Strontium acetylacetonate hydrate

sc-236936

Material Safety Data Sheet

The Power to Question

Hazard Alert Code Key:	EXTREME	HIGH	MODERATE	LOW

Section 1 - CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

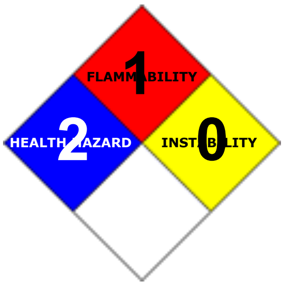
PRODUCT NAME

Strontium acetylacetonate hydrate

STATEMENT OF HAZARDOUS NATURE

CONSIDERED A HAZARDOUS SUBSTANCE ACCORDING TO OSHA 29 CFR 1910.1200.

NFPA



SUPPLIER

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

PRODUCT USE

- Intermediate.

SYNONYMS

C10-H14-O4-Sr, [CH3COCH=C(O-)CH3]2Sr, Sr[OC(CH3)=CHCOCH3]2, "strontium bis(2, 4-pentanedionato)-", bis(acetylacetonato)strontium, "bis(2, 4-pentanedionato)strontium", "strontium acetonyl acetonate", "strontium oxide bis(acetylacetonate)", "strontium bis(2, 4-pentanedionato-O, O')", "strontium bis(acetylacetonate)", strontiumacetylacetonate, "strontium 2, 4-pentanedionate", "strontium 2, 4-pentanedionate"

Section 2 - HAZARDS IDENTIFICATION

CANADIAN WHMIS SYMBOLS

EMERGENCY OVERVIEW

RISK

Harmful by inhalation, in contact with skin and if swallowed.
Irritating to eyes, respiratory system and skin.
Harmful to aquatic organisms.

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 2,4-pentanedione (acetylacetone) may produce irritation of the mouth, oesophagus and stomach producing abdominal discomfort, nausea, vomiting diarrhoea, dizziness, malaise and fainting.

■ At sufficiently high doses the material may be neurotoxic(i.e. poisonous to the nervous system).

EYE

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

■ Exposure to 2,4-pentadione may produce excessive redness of the eyes and swelling of the conjunctivae; blinking and tearing may occur. Corneal damage is unlikely.

SKIN

■ Skin contact with the material may be harmful; systemic effects may resultfollowing absorption.

■ The material may cause mild but significant inflammation of the skin either following direct contact or after a delay of some time. Repeated exposure can cause contact dermatitis which is characterized by redness, swelling and blistering.

■ Open cuts, abraded or irritated skin should not be exposed to this material.

■ 2,4-Pentadione may produce contact dermatitis or urticaria. Prolonged contact with 2,4-pentanedione may produce severe discomfort or pain, redness and swelling and corrosion, ulceration and development of fissures. The inflamed area may show bleeding.

■ 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

■ Inhalation of dusts, generated by the material, during the course of normalhandling, may be harmful.

■ The material can cause respiratory irritation in some persons. The body's response to such irritation can cause further lung damage.

■ Persons with impaired respiratory function, airway diseases and conditions such as emphysema or chronic bronchitis, may incur further disability if excessive concentrations of particulate are inhaled.

■ At sufficiently high doses the material may be neurotoxic(i.e. poisonous to the nervous system).

■ High doses of 2,4-pentanedione produced dyspnae, severe, central nervous system depression and death in experimental animals. Similar effects were produced at lower repeated doses although some animals survive and develop a central nervous system disorder characterised by irreversible cerebellar
syndrome. Thymic necrosis and atrophy accompany the central nervous system damage. [Patty's].
Inhalation of vapours may produce narcosis.

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. Prime symptom is breathlessness; lung shadows show on X-ray.
Repeated overexposure to 200 ppm 2,4-pentanedione vapor may result in inflammation of the nasal mucosa. Higher concentrations may produce central nervous system effects, and immune system and bone marrow deficits. Recurrent exposure to high concentrations of the 2,4-pentadione vapor (~650 ppm) produces lethal degenerative lesions in the central nervous system and thymus. Exposure in pregnancy can damage to fetus.
Strontium accumulates in teeth and bone, especially in the growth plates of rapidly growing bone. A chronic diet high in strontium and low in calcium produces severe bone deformities, inco-ordination, weakness and paralysis. Most health concerns related to strontium arise from radioisotopes of strontium which occur in "fall-out" following testing of nuclear weapons.

Section 3 - COMPOSITION / INFORMATION ON INGREDIENTS

HAZARD RATINGS

		Min	Max
Flammability:	1		
Toxicity:	2		
Body Contact:	2		
Reactivity:	1		
Chronic:	2		

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

NAME	CAS RN	%
strontium(II) acetylacetonate	12193-47-4	>98.5
NOTE: In use may evolve		
2,4-pentanedione	123-54-6	

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:
- For advice, contact a Poisons Information Center or a doctor.
- Urgent hospital treatment is likely to be needed.
- If conscious, give water to drink.

- INDUCE vomiting with fingers down the back of the throat, ONLY IF CONSCIOUS. Lean patient forward or place on left side (head-down position, if possible) to maintain open airway and prevent aspiration.

NOTE: Wear a protective glove when inducing vomiting by mechanical means.

- In the mean time, qualified first-aid personnel should treat the patient following observation and employing supportive measures as indicated by the patient's condition.
- If the services of a medical officer or medical doctor are readily available, the patient should be placed in his/her care and a copy of the MSDS should be provided. Further action will be the responsibility of the medical specialist.
- If medical attention is not available on the worksite or surroundings send the patient to a hospital together with a copy of the MSDS.

EYE

■ If this product comes in contact with the eyes:

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

SKIN

■ If skin contact occurs:

- Immediately remove all contaminated clothing, including footwear
- Flush skin and hair with running water (and soap if available).
- Seek medical attention in event of irritation.

INHALED

■

- If fumes or combustion products are inhaled remove from contaminated area.
- Lay patient down. Keep warm and rested.
- Prostheses such as false teeth, which may block airway, should be removed, where possible, prior to initiating first aid procedures.
- Apply artificial respiration if not breathing, preferably with a demand valve resuscitator, bag-valve mask device, or pocket mask as trained. Perform CPR if necessary.
- Transport to hospital, or doctor, without delay.

NOTES TO PHYSICIAN

■ for poisons (where specific treatment regime is absent):

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BASIC TREATMENT

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- Establish a patent airway with suction where necessary.
- Watch for signs of respiratory insufficiency and assist ventilation as necessary.
- Administer oxygen by non-rebreather mask at 10 to 15 l/min.
- Monitor and treat, where necessary, for pulmonary edema .
- Monitor and treat, where necessary, for shock.
- Anticipate seizures .
- DO NOT use emetics. Where ingestion is suspected rinse mouth and give up to 200 ml water (5 ml/kg recommended) for dilution where patient is able to swallow, has a strong gag reflex and does not drool.

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ADVANCED TREATMENT

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- Consider orotracheal or nasotracheal intubation for airway control in unconscious patient or where respiratory arrest has occurred.
- Positive-pressure ventilation using a bag-valve mask might be of use.
- Monitor and treat, where necessary, for arrhythmias.
- Start an IV D5W TKO. If signs of hypovolemia are present use lactated Ringers solution. Fluid overload might create complications.
- Drug therapy should be considered for pulmonary edema.
- Hypotension with signs of hypovolemia requires the cautious administration of fluids. Fluid overload might create complications.
- Treat seizures with diazepam.
- Proparacaine hydrochloride should be used to assist eye irrigation.

BRONSTEIN, A.C. and CURRANCE, P.L.
EMERGENCY CARE FOR HAZARDOUS MATERIALS EXPOSURE: 2nd Ed. 1994.
Treat symptomatically.

Section 5 - FIRE FIGHTING MEASURES

Vapour Pressure (mmHG):	Not available
Upper Explosive Limit (%):	Not available
Specific Gravity (water=1):	Not available
Lower Explosive Limit (%):	Not available

EXTINGUISHING MEDIA

■

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

FIRE FIGHTING

■
- Alert Emergency Responders and tell them location and nature of hazard.
- Wear breathing apparatus plus protective gloves.
- Prevent, by any means available, spillage from entering drains or water course.
- Use water delivered as a fine spray to control fire and cool adjacent area.
- DO NOT approach containers suspected to be hot.
- Cool fire exposed containers with water spray from a protected location.
- If safe to do so, remove containers from path of fire.
- Equipment should be thoroughly decontaminated after use.

GENERAL FIRE HAZARDS/HAZARDOUS COMBUSTIBLE PRODUCTS

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- Combustible solid which burns but propagates flame with difficulty.
- Avoid generating dust, particularly clouds of dust in a confined or unventilated space as dusts may form an explosive mixture with air, and any source of ignition, i.e. flame or spark, will cause fire or explosion. Dust clouds generated by the fine grinding of the solid are a particular hazard; accumulations of fine dust may burn rapidly and fiercely if ignited.
- Dry dust can be charged electrostatically by turbulence, pneumatic transport, pouring, in exhaust ducts and during transport.
- Build-up of electrostatic charge may be prevented by bonding and grounding.
- Powder handling equipment such as dust collectors, dryers and mills may require additional protection measures such as explosion venting.

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

FIRE INCOMPATIBILITY

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

PERSONAL PROTECTION

Glasses:
Chemical goggles.
Gloves:
Respirator:
Type A-P Filter of sufficient capacity

Section 6 - ACCIDENTAL RELEASE MEASURES

MINOR SPILLS

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

MAJOR SPILLS

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

ACUTE EXPOSURE GUIDELINE LEVELS (AEGL) (in ppm)

AEGL 1: The airborne concentration of a substance above which it is predicted that the general population, including susceptible individuals, could experience notable discomfort, irritation, or certain asymptomatic nonsensory effects. However, the effects are not disabling and are transient and reversible upon cessation of exposure.
AEGL 2: The airborne concentration of a substance above which it is predicted that the general population, including susceptible individuals, could experience irreversible or other serious, long-lasting adverse health effects or an impaired ability to escape.
AEGL 3: The airborne concentration of a substance above which it is predicted that the general population, including susceptible individuals, could experience life-threatening health effects or death.

Section 7 - HANDLING AND STORAGE

PROCEDURE FOR HANDLING

■
- Avoid all personal contact, including inhalation.
- Wear protective clothing when risk of exposure occurs.
- Use in a well-ventilated area.

- Prevent concentration in hollows and sumps.
- DO NOT enter confined spaces until atmosphere has been checked.
- DO NOT allow material to contact humans, exposed food or food utensils.
- Avoid contact with incompatible materials.
- When handling, DO NOT eat, drink or smoke.
- Keep containers securely sealed when not in use.
- Avoid physical damage to containers.
- Always wash hands with soap and water after handling.
- Work clothes should be laundered separately.
- Launder contaminated clothing before re-use.
- Use good occupational work practice.
- Observe manufacturer's storing and handling recommendations.
- Atmosphere should be regularly checked against established exposure standards to ensure safe working conditions are maintained.

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

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

RECOMMENDED STORAGE METHODS

■

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

STORAGE REQUIREMENTS

■

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

SAFE STORAGE WITH OTHER CLASSIFIED CHEMICALS

\+ X + X X +

X: Must not be stored together
O: May be stored together with specific preventions
+: May be stored together

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
Canada - Alberta Occupational Exposure Limits	2,4-pentanedione (Kerosene/Jet fuels, as total hydrocarbon vapour)		200						
Canada - Ontario Occupational Exposure Limits	2,4-pentanedione (Diesel fuel, as total hydrocarbons, vapour and aerosol)		100						Skin
Canada - Saskatchewan Occupational Health and Safety Regulations - Contamination Limits	2,4-pentanedione (Diesel fuel as total hydrocarbons, (vapour))		100		150				Skin
Canada - Alberta Occupational Exposure Limits	2,4-pentanedione (Diesel fuel, as total hydrocarbons)		100						
Canada - British Columbia Occupational Exposure Limits	2,4-pentanedione (Diesel fuel, as total hydrocarbons, Inhalable)		100 (V)						Skin

The following materials had no OELs on our records

- strontium(II) acetylacetonate: CAS:12193-47-4 CAS:66586-42-3

MATERIAL DATA

2,4-PENTANEDIONE:
STRONTIUM(II) ACETYLACETONATE:

■ CEL TWA for 2,4-pentadione: 20 ppm, 82 mg/m3 [cf recommended OEL, Union Carbide]

The disagreeable odour associated with relatively low concentrations of 2,4-pentanedione, in the atmosphere, may produce nausea. Exposure to about 1000 ppm for 30 minutes may result in the inhalation of harmful and potentially fatal amounts of the material.

Odour Safety Factor(OSF)
OSF=21 (2,4-pentanedione.
STRONTIUM(II) ACETYLACETONATE:
■ No exposure limits set by NOHSC or ACGIH.
2,4-PENTANEDIONE:

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

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

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

PERSONAL PROTECTION

Consult your EHS staff for recommendations

EYE

■

- Safety glasses with side shields.
- Chemical goggles.
- Contact lenses pose a special hazard; soft lenses may absorb irritants and all lenses concentrate them. DO NOT wear contact lenses.

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: such as:

- frequency and duration of contact,
- chemical resistance of glove material,
- glove thickness and
- dexterity

Select gloves tested to a relevant standard (e.g. Europe EN 374, US F739).

- When prolonged or frequently repeated contact may occur, a glove with a protection class of 5 or higher (breakthrough time greater than 240 minutes according to EN 374) is recommended.
- When only brief contact is expected, a glove with a protection class of 3 or higher (breakthrough time greater than 60 minutes according to EN 374) is recommended.
- Contaminated gloves should be replaced.

Gloves must only be worn on clean hands. After using gloves, hands should be washed and dried thoroughly. Application of a non-perfumed moisturiser is recommended.

Experience indicates that the following polymers are suitable as glove materials for protection against undissolved, dry solids, where abrasive particles are not present.

- polychloroprene
- nitrile rubber
- butyl rubber
- fluorocaoutchouc
- polyvinyl chloride

Gloves should be examined for wear and/ or degradation constantly.

OTHER

■

- Overalls.
- P.V.C. apron.
- Barrier cream.
- Skin cleansing cream.
- Eye wash unit.

■

- Respirators may be necessary when engineering and administrative controls do not adequately prevent exposures.
- The decision to use respiratory protection should be based on professional judgment that takes into account toxicity information, exposure measurement data, and frequency and likelihood of the worker's exposure - ensure users are not subject to high thermal loads which may result in heat stress or distress due to personal protective equipment (powered, positive flow, full face apparatus may be an option).
- Published occupational exposure limits, where they exist, will assist in determining the adequacy of the selected respiratory . These may be government mandated or vendor recommended.
- Certified respirators will be useful for protecting workers from inhalation of particulates when properly selected and fit tested as part of a complete respiratory protection program.

- Use approved positive flow mask if significant quantities of dust becomes airborne.
- Try to avoid creating dust conditions.

RESPIRATOR

■

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

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

ENGINEERING CONTROLS

■

- Local exhaust ventilation is required where solids are handled as powders or crystals; even when particulates are relatively large, a certain proportion will be powdered by mutual friction.
- Exhaust ventilation should be designed to prevent accumulation and recirculation of particulates in the workplace.
- If in spite of local exhaust an adverse concentration of the substance in air could occur, respiratory protection should be considered. Such protection might consist of:

(a): particle dust respirators, if necessary, combined with an absorption cartridge;
(b): filter respirators with absorption cartridge or canister of the right type;
(c): fresh-air hoods or masks

- Build-up of electrostatic charge on the dust particle, may be prevented by bonding and grounding.
- Powder handling equipment such as dust collectors, dryers and mills may require additional protection measures such as explosion venting.

Air contaminants generated in the workplace possess varying "escape" velocities which, in turn, determine the "capture velocities" of fresh circulating air required to efficiently remove the contaminant.

Type of Contaminant:	Air Speed:
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 f/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 f/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 favorable 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 f/min) for extraction of crusher dusts generated 2 meters distant from the extraction point. Other mechanical considerations, producing performance deficits within the extraction apparatus, make it essential that theoretical air velocities are multiplied by factors of 10 or more when extraction systems are installed or used.

Section 9 - PHYSICAL AND CHEMICAL PROPERTIES

PHYSICAL PROPERTIES

Solid.
Does not mix with water.

State	Divided solid	Molecular Weight	285.84

Melting Range (°F)	>572	Viscosity	Not Applicable
Boiling Range (°F)	Not available	Solubility in water (g/L)	Partly miscible
Flash Point (°F)	Not Available	pH (1% solution)	Not available
Decomposition Temp (°F)	Not available	pH (as supplied)	Not applicable
Autoignition Temp (°F)	Not available	Vapour Pressure (mmHG)	Not available
Upper Explosive Limit (%)	Not available	Specific Gravity (water=1)	Not available
Lower Explosive Limit (%)	Not available	Relative Vapor Density (air=1)	Not Applicable
Volatile Component (%vol)	Not available	Evaporation Rate	Not Applicable

APPEARANCE

White powder; does not mix well with water.

Section 10 - CHEMICAL STABILITY

CONDITIONS CONTRIBUTING TO INSTABILITY

■

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

STORAGE INCOMPATIBILITY

■ Avoid reaction with oxidizing agents, bases and strong reducing agents.
For 2,4-pentanedione:

- Segregate from halogens.
- Store away from steel, nickel, zinc, galvanized iron, tinned iron, copper and copper alloys.

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

Section 11 - TOXICOLOGICAL INFORMATION

strontium(II) acetylacetonate

TOXICITY AND IRRITATION

■ unless otherwise specified data extracted from RTECS - Register of Toxic Effects of Chemical Substances.
■ Asthma-like symptoms may continue for months or even years after exposure to the material ceases. This may be due to a non-allergenic condition known as reactive airways dysfunction syndrome (RADS) which can occur following exposure to high levels of highly irritating compound. Key criteria for the diagnosis of RADS 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.
No significant acute toxicological data identified in literature search.
The material may cause skin irritation after prolonged or repeated exposure and may produce on contact skin redness, swelling, the production of vesicles, scaling and thickening of the skin.

SKIN

2,4-pentanedione	Canada - Ontario Occupational Exposure Limits - Skin	Notes	Skin
2,4-pentanedione	US AIHA Workplace Environmental Exposure Levels (WEELs) - Skin	Notes	Skin
2,4-pentanedione	Canada - Quebec Permissible Exposure Values for Airborne Contaminants - Skin (French)	Notes	Skin
2,4-pentanedione	Canada - British Columbia Occupational Exposure Limits - Skin	Notation	Skin
2,4-pentanedione	Canada - Alberta Occupational Exposure Limits - Skin	Substance Interaction	1

Section 12 - ECOLOGICAL INFORMATION

Refer to data for ingredients, which follows:
2,4-PENTANEDIONE:
STRONTIUM(II) ACETYLACETONATE:
■ DO NOT discharge into sewer or waterways.
■ for 2,4-pentanedione:
log Kow : 1.9-2.25
BOD 5 if unstated: 5.60%
Harmful to aquatic life/ birdlife.
Environmental fate:
Biodegradation of 2,4-pentadione occurs in the soil. Leaching into ground water is expected to occur. Biodegradation in water is expected to proceed at a moderate rate. No significant bioaccumulation is expected to occur.

In air 2,4-pentadione undergoes photochemical degradation to hydroxyl radicals. The material is expected to be removed from air by wet deposition with a half-life between 10 and 30 days.

■ Harmful to aquatic organisms.

STRONTIUM(II) ACETYLACETONATE:

■ For strontium:

Environmental fate:

Strontium present in the atmosphere is in the form of wet or dry aerosols. The principal chemical species in the air is strontium oxide (SrO). Strontium oxide will react rapidly in the presence of moisture to form Sr+2 and SrOH+ ions. Strontium is dispersed by atmospheric cycling and is subsequently deposited by wet deposition on the earth's surface. In surface water and groundwater, strontium exists primarily as a hydrated ion. Strontium can form ionic complexes with other inorganic or organic substances. Strontium is relatively mobile in water. However, the formation of insoluble complexes or sorption of strontium to soils can reduce its mobility in water. Strontium sorbs to soils by ion exchange, and tends to be more mobile in soils with a high concentration of exchangeable ions or in soils with low cation exchange capacities. Strontium is taken up and retained by aquatic and terrestrial plants and is concentrated in the boney tissues of animals that eat contaminated vegetation. The concentration of radioactive 90Sr in the atmosphere has steadily decreased since its maximum concentration in 1963, probably as a result of reduced numbers of tests involving nuclear explosives. However radioactive strontium occurs naturally in the earths crust and partitions between various environmental compartments.

Strontium exists almost exclusively in the environment as a +2 cation, and will form different species, some of which are more soluble than others. Because the different species have different solubilities, they will have different mobilities in the environment and different exposure potentials. Strontium exists as a hydrated cation, an ionic solution complex, or an ionic salt. In the environment, typical solution species for strontium are Sr2+ and SrOH+, and some strontium compounds (SrCO3 and SrSO4) are practically insoluble in neutral water.

The principal abiotic processes that transform strontium in soils and sediments are mediated by sorption and desorption reactions between the soil solution and matrix (precipitation, complexation, and ion exchange), and controlled by pH, ionic strength, solution speciation, mineral composition, organic matter, biological organisms, and temperature. For many soil systems, in the short term, strontium sorption is dominated by simple ion exchange, and strontium ions are readily exchangeable. At longer time scales, however, strontium ions may relocated into sterically hindered sites that are not readily exchangeable.

Because strontium is an element, its atoms do not degrade by environmental processes such as hydrolysis or biodegradation. However, radioactive strontium will be subject to radioactive decay and transformation to other elements. Eventually, all of the radioactive strontium will be transformed into stable zirconium by the process of radioactive decay

90Sr (t½ = 29 years) ? 90Y (t½ = 64 hours) + ß- ? 90Zr (stable) + ß-

Both radioactive and nonradioactive strontium compounds are subject to both biotic and abiotic transformation mechanisms.

Like calcium, strontium has moderate mobility in soils and sediments, and sorbs moderately to metal oxides and clays. The Sr2+ ion is strongly hydrated and is firmly coordinated with six or more water molecules in aqueous solution. When Sr2+ ions sorb on negatively charged mineral surface sites, the hydration sphere is retained. Strontium sorbs as hydrated ions on the surface of clay minerals (kaolinite), weathered minerals (amorphous silica), and iron oxides). Sorbed carbonate on iron oxides enhances the sorption of Sr2+ and permits the nucleation of Sr2+ as strontium carbonate. On calcite (calcium carbonate), Sr2+ sorption occurs by electrostatic attraction as hydrated ions. However, at higher concentrations, precipitation of strontianite (strontium carbonate) occurs, and strontium is likely to be less mobile.

Strontium is not necessary for growth or reproduction for most plants, but is typically absorbed to satisfy the plant's metabolic requirements for calcium. Soil to plant concentration ratios for strontium (the ratio of the concentration of strontium in wet vegetation to the concentration of strontium in dry soil) are, and indicate that strontium can be easily absorbed into plants from soil. The uptake of strontium by plants is greatest in sandy soils having low clay and organic matter content. The concentration of nutritive mineral elements in soil such as calcium lower the intake of strontium to the aboveground phytomass. The average reduction of the soil-to-plant concentration ratios for 90Sr caused by amendment with Ca or K is around 50-60% .

Strontium may be deposited on plant surfaces from the atmosphere, remain on the plant, be washed off, or be absorbed directly into the plant through leaves. Contamination by direct deposition on foliage surfaces is predominantly a short-term mechanism with a weathering half-life of approximately 14 days. Once absorbed in the plant, strontium translocates to other parts of the plant, such as the leaves or fruit. Translocation of strontium in plants is affected by the particular species and stage of organism growth, and the most metabolically active parts (growing) will accumulate higher concentrations of strontium.

The primary routes of human exposure to strontium are from inhalation of aerosols and ingestion of food and drinking water containing strontium. The intake of strontium, therefore, depends upon the concentration of strontium in air, drinking water, and in the food items that comprise a person's diet, which may be highly variable.

External exposure to 90Sr is not a concern because of minor emission of penetrating radiation from 90Sr.

No estimate of the concentration of 90Sr in air is available. However, it is assumed that ambient concentrations of 90Sr in the atmosphere are small relative to exposures from water and diet. If the concentration of 90Sr in average U.S. drinking water is estimated as 0.1 pCi/L (4 mBq/L) or one radiochemical event per 5?10 minutes, and the consumption rate of drinking water by a normal adult is assumed to be 2 L/day, then the exposure from drinking water would be 0.2 pCi (7 mBq) per day.

The distributions of 90Sr in the body are significantly different for males and females. As expected, the highest concentrations of 90Sr are measured in the boney tissue. Males and females averaged 10.4 and 65 pCi/kg (0.38 and 2.4 Bq/kg) wet weight, respectively. Males had a much higher concentration of 90Sr in the muscular tissue compared to females. The heart and psoas muscles had respective concentrations of 90Sr for men averaging 13.9 and 18.7 pCi/kg (0.51 and 0.69 Bq) wet weight versus respective concentrations of 7.4 and 1.9 pCi/kg (0.27 Bq/kg and 70 mBq/kg) wet weight for females.

Occupational exposure to strontium compounds affords the opportunity to accumulate higher levels of all forms of strontium.

Children drink more fluids, eat more food, breathe more air per kilogram of body weight, and have a larger skin surface in proportion to their body volume. A child's diet often differs from that of adults. The developing human's source of nutrition changes with age: from placental nourishment to breast milk or formula to the diet of older children who eat more of certain types of foods than adults. A child's behavior and lifestyle also influence exposure. Compared to adults, the potential for radiostrontium exposure is greater for children who consume foods (e.g., milk, grains) produced in areas with elevated concentrations of radiostrontium in the soil and for children with elevated concentrations of radiostrontium in their drinking water. Children are more likely to be exposed to 90Sr in cow's milk produced in contaminated areas..

Agency for Toxic Substances and Disease Registry (ATSDR); Toxicological Profile for Strontium.

2,4-PENTANEDIONE:

■ log Pow (Verschueren 1983):	1.9/2.25
■ Algae IC50 (72hr.) (mg/l):	2.7- 8.5
■ BCF<100:	0.7, 0.75
■ Water solubility (g/l):	166000
■ log Kow (Prager 1995):	0.14
■ log Pow (Verschueren 1983):	1.90/2.25
■ BOD5:	5.60%
■ BOD20:	69.6

Ecotoxicity

Ingredient	Persistence: Water/Soil	Persistence: Air	Bioaccumulation	Mobility
2,4-pentanedione	LOW		LOW	HIGH

Section 13 - DISPOSAL CONSIDERATIONS

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.
For small quantities:

- Dissolve the material (in water or acid solution as appropriate) or convert it to a water soluble state with appropriate oxidizing agent.
- Precipitate as the sulfide, adjusting the pH to neutral to complete the precipitation.
- Filter off sulfide solids for recovery or disposal to approved land-fill.
- Destroy excess sulfide in solution with, for example, sodium hypochlorite, neutralize, and flush to sewer (subject to local regulation).
- Recycle wherever possible.
- Consult manufacturer for recycling options or consult Waste Management Authority for disposal if no suitable treatment or disposal facility can be identified.
- Dispose of by: Burial in a licensed land-fill or Incineration in a licensed apparatus (after admixture with suitable combustible material)
- Decontaminate empty containers. Observe all label safeguards until containers are cleaned and destroyed.

Section 14 - TRANSPORTATION INFORMATION

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

Section 15 - REGULATORY INFORMATION

Regulations for ingredients

2,4-pentanedione (CAS: 123-54-6) is found on the following regulatory lists;

"Canada Domestic Substances List (DSL)","Canada Ingredient Disclosure List (SOR/88-64)","International Council of Chemical Associations (ICCA) - High Production Volume List","OECD Representative List of High Production Volume (HPV) Chemicals","US - Massachusetts Oil & Hazardous Material List","US - New Jersey Right to Know Hazardous Substances","US DOE Temporary Emergency Exposure Limits (TEELs)","US EPA High Production Volume Program Chemical List","US FDA Indirect Food Additives: Adhesives and Components of Coatings - Substances for Use Only as Components of Adhesives - Adhesives","US Toxic Substances Control Act (TSCA) - Inventory","US TSCA Section 12(b) - List of Chemical Substances Subject to Export Notification Requirements","US TSCA Section 5(a)(2) - Significant New Use Rules (SNURs)","US TSCA Section 8 (a) - Preliminary Assessment Information Rules (PAIR) - Reporting List","US TSCA Section 8 (d) - Health and Safety Data Reporting"

No data for strontium(II) acetylacetonate (CAS: , 12193-47-4, 66586-42-3)

Section 16 - OTHER INFORMATION

LIMITED EVIDENCE

■ Cumulative effects may result following exposure*.
■ Possible skin sensitizer*.
* (limited evidence).

Ingredients with multiple CAS Nos

Ingredient Name	CAS
strontium(II) acetylacetonate	12193-47-4, 66586-42-3

■ Classification of the mixture and its individual components has drawn on official and authoritative sources as well as independent review by the Chemwatch Classification committee using available literature references.
A list of reference resources used to assist the committee may be found at:

www.chemwatch.net/references.

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

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