous Substances", "US Department of Homeland Security Chemical Facility Anti-Terrorism Standards - Chemicals of Interest", "US Department of Transportation (DOT) List of Hazardous Substances and Reportable Quantities - Hazardous Substances Other Than Radionuclides", "US DOE Temporary Emergency Exposure Limits (TEELs)", "US EPA Acute Exposure Guideline Levels (AEGs) - Final", "US EPA High Production Volume Program Chemical List", "US EPA Master Testing List - Index I Chemicals Listed", "US EPA National Priorities List - Superfund Chemical Data Matrix (SCDM) - Hazard Ranking System - Hazardous Substance Benchmarks", "US EPCRA Section 313 Chemical List", "US List of Lists - Consolidated List of Chemicals Subject to EPCRA, CERCLA and Section 112(r) of the Clean Air Act", "US NIOSH Recommended Exposure Limits (RELs)", "US OSHA Permissible Exposure Levels (PELs) - Table Z1", "US OSHA Permissible Exposure Levels (PELs) - Table Z2", "US Postal Service (USPS) Hazardous Materials Table: Postal Service Mailability Guide", "US RCRA (Resource Conservation & Recovery Act) - Appendix IX to Part 264 Ground-Water Monitoring List 1", "US RCRA (Resource Conservation & Recovery Act) - Hazardous Constituents - Appendix VIII to 40 CFR 261", "US RCRA (Resource Conservation & Recovery Act) - List of Hazardous Inorganic and Organic Constituents 1", "US RCRA (Resource Conservation & Recovery Act) - List of Hazardous Wastes", "US RCRA (Resource Conservation & Recovery Act) - Phase 4 LDR Rule - Universal Treatment Standards", "US SARA Section 302 Extremely Hazardous Substances", "US Toxic Substances Control Act (TSCA) - Chemical Substance Inventory", "US TSCA Section 12(b) - List of Chemical Substances Subject to Export Notification Requirements", "US TSCA Section 4/12 (b) - Sunset Date/Status", "US TSCA Section 8 (a) - Preliminary Assessment Information Rules (PAIR) - Reporting List", "US TSCA Section 8 (d) - Health and Safety Data Reporting", "USA: Chemical Facility Anti-Terrorism Standards - List Appendix A - 6CFR 27"

Section 16 - OTHER INFORMATION

LIMITED EVIDENCE

- Inhalation and/or skin contact may produce health damage*.
- Cumulative effects may result following exposure*.
- Possible skin sensitiser*.

* (limited evidence).

Denmark Advisory list for selfclassification of dangerous substances

Substance CAS Suggested codes potassium ethyl xanthate 140- 89- 6 Xn; R22 carbon disulfide 75- 15- 0 Xn; R22

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- 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.

A list of reference resources used to assist the committee may be found at:
www.chemwatch.net/references.

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

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