

2-Cyanoethyl Phosphate, Barium Salt Dihydrate

sc-209164

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

2-Cyanoethyl Phosphate, Barium Salt Dihydrate

STATEMENT OF HAZARDOUS NATURE

CONSIDERED A HAZARDOUS SUBSTANCE ACCORDING TO OSHA 29 CFR 1910.1200.

NFPA



SUPPLIER

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EMERGENCY:

ChemWatch
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(1-800-CHEMCALL) or call +613 9573 3112

SYNONYMS

C3-H6-N-O4-P, NCCH2CH2OPO3Ba.2H2O, "barium 2-cyanoethyl phosphate"

Section 2 - HAZARDS IDENTIFICATION

CHEMWATCH 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



CANADIAN WHMIS SYMBOLS



EMERGENCY OVERVIEW

RISK

Contact with acids liberates very toxic gas.
Harmful by inhalation and if swallowed.
May cause long-term adverse effects in the environment.

POTENTIAL HEALTH EFFECTS

ACUTE HEALTH EFFECTS

SWALLOWED

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

■ Nitrile poisoning exhibits similar symptoms to poisoning due to hydrogen cyanide.

The substances irritate the eyes and skin, and are absorbed quickly and completely through the skin.

■ Ingestion of soluble barium compounds may result in ulceration of the mucous membranes of the gastrointestinal tract, tightness in the muscles of the face and neck, gastroenteritis, vomiting, diarrhea, muscular tremors and paralysis, anxiety, weakness, labored breathing, cardiac irregularity due to contractions of smooth striated and cardiac muscles (often violent and painful), slow irregular pulse, hypertension, convulsions and respiratory failure.

EYE

■ Although the material is not thought to be an irritant, direct contact with the eye may cause transient discomfort characterized by tearing or conjunctival redness (as with windburn).
Slight abrasive damage may also result.

SKIN

■ Skin contact is not thought to produce harmful health effects (as classified using animal models).

Systemic harm, however, has been identified following exposure of animals by at least one other route and the material may still produce health damage following entry through wounds, lesions or abrasions.

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

■ Entry into the blood-stream, through, for example, cuts, abrasions or lesions, may produce systemic injury with harmful effects.

Examine the skin prior to the use of the material and ensure that any external damage is suitably protected.

INHALED

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

■ There is some evidence to suggest that 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.

■ Barium fumes are respiratory irritants.

Over-exposure to barium dusts and fume may result in rhinitis, frontal headache, wheezing, laryngeal spasm, salivation and anorexia.

CHRONIC HEALTH EFFECTS

■ 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.

Barium compounds may cause high blood pressure, airway irritation and damage the liver, spleen and bone marrow. Prolonged exposure may cause a lung inflammation and scarring.

Chronic exposure to cyanides and certain nitriles may result in interference to iodine uptake by thyroid gland and its consequent enlargement. This occurs following metabolic conversion of the cyanide moiety to thiocyanate.

Section 3 - COMPOSITION / INFORMATION ON INGREDIENTS

NAME	CAS RN	%
2-cyanoethyl phosphate, barium salt dihydrate	5015-38-3	>98

Section 4 - FIRST AID MEASURES

SWALLOWED

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

EYE

■ If 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.

SKIN

■ If skin or hair contact occurs: · 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.

NOTES TO PHYSICIAN

· After ingestion of barium acid salts, severe gastro-intestinal irritation followed by muscle twitching, progressive flaccid paralysis and severe hypokalemia and hypertension, occurs.
· Respiratory failure, renal failure and occasional cardiac dysrhythmias may result from an acute ingestion.
· Signs symptoms of acute cyanide poisoning reflect cellular hypoxia and are often non-specific.
· Cyanosis may be a late finding.
Nitriles may produce metabolic cyanide.

Section 5 - FIRE FIGHTING MEASURES

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

EXTINGUISHING MEDIA

· Water spray or fog.
· Foam.

FIRE FIGHTING

· Alert Emergency Responders and tell them location and nature of hazard.
· Wear breathing apparatus plus protective gloves.
When any large container (including road and rail tankers) is involved in a fire, consider evacuation by 800 metres in all directions.

GENERAL FIRE HAZARDS/HAZARDOUS COMBUSTIBLE PRODUCTS

· 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.
Combustion products include: carbon monoxide (CO), carbon dioxide (CO₂), nitrogen oxides (NO_x), phosphorus oxides (PO_x), metal oxides, other pyrolysis products typical of burning organic material.
Decomposes at high temperatures to produce barium oxide. Barium oxide is strongly alkaline and, upon contact with water, is exothermic. When barium oxide reacts with oxygen to give a peroxide, there is a fire and explosion risk.
May emit poisonous 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:
Particulate

Section 6 - ACCIDENTAL RELEASE MEASURES

MINOR SPILLS

■ Environmental hazard - contain spillage.
· 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

■ Environmental hazard - contain spillage.
· Clear area of personnel and move upwind.

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

Section 7 - HANDLING AND STORAGE

PROCEDURE FOR HANDLING

- Avoid all personal contact, including inhalation.
 - Wear protective clothing when risk of exposure occurs.
- 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

- Lined metal can, Lined metal pail/drum
 - Plastic pail.
- For low viscosity materials
- Drums and jerricans must be of the non-removable head type.
 - Where a can is to be used as an inner package, the can must have a screwed enclosure.

STORAGE REQUIREMENTS

- Store in original containers.
- Keep containers securely sealed.

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 - British Columbia Occupational Exposure Limits	2-cyanoethyl phosphate, barium salt dihydrate (Barium and soluble compounds, as Ba)		0.5						
US - Minnesota Permissible Exposure Limits (PELs)	2-cyanoethyl phosphate, barium salt dihydrate (Barium, soluble compounds (as Ba))		0.5						
US OSHA Permissible Exposure Levels (PELs) - Table Z1	2-cyanoethyl phosphate, barium salt dihydrate (Barium, soluble compounds (as Ba))		0.5						
Canada - Alberta Occupational Exposure Limits	2-cyanoethyl phosphate, barium salt dihydrate (Barium and soluble compounds, as Ba)		0.5						

US - Vermont Permissible Exposure Limits Table Z-1-A Transitional Limits for Air Contaminants	2-cyanoethyl phosphate, barium salt dihydrate (Barium, soluble compounds (as Ba))	0.5			
US - Vermont Permissible Exposure Limits Table Z-1-A Final Rule Limits for Air Contaminants	2-cyanoethyl phosphate, barium salt dihydrate (Barium, soluble compounds (as Ba))	0.5			
US - Idaho - Limits for Air Contaminants	2-cyanoethyl phosphate, barium salt dihydrate (Barium, soluble compounds (as Ba))	0.5			
US - Tennessee Occupational Exposure Limits - Limits For Air Contaminants	2-cyanoethyl phosphate, barium salt dihydrate (Barium, soluble compounds (as Ba))	0.5			
Canada - Saskatchewan Occupational Health and Safety Regulations - Contamination Limits	2-cyanoethyl phosphate, barium salt dihydrate (Barium and soluble compounds, (as Ba))	0.5		1.5	
US - Hawaii Air Contaminant Limits	2-cyanoethyl phosphate, barium salt dihydrate (Barium, soluble compounds (as Ba))	0.5			
Canada - Yukon Permissible Concentrations for Airborne Contaminant Substances	2-cyanoethyl phosphate, barium salt dihydrate (Barium (soluble compounds) (as Ba))	-	0.5	-	0.5
US - Washington Permissible exposure limits of air contaminants	2-cyanoethyl phosphate, barium salt dihydrate (Barium, soluble compounds (as Ba))	0.5		1.5	

Canada - Northwest Territories Occupational Exposure Limits (English)	2-cyanoethyl phosphate, barium salt dihydrate (Barium (soluble compounds) (as Ba))	0.5	1.5	
Canada - Nova Scotia Occupational Exposure Limits	2-cyanoethyl phosphate, barium salt dihydrate (Barium - Soluble compounds (as Ba))	0.5		TLV Basis: eye, skin & gastrointestinal irritation; muscular stimulation
US - Alaska Limits for Air Contaminants	2-cyanoethyl phosphate, barium salt dihydrate (Barium, soluble compounds (as Ba))	0.5		
US - Michigan Exposure Limits for Air Contaminants	2-cyanoethyl phosphate, barium salt dihydrate (Barium, soluble compounds (as Ba))	0.5		
Canada - Quebec Permissible Exposure Values for Airborne Contaminants (English)	2-cyanoethyl phosphate, barium salt dihydrate (Barium, soluble compounds (as Ba))	0.5		
US ACGIH Threshold Limit Values (TLV)	2-cyanoethyl phosphate, barium salt dihydrate (Barium - Soluble compounds (as Ba))	0.5		TLV Basis: eye, skin & gastrointestinal irritation; muscular stimulation
US - California Permissible Exposure Limits for Chemical Contaminants	2-cyanoethyl phosphate, barium salt dihydrate (Barium, soluble compounds, as Ba)	0.5		
US - Oregon Permissible Exposure Limits (Z-1)	2-cyanoethyl phosphate, barium salt dihydrate (Barium (soluble compounds))	-	0.5	

Canada - Prince Edward Island Occupational Exposure Limits	2-cyanoethyl phosphate, barium salt dihydrate (Barium - Soluble compounds (as Ba))	0.5	TLV Basis: eye, skin & gastrointestinal irritation; muscular stimulation
US - Wyoming Toxic and Hazardous Substances Table Z1 Limits for Air Contaminants	2-cyanoethyl phosphate, barium salt dihydrate (Barium, soluble compounds (as Ba))	0.5	

ENDOELTABLE

PERSONAL PROTECTION



RESPIRATOR

- particulate.

EYE

- Safety glasses with side shields.
- Chemical goggles.

HANDS/FEET

- Wear chemical protective gloves, eg. PVC.

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.

OTHER

- Overalls.
- Eyewash unit.

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.

Section 9 - PHYSICAL AND CHEMICAL PROPERTIES

PHYSICAL PROPERTIES

Solid.

Mixes with water.

Contact with acids liberates very toxic gas.

State	Divided solid	Molecular Weight	322.41
Melting Range (°F)	>572	Viscosity	Not Applicable

Boiling Range (°F)	Not available	Solubility in water (g/L)	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)	Negligible
Upper Explosive Limit (%)	Not available.	Specific Gravity (water=1)	Not available
Lower Explosive Limit (%)	Not available	Relative Vapor Density (air=1)	>1
Volatile Component (%vol)	Negligible	Evaporation Rate	Not applicable

APPEARANCE

White powder; mixes with water.

Section 10 - CHEMICAL STABILITY

CONDITIONS CONTRIBUTING TO INSTABILITY

- Presence of incompatible materials.
- Product is considered stable.

STORAGE INCOMPATIBILITY

- Avoid strong acids.
- Nitriles may polymerize in the presence of metals and some metal compounds.
- They are incompatible with acids; mixing nitriles with strong oxidizing acids can lead to extremely violent reactions.
- The covalent cyano group is endothermic and many organic nitriles are reactive under certain conditions; N-cyano derivatives are reactive or unstable.
- The majority of endothermic compounds are thermodynamically unstable and may decompose explosively under various circumstances of initiation.
- Many but not all endothermic compounds have been involved in decompositions, reactions and explosions and, in general, compounds with significantly positive values of standard heats of formation, may be considered suspect on stability grounds.

BREThERICK L.: Handbook of Reactive Chemical Hazards.

Avoid reaction with oxidizing agents, bases and strong reducing agents.

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

Section 11 - TOXICOLOGICAL INFORMATION

2-cyanoethyl phosphate, barium salt dihydrate

TOXICITY AND IRRITATION

2-CYANOETHYL PHOSPHATE, BARIUM SALT DIHYDRATE:

- No significant acute toxicological data identified in literature search.

CARCINOGEN

2-cyanoethyl phosphate, barium salt dihydrate	US - Rhode Island Hazardous Substance List	IARC
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Section 12 - ECOLOGICAL INFORMATION

May cause long-term adverse effects in the environment.

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

Ecotoxicity

Ingredient	Persistence: Water/Soil	Persistence: Air	Bioaccumulation	Mobility
2-cyanoethyl phosphate, barium salt dihydrate	No Data Available	No Data Available	No Data Available	No Data Available

Section 13 - DISPOSAL CONSIDERATIONS

US EPA Waste Number & Descriptions

A. General Product Information

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

Toxicity characteristic: use EPA hazardous waste number D005 (waste code E) if this substance, in a solid waste, produces an extract containing greater than 100 mg/L of barium.

Disposal Instructions

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

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

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

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

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

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

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

- Recycle wherever possible.
- Consult manufacturer for recycling options or consult Waste Management Authority for disposal if no suitable treatment or disposal facility can be identified.

Section 14 - TRANSPORTATION INFORMATION

DOT:

Symbols: None Hazard class or Division: 6.1

Identification Numbers: UN1564 PG: III

Label Codes: 6.1 Special provisions: IB8, IP3, T1, TP33

Packaging: Exceptions: 153 Packaging: Non- bulk: 213

Packaging: Exceptions: 153 Quantity limitations: 100 kg

Passenger aircraft/rail:

Quantity Limitations: Cargo 200 kg Vessel stowage: Location: A aircraft only:

Vessel stowage: Other: None

Hazardous materials descriptions and proper shipping names:

Barium compounds, n.o.s.

Air Transport IATA:

ICAO/IATA Class: 6.1 ICAO/IATA Subrisk: None

UN/ID Number: 1564 Packing Group: III

Special provisions: A3

Cargo Only

Packing Instructions: 200 kg Maximum Qty/Pack: 677

Passenger and Cargo Passenger and Cargo

Packing Instructions: 100 kg Maximum Qty/Pack: 670

Passenger and Cargo Limited Quantity Passenger and Cargo Limited Quantity

Packing Instructions: 10 kg Maximum Qty/Pack: Y645

Shipping Name: BARIUM COMPOUND, N.O.S. *(CONTAINS 2-CYANOETHYL PHOSPHATE, BARIUM SALT DIHYDRATE)

Maritime Transport IMDG:

IMDG Class: 6.1 IMDG Subrisk: None

UN Number: 1564 Packing Group: III

EMS Number: F-A , S-A Special provisions: 177 223

Limited Quantities: 5 kg

Shipping Name: BARIUM COMPOUND, N.O.S.(contains 2-cyanoethyl phosphate, barium salt dihydrate)

Section 15 - REGULATORY INFORMATION

2-cyanoethyl phosphate, barium salt dihydrate (CAS: 5015-38-3) is found on the following regulatory lists;
"Canada Domestic Substances List (DSL)", "US Toxic Substances Control Act (TSCA) - Inventory"

Section 16 - OTHER INFORMATION

Reasonable care has been taken in the preparation of this information, but the author makes no warranty of merchantability or any other warranty, expressed or implied, with respect to this information. The author makes

no representations and assumes no liability for any direct, incidental or consequential damages resulting from its use. For additional technical information please call our toxicology department on +800 CHEMCALL.

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

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

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

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Issue Date: Mar-12-2009

Print Date: May-25-2011