Sodium-potassium alloy

sc-281150

Material Safety Data Sheet

Hazard Alert Code Key:	EXTREME	HIGH	MODERATE	LOW

Section 1 - CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME

Sodium-potassium alloy

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

- Reagent. Sodium substitute in many reactions.

SYNONYMS

NaK, "potassium compound with sodium (2:1) (CAS RN 12532-69-3)"

Section 2 - HAZARDS IDENTIFICATION

CANADIAN WHMIS SYMBOLS

EMERGENCY OVERVIEW

RISK

Causes burns.
Risk of serious damage to eyes.
Reacts violently with water liberating extremely flammable gases.
Extremely flammable.

POTENTIAL HEALTH EFFECTS

ACUTE HEALTH EFFECTS

SWALLOWED

- The material can produce chemical burns within the oral cavity and gastrointestinal tract following ingestion.
- Accidental ingestion of the material may be damaging to the health of the individual.

■ Ingestion of alkaline corrosives may produce burns around the mouth, ulcerations and swellings of the mucous membranes, profuse saliva production, with an inability to speak or swallow. Both the esophagus and stomach may experience burning pain; vomiting and diarrhea may follow. Epiglottal swelling may result in respiratory distress and asphyxia; shock can occur. Narrowing of the esophagus, stomach or stomach valve may occur immediately or after a long delay (weeks to years). Severe exposure can perforate the esophagus or stomach leading to infections of the chest or abdominal cavity, with low chest pain, abdominal stiffness and fever. All of the above can cause death.

EYE

■ The material can produce chemical burns to the eye following direct contact. Vapors or mists may be extremely irritating.
■ If applied to the eyes, this material causes severe eye damage.
■ Direct eye contact with corrosive bases can cause pain and burns. There may be swelling, epithelium destruction, clouding of the cornea and inflammation of the iris. Mild cases often resolve; severe cases can be prolonged with complications such as persistent swelling, scarring, permanent cloudiness, bulging of the eye, cataracts, eyelids glued to the eyeball and blindness.

SKIN

■ The material can produce chemical burns following direct contactwith the skin.
■ Skin contact with the material may damage the health of the individual; systemic effects may result following absorption.
■ 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.
■ The material can produce severe chemical burns following direct contactwith the skin.

INHALED

■ If inhaled, this material can irritate the throat andlungs of some persons.
■ 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.
■ The inhalation of small particles of metal oxide results in sudden thirst, a sweet, metallic our foul taste, throat irritation, cough, dry mucous membranes, tiredness and general unwellness. Headache, nausea and vomiting, fever or chills, restlessness, sweating, diarrhea, excessive urination and prostration may also occur. After exposure is removed, recovery occurs within 24-36 hours.
■ Inhaling corrosive bases may irritate the respiratory tract. Symptoms include cough, choking, pain and damage to the mucous membrane. In severe cases, lung swelling may develop, sometimes after a delay of hours to days. There may be low blood pressure, a weak and rapid pulse, and crackling sounds.

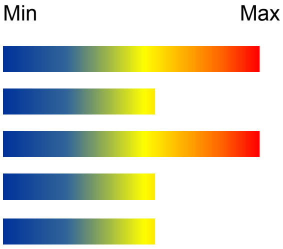
CHRONIC HEALTH EFFECTS

■ Repeated or prolonged exposure to corrosives may result in the erosion of teeth, inflammatory and ulcerative changes in the mouth and necrosis (rarely) of the jaw. Bronchial irritation, with cough, and frequent attacks of bronchial pneumonia may ensue. Gastrointestinal disturbances may also occur. Chronic exposures may result in dermatitis and/or conjunctivitis.
Limited evidence suggests that repeated or long-term occupational exposure may produce cumulative health effects involving organs or biochemical systems.
Long term exposure to high dust concentrations may cause changes in lung function i.e. pneumoconiosis; caused by particles less than 0.5 micron penetrating and remaining in the lung. Prime symptom is breathlessness; lung shadows show on X-ray.

Section 3 - COMPOSITION / INFORMATION ON INGREDIENTS

HAZARD RATINGS

Flammability:	4
Toxicity:	2
Body Contact:	4
Reactivity:	2
Chronic:	2



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

NAME	CAS RN	%
sodium/ potassium alloy	11135-81-2	
contains		
sodium	7440-23-5	50-80
potassium	7440-09-7	20-50

Section 4 - FIRST AID MEASURES

SWALLOWED

■

- For advice, contact a Poisons Information Center or a doctor at once.
- Urgent hospital treatment is likely to be needed.
- If swallowed do NOT induce vomiting.
- If vomiting occurs, lean patient forward or place on left side (head-down position, if possible) to maintain open airway and prevent aspiration.
- Observe the patient carefully.
- Never give liquid to a person showing signs of being sleepy or with reduced awareness; i.e. becoming unconscious.
- Give water to rinse out mouth, then provide liquid slowly and as much as casualty can comfortably drink.
- Transport to hospital or doctor without delay.

EYE

■ If this product comes in contact with the eyes:

- Immediately hold eyelids apart and flush the eye continuously with 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.
- Continue flushing until advised to stop by the Poisons Information Center or a doctor, or for at least 15 minutes.
- Transport to hospital or doctor without delay.
- Removal of contact lenses after an eye injury should only be undertaken by skilled personnel.
- DO NOT attempt to remove particles attached to or embedded in eye.
- 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.
- Wash skin and hair with running water. Continue flushing with water until advised to stop by the Poisons Information Center.
- Transport to hospital, or doctor.

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.

NOTES TO PHYSICIAN

■ Treat symptomatically.

Copper, magnesium, aluminum, antimony, iron, manganese, nickel, zinc (and their compounds) in welding, galvanizing or smelting operations all give rise to thermally produced particulates of smaller dimension than might be produced if the metals are divided mechanically. Where insufficient ventilation or respiratory protection is available these particulates may produce "metal fume fever" in workers from an acute or long term exposure.

- Onset occurs in 4-6 hours generally on the evening following exposure. Tolerance develops in workers but may be lost over the weekend. (Monday Morning Fever)
- Pulmonary function tests may indicate reduced lung volumes, small airway obstruction and decreased carbon monoxide diffusing capacity but these abnormalities resolve after several months.
- Although mildly elevated urinary levels of heavy metal may occur they do not correlate with clinical effects.
- The general approach to treatment is recognition of the disease, supportive care and prevention of exposure.
- Seriously symptomatic patients should receive chest x-rays, have arterial blood gases determined and be observed for the development of tracheobronchitis and pulmonary edema.

[Ellenhorn and Barceloux: Medical Toxicology].

For acute or short-term repeated exposures to highly alkaline materials:

- Respiratory stress is uncommon but present occasionally because of soft tissue edema.
- Unless endotracheal intubation can be accomplished under direct vision, cricothyroidotomy or tracheotomy may be necessary.
- Oxygen is given as indicated.
- The presence of shock suggests perforation and mandates an intravenous line and fluid administration.
- Damage due to alkaline corrosives occurs by liquefaction necrosis whereby the saponification of fats and solubilization of proteins allow deep penetration into the tissue.

Alkalis continue to cause damage after exposure.

INGESTION:

- Milk and water are the preferred diluents

No more than 2 glasses of water should be given to an adult.

- Neutralizing agents should never be given since exothermic heat reaction may compound injury.

* Catharsis and emesis are absolutely contra-indicated.
* Activated charcoal does not absorb alkali.
* Gastric lavage should not be used.

Supportive care involves the following:

- Withhold oral feedings initially.
- If endoscopy confirms transmucosal injury start steroids only within the first 48 hours.
- Carefully evaluate the amount of tissue necrosis before assessing the need for surgical intervention.
- Patients should be instructed to seek medical attention whenever they develop difficulty in swallowing (dysphagia).

SKIN AND EYE:

- Injury should be irrigated for 20-30 minutes.
- Eye injuries require saline. [Ellenhorn & Barceloux: Medical Toxicology]

Section 5 - FIRE FIGHTING MEASURES

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

EXTINGUISHING MEDIA

■ Metal dust fires need to be smothered with sand, inert dry powders.

DO NOT USE WATER, CO2 , FOAM, GRAPHITE POWDER or HALOGENATED EXTINGUISHING AGENTS.

- Use DRY sand, dry sodium chloride based extinguishers, G-1 or Met L-X to smother fire.
- Confining or smothering material is preferable to applying water as chemical reaction may produce flammable and explosive hydrogen gas.
- Chemical reaction with CO2 may produce flammable and explosive methane.
- If impossible to extinguish, withdraw, protect surroundings and allow fire to burn itself out.

FIRE FIGHTING

■

- Alert Emergency Responders and tell them location and nature of hazard.
- May be violently or explosively reactive.
- Wear full protective clothing plus breathing apparatus.
- Prevent, by any means available, spillage from entering drains or water course.
- Consider evacuation (or protect in place)
- DO NOT use water on fires.

CAUTION: If only water available, use flooding quantities of water or withdraw personnel.

- DO NOT allow water to enter containers.
- DO NOT approach containers suspected to be hot.
- Cool fire exposed containers with flooding quantities of water from a protected location until well after fire is out.
- If safe to do so, remove undamaged containers from path of fire.
- If fire gets out of control withdraw personnel and warn against entry.
- Equipment should be thoroughly decontaminated after use.
- Fight fire from a protected position or use unmanned hose holders or monitor nozzles.
- Withdraw immediately in case of rising sound from venting safety devices or discolouration of tanks.
- ALWAYS stay away from tank ends.

GENERAL FIRE HAZARDS/HAZARDOUS COMBUSTIBLE PRODUCTS

■ Combustion products include: metal oxides.
Ignites spontaneously in air or oxygen.
Solid in contact with water or moisture liberates flammable hydrogen gas with sufficient heat to cause ignition or explosion.
Burns violently accompanied by explosions, which can cause spattering of material.
Decomposes to form toxic fumes of the oxide, which can react with moisture or steam to produce heat,the corrosive hydroxide and flammable hydrogen gas.
WARNING: Long standing in contact with air and light may result in the formation
of potentially explosive peroxides.

FIRE INCOMPATIBILITY

■

- Reacts with acids producing flammable / explosive hydrogen (H2) gas

Segregate from alcohol, water.

- NOTE: May develop pressure in containers; open carefully. Vent periodically.
- Keep dry

PERSONAL PROTECTION

Glasses:
Full face- shield.
Gloves:
Respirator:
Particulate

Section 6 - ACCIDENTAL RELEASE MEASURES

MINOR SPILLS

■

- Material from spill may be contaminated with water resulting in generation of gas which subsequently may pressure closed containers.
- Hold spill material in vented containers only and plan for prompt disposal.
- Eliminate all ignition sources.
- Cover with DRY earth, sand or other non-combustible material.
- Then cover with plastic sheet to minimize spreading and to prevent exposure to rain or other sources of water.
- Use clean, non-sparking tools to collect absorbed material and place into loosely-covered metal or plastic containers ready for disposal.
- Wear gloves and safety glasses as appropriate.

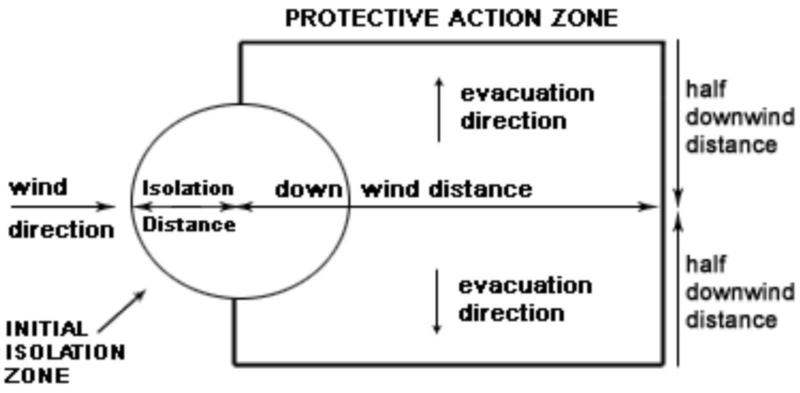
MAJOR SPILLS

■

- Clear area of personnel and move upwind.
- Alert Emergency Responders and tell them location and nature of hazard.
- 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.
- Wear full protective clothing plus breathing apparatus.
- DO NOT touch damaged containers or spilled material unless wearing appropriate protective clothing.
- Water spray may be used to knock down vapors or divert vapor clouds; DO NOT allow water to enter container or come into contact with the material.
- Cover with DRY earth, sand, vermiculite or other non-combustible material.
- Then cover with plastic sheet to minimize spreading and to prevent exposure to rain or other sources of water.
- 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 DRY earth, sand, or vermiculite and then covered with a high boiling point mineral oil.
- Recover the liquid using non-sparking appliances and place in labeled, sealable container.
- Wash spill area with detergent and 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.

PROTECTIVE ACTIONS FOR SPILL



From IERG (Canada/Australia)	
Isolation Distance	50 meters
Downwind Protection Distance	500 meters

FOOTNOTES

1 PROTECTIVE ACTION ZONE is defined as the area in which people are at risk of harmful exposure. This zone assumes that random changes in wind direction confines the vapour plume to an area within 30 degrees on either side of the predominant wind direction, resulting in a crosswind protective action distance equal to the downwind protective action distance.
2 PROTECTIVE ACTIONS should be initiated to the extent possible, beginning with those closest to the spill and working away from the site in the downwind direction. Within the protective action zone a level of vapour concentration may exist resulting in nearly all unprotected persons becoming incapacitated and unable to take protective action and/or incurring serious or irreversible health effects.
3 INITIAL ISOLATION ZONE is determined as an area, including upwind of the incident, within which a high probability of localised wind reversal may expose nearly all persons without appropriate protection to life-threatening concentrations of the material.
4 SMALL SPILLS involve a leaking package of 200 litres (55 US gallons) or less, such as a drum (jerrican or box with inner containers). Larger packages leaking less than 200 litres and compressed gas leaking from a small cylinder are also considered "small spills". LARGE SPILLS involve many small leaking packages or a leaking package of greater than 200 litres, such as a cargo tank, portable tank or a "one-tonne" compressed gas cylinder.
5 Guide 138 is taken from the US DOT emergency response guide book.
6 IERG information is derived from CANUTEC - Transport Canada.

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

■ The substance accumulates peroxides which may become hazardous only if it evaporates or is distilled or otherwise treated to concentrate the peroxides. The substance may concentrate around the container opening for example.
Purchases of peroxidizable chemicals should be restricted to ensure that the chemical is used completely before it can become peroxidized.

- A responsible person should maintain an inventory of peroxidizable chemicals or annotate the general chemical inventory to indicate which chemicals are subject to peroxidation. An expiration date should be determined. The chemical should either be treated to remove peroxides or disposed of before this date.
- The person or laboratory receiving the chemical should record a receipt date on the bottle. The individual opening the container should add an opening date.
- Unopened containers received from the supplier should be safe to store for 18 months.
- Opened containers should not be stored for more than 12 months.
- Avoid all personal contact, including inhalation.
- Wear protective clothing when risk of overexposure occurs.
- Use in a well-ventilated area.
- Avoid contact with moisture.
- 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.

RECOMMENDED STORAGE METHODS

■ DO NOT repack. Use only containers as originally supplied by manufacturer.
Glass container.
Storage containers must be hermetically sealed; the product must bestored under an inert, dry gas.
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. For materials with a viscosity of at least 2680 cSt. (23 deg. C):

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

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 molded plastic box and the substances are not incompatible with the plastic. All combination packages for Packing group I and II must contain cushioning material.

STORAGE REQUIREMENTS

■

- Potassium (and its alloys) should be stored in an airtight container under an inert atmosphere such as nitrogen or argon, or in naphtha or another similar liquid hydrocarbon, such as mineral oil, coal oil or kerosene, free from any traces of moisture; to prevent reaction with water vapour in the air
- Unlike lithium and sodium, however, potassium should not be stored under oil indefinitely. If stored longer than 6 months to a year, dangerous shock-sensitive peroxides can form on the metal and under the lid of the container, which can detonate upon opening.
- It is recommended that potassium not be stored for longer than three months unless stored in an inert (oxygen free) atmosphere, or under vacuum
- Never store under halogenated hydrocarbons such as Freon or methylene chloride
- Storage area should be warm and dry to prevent moisture condensation

KEEP DRY! Packages must be protected from water ingress.
FOR MINOR QUANTITIES:

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

FOR PACKAGE STORAGE:

- 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 vapors 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.
- Automatic fire-sprinklers MUST NOT be installed in room or space.
- The room or space must be located at least five meters from the boundaries of the premises and from other buildings unless separated by a wall with a fire resistance of at least four hours.
- Observe manufacturer's storing and handling recommendations.

SAFE STORAGE WITH OTHER CLASSIFIED CHEMICALS

+	X	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/m³	STEL ppm	STEL mg/m³	Peak ppm	Peak mg/m³	TWA F/CC	Notes
US - Oregon Permissible Exposure Limits (Z3)	potassium (Inert or Nuisance Dust: (d) Total dust)		10						*
US OSHA Permissible Exposure Levels (PELs) - Table Z3	potassium (Inert or Nuisance Dust: (d) Respirable fraction)		5						
US OSHA Permissible Exposure Levels (PELs) - Table Z3	potassium (Inert or Nuisance Dust: (d) Total dust)		15						
US - Hawaii Air Contaminant Limits	potassium (Particulates not other wise regulated - Total dust)		10						
US - Hawaii Air Contaminant Limits	potassium (Particulates not other wise regulated - Respirable fraction)		5						

US - Oregon Permissible Exposure Limits (Z3)	potassium (Inert or Nuisance Dust: (d) Respirable fraction)	5	*
US - Tennessee Occupational Exposure Limits - Limits For Air Contaminants	potassium (Particulates not otherwise regulated Respirable fraction)	5	
US - Wyoming Toxic and Hazardous Substances Table Z1 Limits for Air Contaminants	potassium (Particulates not otherwise regulated (PNOR)(f)- Respirable fraction)	5	
US - Michigan Exposure Limits for Air Contaminants	potassium (Particulates not otherwise regulated, Respirable dust)	5	

The following materials had no OELs on our records

• sodium/ potassium alloy: CAS:11135-81-2 CAS:12532-69-3

• sodium: CAS:7440-23-5

MATERIAL DATA

POTASSIUM:
SODIUM/ POTASSIUM ALLOY:
SODIUM:

■ It is the goal of the ACGIH (and other Agencies) to recommend TLVs (or their equivalent) for all substances for which there is evidence of health effects at airborne concentrations encountered in the workplace.

At this time no TLV has been established, even though this material may produce adverse health effects (as evidenced in animal experiments or clinical experience). Airborne concentrations must be maintained as low as is practically possible and occupational exposure must be kept to a minimum.

NOTE: The ACGIH occupational exposure standard for Particles Not Otherwise Specified (P.N.O.S) does NOT apply.

POTASSIUM:
SODIUM/ POTASSIUM ALLOY:
SODIUM:

■ 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

■

- Chemical goggles.
- Full face shield.
- Contact lenses pose a special hazard; soft lenses may absorb irritants and all lenses concentrate them.

HANDS/FEET

■ Wear chemical protective gloves, eg. PVC.

Wear safety footwear or safety gumboots, eg. Rubber.

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.

- Layered protective clothing gives added protection from burns, e.g. elbow length mitts (which are oversize for easy removal) over fitting gloves.

- Where possible design should minimise manual handling.
- Because of fire hazard, do not use rubber or plastic protective clothing which will melt compounding burn injury.
- All protective clothing must be kept warm and dry, to prevent condensation of atmospheric moisture.
- Protective gloves eg. Leather gloves or gloves with Leather facing
- Neoprene gloves

OTHER

■ For industrial quantities:

- Hard hat with brim.
- Layered protective clothing gives added protection from burns, consider supply of fire resistant underwear, trousers, heavy duty shoes.
- Overalls.
- Eyewash unit.
- Barrier cream.
- Skin cleansing cream.
- Some plastic personal protective equipment (PPE) (e.g. gloves, aprons, overshoes) are not recommended as they may produce static electricity.
- For large scale or continuous use wear tight-weave non-static clothing (no metallic fasteners, cuffs or pockets), non sparking safety footwear.

■

- 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	P1	-	PAPR-P1
	Air-line*	-	-
50 x PEL	Air-line**	P2	PAPR-P2
100 x PEL	-	P3	-
		Air-line*	-
100+ x PEL	-	Air-line**	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 systems must be designed to provide a minimum capture velocity at the fume source away from the worker of 0.5 metre/sec.

Section 9 - PHYSICAL AND CHEMICAL PROPERTIES

PHYSICAL PROPERTIES

Solid.
Alkaline.

State	Divided solid	Molecular Weight	Not applicable
Melting Range (°F)	Not available	Viscosity	Not Applicable
Boiling Range (°F)	Not available	Solubility in water (g/L)	Reacts violently
Flash Point (°F)	Not applicable	pH (1% solution)	14
Decomposition Temp (°F)	Not Applicable	pH (as supplied)	Not applicable
Autoignition Temp (°F)	Not available.	Vapour Pressure (mmHG)	Negligible

Upper Explosive Limit (%)	Not applicable	Specific Gravity (water=1)	<1
Lower Explosive Limit (%)	Not applicable	Relative Vapor Density (air=1)	Not Applicable
Volatile Component (%vol)	Negligible	Evaporation Rate	Not available

APPEARANCE

Silvery liquid metal or white ductile metal, depends on alloy composition, Supplied packed under dry hydrocarbon liquid or in hermetic containers. CARE: May inflame on opening in air. Reacts violently with water, moisture, steam, acids (including carbon dioxide) producing hydrogen gas which may ignite by heat of reaction.

Section 10 - CHEMICAL STABILITY

CONDITIONS CONTRIBUTING TO INSTABILITY

■

- Presence of heat source and ignition source
- Presence of incompatible materials
- Presence of air
- May heat spontaneously
- Identify and remove sources of ignition and heating.
- Incompatible material, especially oxidizers, and/or other sources of oxygen may produce unstable product(s).
- Avoid sources of water contamination (e.g. rain water, moisture, high humidity).
- Avoid contact with oxygenated solvents/ reagents such as alcohols.

STORAGE INCOMPATIBILITY

■ Sodium:

- is an extremely flammable solid which evolves sodium oxide at its autoignition temperature
- produces unstable peroxides on exposure to moist air and/ or may spontaneously ignite
- reacts violently with water, forming flammable hydrogen gas, sodium hydroxide, heat, often with fire
- is a powerful reducing agent
- reacts violently with oxidisers, acids, antimony chloride, carbon dioxide, carbon monoxide, carbon tetrachloride, chlorobenzene, copper oxide, diazomethane, dibromomethylborane, haloids, halogens, halogenated hydrocarbons (such as chlorinated solvents), heavy metal oxides, hexachlorocyclopentadiene, hydrazine hydrate, iodine monochloride, iodine pentafluoride, iron bromide, lead dioxide, maleic anhydride, manganese chloride, methyl chloride, methyl iodide, nitrous oxide, nitrosyl fluoride, nitrotoluene, nitryl fluoride, oxygen difluoride, phosgene, phosphorus, phosphorus pentachloride, phosphorus trichloride, seleninyl bromide, silver bromide, silver chloride, silver fluoride, silver oxide, silver iodide, sodium peroxide, sulfur, tetrachloroethane, trichloroethylene, vanadium oxytrichloride, and many other substances
- forms explosive mixtures with many substances including aluminium bromide, ammonium nitrate, arsenic iodide, ferric chloride, nitrotoluene, sodium nitrate
- is incompatible with many substances including boron trifluoride, chromic acid, cobalt bromide, cobalt chloride, mercury oxide, thionyl chloride, titanium dioxide, Teflon, , volatile hydrocarbons such as petroleum ether
- reacts violently with most common fire extinguishers

NOTE:

- Separate from all other materials and ensure the metal remains moisture free
- Store under inert gas or liquid hydrocarbon
- Mixtures of sodium with a wide range of halogenated alkane solvents are metastable and capable of initiation to explosion by shock or impact - generally the sensitivity to initiation and the force of the explosion increases with the degree of halogen substitution. Any aliphatic halocarbon (except fully fluorinated alkanes) may be expected to behave in this manner
- Sodium dispersions reduce metal halides exothermically
- Sodium and carbon dioxide are normally unreactive till red heat is attained but mixtures of the two solids are impact-sensitive and explode violently. Carbon dioxide is unsuitable as an extinguishant for the burning metal alone as the intensity of combustion is increased by replacing air with carbon dioxide (72.7% oxygen content). However it has been used successfully to extinguish solvent fires where sodium is present since it fails to ignite because of the blanketing effect of solvent vapour.
- Finely divided silica (sand) will often react with burning sodium so is not entirely suitable as an extinguishant
- Explosions have occurred when carbon powder is in contact with evaporating sodium and air

Potassium:

- is a combustible solid which may react with substances producing fire and explosion
- is a dangerous explosion hazard which may ignite spontaneously on contact with air
- reacts violently with water, causing spattering, forming heat, corrosive potassium hydroxide, and explosive hydrogen; the heat of reaction may cause ignition or explosion of the generated hydrogen
- is a powerful reducing agent
- reacts violently with many substances including oxidisers, organic materials, strong acids, alkalis, alcohols, carbon, carbonates, chlorinated hydrocarbons, nitrogen-containing explosives, compounds of heavy metals such as silver oxide and silver chloride, volatile hydrocarbons such petroleum ether or benzene (there is a serious risk of fire if powdered potassium (potassium sand), dispersed in benzene, is exposed to air)., halogens, halogenated hydrocarbons, nitrates , oxides, metal and non-metal halides,(mixtures of potassium with metal halides are sensitive to mechanical shock) mercury, peroxides, phosphates, silicates, sulfates, hydroxides of heavy metals, acetylene, carbon tetrachloride, carbon dioxide, carbon monoxide, hydrazine, maleic anhydride, phosphorus, phosphorus trichloride, selenium, sodium, tellurium
- is incompatible with Teflon
- undergoes oxidation and is able to form unstable peroxide ($K2O2$) or superoxides ($KO3$ or $K2O4$) under normal conditions of temperature and storage; oxidation and formation of peroxides may occur even when the metal is packaged under an inert gas, kerosene or mineral oil

WARNING:

- Potassium metal containing an oxide coating is an extremely dangerous explosion hazard and should be removed and destroyed by burning - a Police or Military Explosives Unit may need to be contacted where quantities are large - see Disposal section for further discussion.
- Several fires (but not explosions) occurred when potassium was "blotted" free of solvent (used to remove traces of oil) with previously used filter paper. The fires were attributed to rapid formation of potassium hydroxide solution from traces of potassium on the filter paper under humid conditions and ignition of the dry metal on contact with the wet alkali.
- Do not store potassium in aluminium containers; severe corrosion of the container may lead to perforation - this is due to

the deliquescent and subsequently, corrosive nature of potassium carbonate formed from atmospheric carbon dioxide inside the container (sodium in contrast produces sodium carbonate which is non-deliquescent). A serious laboratory fire originating in a store cupboard containing potassium in an aluminium container may have arisen through corrosive failure of the latter.

NOTE:

Reaction with air or oxygen in the complete absence of moisture does not occur even on heating to the boiling point. However, in contact with normal (moist) air, oxidation may become so fast that melting or ignition occurs, particularly if pressure is applied locally to cause melting and exposure of a fresh surface, as when potassium is pressed through a die to form potassium wire.

Metallic potassium on prolonged exposure to air forms a coating of yellowish potassium superoxide (KO2) under which is a layer of potassium oxide in contact with the metal. Earlier claims that normal contact with the superoxide caused ignition to occur (by impact of the superoxide into the underlying metal) are now known to be incorrect. Explosion is caused by interaction of residual traces of mineral oil and other organic contaminants, rather than the potassium metal, with the surface layer of the superoxide, initiated by blade pressure or impact. Flashes of light and fires or explosion have been reported when potassium was cut under oil.

Reaction with various forms of carbon (soot, graphite or activated charcoal) is exothermic and vigorous at elevated temperatures, and if the carbon is finely divided and air is present, ignition, leading to explosions, may occur (possibly owing to potassium superoxide formation). Explosions caused by attempts to extinguish potassium fires with graphite powder have been so attributed.

Metals and their oxides or salts may react violently with chlorine trifluoride. Chlorine trifluoride is a hypergolic oxidizer. It ignites on contact (without external source of heat or ignition) with recognized fuels - contact with these materials, following an ambient or slightly elevated temperature, is often violent and may produce ignition. The state of subdivision may affect the results.

Contact with water may generate highly flammable hydrogen gas.

- NOTE: May develop pressure in containers; open carefully. Vent periodically.
- Potassium sodium alloy is generally more hazardous than either of the component metals because alloys in the range 50-80 wt% of potassium are liquid at ambient temperatures can therefore come into more intimate contact with reagents than the solid metals.
- Most of the reaction characteristics of potassium and sodium may be expected to apply to the alloy with allowance for composition .
- The alloy usually ignites on exposure to air, with which it reacts to form potassium dioxide (or superoxide), a very powerful oxidant
- Mixtures of the alloy with solid carbon dioxide are powerful explosives, some 40 times more sensitive to shock than mercury fulminate
- Polytetrafluoroethylene (PTFE, Teflon) or hexafluoropropylene sealing tapes burn vigorously in contact with the alloy in a helium atmosphere. A Teflon coated magnetic stirrer used to stir the alloy under a propane atmosphere ignited when the speed was increased and generated enough heat to melt the glass. Triboelectric initiation was postulated
- The liquid alloy gives mixtures with halocarbons even more shock-sensitive than those with potassium
- Mixtures of the alloy with silver or mercury oxide are shock sensitive. Red mercury(I) oxide gives mixtures 40 times and yellow mercury(II) oxide gives mixtures 140 times as sensitive as mercury fulminate

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

Section 11 - TOXICOLOGICAL INFORMATION

sodium/ potassium alloy

TOXICITY AND IRRITATION

POTASSIUM:
SODIUM:

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

■ No significant acute toxicological data identified in literature search.

■ 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.

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

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SODIUM:

POTASSIUM:

CARCINOGEN

METALS	US Environmental Defense Scorecard Suspected Carcinogens	Reference(s)	P65-MC

Section 12 - ECOLOGICAL INFORMATION

Refer to data for ingredients, which follows:
SODIUM:
POTASSIUM:
SODIUM/ POTASSIUM ALLOY:
■ DO NOT discharge into sewer or waterways.
■ Metal-containing inorganic substances generally have negligible vapour pressure and are not expected to partition to air. Once released to surface waters and moist soils their fate depends on solubility and dissociation in water. Environmental processes (such as oxidation and the presence of acids or bases) may transform insoluble metals to more soluble ionic forms. Microbiological processes may also transform insoluble metals to more soluble forms. Such ionic species may bind to dissolved ligands or sorb to solid particles in aquatic or aqueous media. A significant proportion of dissolved/ sorbed metals will end up in sediments through the settling of suspended particles. The remaining metal ions can then be taken up by aquatic organisms.
When released to dry soil most metals will exhibit limited mobility and remain in the upper layer; some will leach locally into ground water and/ or surface water ecosystems when soaked by rain or melt ice. Environmental processes may also be important in changing solubilities.
Even though many metals show few toxic effects at physiological pHs, transformation may introduce new or magnified effects.
A metal ion is considered infinitely persistent because it cannot degrade further.
The current state of science does not allow for an unambiguous interpretation of various measures of bioaccumulation.
The counter-ion may also create heath and environmental concerns once isolated from the metal. Under normal physiological conditions the counter-ion may be essentially insoluble and may not be bioavailable.
Environmental processes may enhance bioavailability.
SODIUM/ POTASSIUM ALLOY:
SODIUM:
POTASSIUM:

Ecotoxicity

Ingredient	Persistence: Water/Soil	Persistence: Air	Bioaccumulation	Mobility
potassium			LOW	

Section 13 - DISPOSAL CONSIDERATIONS

US EPA Waste Number & Descriptions

A. General Product Information
Reactivity characteristic: use EPA hazardous waste number D003 (waste code R).

Disposal Instructions

All waste must be handled in accordance with local, state and federal regulations.
¦ Legislation addressing waste disposal requirements may differ by country, state and/ or territory. Each user must refer to laws operating in their area. In some areas, certain wastes must be tracked.
A Hierarchy of Controls seems to be common - the user should investigate:

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

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

- Cautiously add the material to dry butanol in an appropriate solvent.
- Reaction may be vigorous and exothermic.
- Large volumes of flammable hydrogen may be generated and ventingprocedures should be conducted in a flame-proof environment.
- Neutralize the solution with aqueous acid, filter and burn the liquidportion in an approved incinerator.

For disposal of small quantities (up to 5-10 g) of sodium metal immerse in isopropanol, which may contain up to 2% of water to increase the rate of reaction
For quantities up to 50 g burn in a heavy metal dish using a gas flame with suitable arrangements for dispersion or absorption of the alkali particulate smoke so produced.
A safe method for disposal of potassium residues in bulk storage and processing vessels has been described; the method involves reaction of the metallic residues with dry (condensate-free) steam under closely controlled conditions. It may be used where small scale techniques (dissolution in higher alcohols) are incompatible.
Old stocks of potassium, where the coating is orange or yellow, should not be cut, but destroyed by burning on an open coke fire, or by the addition of tert-butanol to small portions, under xylene, in a hood
It is dangerous to use methanol or ethanol (either wet or dry) as a replacement for tert-butanol).
DO NOT allow wash water from cleaning equipment to enter drains. Collect all wash water for treatment before disposal.

- Recycle wherever possible.
- Consult manufacturer for recycling options or consult Waste Management Authority for disposal if no suitable treatment or disposal facility can be identified.
- Dispose of by: Burial in a licensed land-fill or Incineration in a licensed apparatus (after admixture with suitable combustible material)
- Decontaminate empty containers. Observe all label safeguards until containers are cleaned and destroyed.
- Recycle where possible.
- Consult Waste Management Authority for disposal.
- Bury residue and dispose of containers/ packaging in authorized landfill.

For the destruction of residual small amounts of potassium sodium alloy, treatment with a 1;1 mixture of isopropanol and heptane over a safety tray is recommended.

Section 14 - TRANSPORTATION INFORMATION

DOT:

Symbols:	None	Hazard class or Division:	4.3
Identification Numbers:	UN1422	PG:	I
Label Codes:	4.3	Special provisions:	A7, A19, B27, N34, N40, T9, TP3, TP7, TP31
Packaging: Exceptions:	None	Packaging: Non-bulk:	201
Packaging: Exceptions:	None	Quantity limitations: Passenger aircraft/rail:	Forbidden
Quantity Limitations: Cargo aircraft only:	1 L	Vessel stowage: Location:	E
Vessel stowage: Other:	40, 52		

Hazardous materials descriptions and proper shipping names:
Potassium sodium alloys, liquid

Air Transport IATA:

ICAO/IATA Class:	4.3	ICAO/IATA Subrisk:	None
UN/ID Number:	1422	Packing Group:	I
Special provisions:	A1		
Cargo Only			
Packing Instructions:	409	Maximum Qty/Pack:	1 L
Passenger and Cargo		Passenger and Cargo	
Packing Instructions:	Forbidden	Maximum Qty/Pack:	Forbidden
Passenger and Cargo Limited Quantity		Passenger and Cargo Limited Quantity	
Packing Instructions:	-	Maximum Qty/Pack:	-

Shipping Name: POTASSIUM SODIUM ALLOYS, LIQUID

Maritime Transport IMDG:

IMDG Class:	4.3	IMDG Subrisk:	None
UN Number:	1422	Packing Group:	I
EMS Number:	F-G,S-L	Special provisions:	None
Limited Quantities:	None		

Shipping Name: POTASSIUM SODIUM ALLOYS, LIQUID

Section 15 - REGULATORY INFORMATION

sodium/ potassium alloy (CAS: 11135-81-2,12532-69-3) is found on the following regulatory lists;

"US - Pennsylvania - Hazardous Substance List","US - Rhode Island Hazardous Substance List","US DOE Temporary Emergency Exposure Limits (TEELs)"
Regulations for ingredients

sodium (CAS: 7440-23-5) is found on the following regulatory lists;

"Canada Domestic Substances List (DSL)","Canada Environmental Quality Guidelines (EQGs) Water: Community","Canada Toxicological Index Service - Workplace Hazardous Materials Information System - WHMIS (English)","Canada Toxicological Index Service - Workplace Hazardous Materials Information System - WHMIS (French)","OECD Representative List of High Production Volume (HPV) Chemicals","US - California Occupational Safety and Health Regulations (CAL/OSHA) - Hazardous Substances List","US - Massachusetts Oil & Hazardous Material List","US - New Jersey Right to Know Hazardous Substances","US - Pennsylvania - Hazardous Substance List","US - Rhode Island Hazardous Substance List","US CWA (Clean Water Act) - List of Hazardous Substances","US CWA (Clean Water Act) - Reportable Quantities of Designated Hazardous Substances","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 List of Lists - Consolidated List of Chemicals Subject to the Emergency Planning and Community Right-to-Know Act (EPCRA) and Section 112(r) of the Clean Air Act","US Toxic Substances Control Act (TSCA) - Inventory","WHO Guidelines for Drinking-water Quality - Chemicals for which guideline values have not been established"

potassium (CAS: 7440-09-7) is found on the following regulatory lists;

"Canada Domestic Substances List (DSL)","Canada Toxicological Index Service - Workplace Hazardous Materials Information System - WHMIS (English)","Canada Toxicological Index Service - Workplace Hazardous Materials Information System - WHMIS (French)","US - California Occupational Safety and Health Regulations (CAL/OSHA) - Hazardous Substances List","US - Massachusetts Oil & Hazardous Material List","US - New Jersey Right to Know Hazardous Substances","US - Pennsylvania - Hazardous Substance List","US - Rhode Island Hazardous Substance List","US DOE Temporary Emergency Exposure Limits (TEELs)","US Toxic Substances Control Act (TSCA) - Inventory"

Section 16 - OTHER INFORMATION

LIMITED EVIDENCE

- ■ Potentially explosive peroxides may form on standing.*.
- ■ Inhalation skin contact and/or ingestion may produce health damage*.
- ■ Cumulative effects may result following exposure*.

* (limited evidence).

Ingredients with multiple CAS Nos

Ingredient Name	CAS
sodium/ potassium alloy	11135-81-2, 12532-69-3

■ 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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