

Isosorbide dinitrate

sc-361929



The Power to Question

Material Safety Data Sheet

Hazard Alert Code
Key:

EXTREME

HIGH

MODERATE

LOW

Section 1 - CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

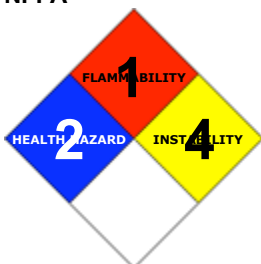
PRODUCT NAME

Isosorbide dinitrate

STATEMENT OF HAZARDOUS NATURE

CONSIDERED A HAZARDOUS SUBSTANCE ACCORDING TO OSHA 29 CFR 1910.1200.

NFPA



SUPPLIER

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EMERGENCY

ChemWatch
Within the US & Canada: 877-715-9305
Outside the US & Canada: +800 2436 2255
(1-800-CHEMCALL) or call +613 9573 3112

SYNONYMS

C6-H8-N2-O8, O2NO(C6H8O2)ONO2, "D-glucitol, 1, 4, 3, 6-dianhydro-, dinitrate", "1, 4, 3, 6-dianhydro-D-glucitol dinitrate", "glucitol, 1, 4, 3, 6-dianhydro-, dinitrate D-", "D-1, 4, 3, 6-dianhydroglucitol dinitrate", "glucitol, 1, 4, 3, 6-dianhydro-, dinitrate", "1, 4, 3, 6-dianhydroglucitol dinitrate", "sorbitol, 1, 4, 3, 6-dianhydro-, dinitrate", "1, 4, 3, 6-dianhydrosorbitol dinitrate", dinitrosorbide, "1, 4, 3, 6-dianhydrosorbitol 2, 5-dinitrate", Carvanil, Carvasin, Cedocard, Corosorbide, Harrical, ISDN, Isoket, Rigidal, Isordil, Sorbidin

Section 2 - HAZARDS IDENTIFICATION

CHEMWATCH HAZARD RATINGS

		Min	Max
Flammability	1		
Toxicity	2		
Body Contact	2		
Reactivity	4		
Chronic	2		

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



CANADIAN WHMIS SYMBOLS



EMERGENCY OVERVIEW

RISK

Explosive when dry.
Extreme risk of explosion by shock, fire, friction or other sources of ignition.
Harmful if swallowed.
May cause SENSITISATION by skin contact.
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.
■ Halitosis has occurred in several patients taking isosorbide nitrate sublingually.
May cause flushing of the face, dizziness, tachycardia, and throbbing headache.
■ The substance and/or its metabolites may bind to haemoglobin inhibiting normal uptake of oxygen.
This condition, known as "methaemoglobinemia", is a form of oxygen starvation (anoxia).

EYE

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

SKIN

■ Skin contact with the material may damage the health of the individual; systemic effects may result following absorption.
■ There is some evidence to suggest that 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 characterised by redness, swelling and blistering.
■ Open cuts, abraded or irritated skin should not be exposed to this material.
■ Entry into the blood-stream, through, for example, cuts, abrasions or lesions, may produce systemic injury with harmful effects.
Examine the skin prior to the use of the material and ensure that any external damage is suitably protected.

INHALED

■ The material is not thought to produce either adverse health effects or irritation of the respiratory tract following inhalation (as classified by EC Directives using animal models).
Nevertheless, adverse systemic effects have been produced following exposure of animals by at least one other route and good hygiene practice requires that exposure be kept to a minimum and that suitable control measures be used in an occupational setting.
■ 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.
If prior damage to the circulatory or nervous systems has occurred or if kidney damage has been sustained, proper screenings should be conducted on individuals who may be exposed to further risk if handling and use of the material result in excessive exposures.

CHRONIC HEALTH EFFECTS

■ Skin contact with the material is more likely to cause a sensitisation 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.

Section 3 - COMPOSITION / INFORMATION ON INGREDIENTS

NAME	CAS RN	%
isosorbide dinitrate	87-33-2	>95

Section 4 - FIRST AID MEASURES

SWALLOWED

- IF SWALLOWED, REFER FOR MEDICAL ATTENTION, WHERE POSSIBLE, WITHOUT DELAY.
- For advice, contact a Poisons Information Centre or a doctor.
- Urgent hospital treatment is likely to be needed.
- 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.

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.
- Seek medical attention without delay; if pain persists or recurs seek medical attention.
- Removal of contact lenses after an eye injury should only be undertaken by skilled personnel.

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, aerosols or combustion products are inhaled remove from contaminated area.
- Other measures are usually unnecessary.

NOTES TO PHYSICIAN

■ for isosorbide nitrate intoxication

- Syncope and hypotension should be treated by keeping the patient in a recumbent position with head lowered.
- The administration of oxygen with assisted respiration may be necessary in severe poisoning.
- If methaemoglobinaemia occurs give methylene blue 1 mg per kg body weight by slow intravenous injection.
- Circulation may be maintained with infusions of plasma or suitable electrolyte solutions.

Symptoms of vasodilation and reflex tachycardia may present following organic nitrate overdose; most organic nitrates are extensively metabolised by hydrolysis to inorganic nitrites. Organic nitrates and nitrites are readily absorbed through the skin, lungs, mucosa and gastro-intestinal tract.

The toxicity of nitrates and nitrites result from their vasodilating properties and their propensity to form methaemoglobin.

- Most produce a peak effect within 30 minutes.
- Clinical signs of cyanosis appear before other symptoms because of the dark pigmentation of methaemoglobin.
- Initial attention should be directed towards improving oxygen delivery, with assisted ventilation, if necessary. Hyperbaric oxygen has not demonstrated conclusive benefits.
- Institute cardiac monitoring, especially in patients with coronary artery or pulmonary disease.

Section 5 - FIRE FIGHTING MEASURES

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

EXTINGUISHING MEDIA

- DANGER Deliver media remotely.
- Water spray or fog.
- Flooding quantities only.

FIRE FIGHTING

DANGER HIGHLY EXPLOSIVE!

- Evacuate all personnel and move upwind to a safe distance.
- Prevent re-entry.
- Alert Fire Brigade and tell them the location and nature of the hazard.
- Fire fighting should only be undertaken by trained personnel.

GENERAL FIRE HAZARDS/HAZARDOUS COMBUSTIBLE PRODUCTS

Combustion products include carbon monoxide (CO), carbon dioxide (CO₂), nitrogen oxides (NO_x), other pyrolysis products typical of burning organic material.

Div 1.1, Compatibility Group A and B DANGER SEVERE EXPLOSION HAZARD!

- Combustible.
- Detonation may occur from heavy impact or excessive heating.
- Dry material is sensitive to shock, friction and sparks.
- Heating may cause expansion or decomposition leading to violent rupture of containers.

FIRE INCOMPATIBILITY

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

Section 6 - ACCIDENTAL RELEASE MEASURES

MINOR SPILLS

WARNING! EXPLOSIVE.

BLAST and/or PROJECTION and/or FIRE HAZARD

- Clean up all spills immediately.
- Avoid inhalation of the material and avoid contact with eyes and skin.
- Wear impervious gloves and safety glasses.
- Remove all ignition sources.

MAJOR SPILLS

WARNING! EXPLOSIVE.

- Clear area of personnel and move upwind.
- Alert Fire Brigade and tell them location and nature of hazard.
- May be violently or explosively reactive.
- Wear full body protective clothing with breathing apparatus.

Section 7 - HANDLING AND STORAGE

PROCEDURE FOR HANDLING

- Handle gently. Use good occupational work practice.
- Observe Manufacturer's storing and handling recommendations.
- Avoid all personal contact, including inhalation.
- Avoid smoking, naked lights, heat or ignition sources.

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

- All packaging for Class 1 Goods shall be in accordance with the requirements of the relevant Code for the transport of Dangerous Goods.

E3

Inner packaging- Bags, plastics/rubber/textile/textile rubberized

Outer- Barrels, wooden

Drums, plastics.

STORAGE REQUIREMENTS

- Store cases in a well ventilated magazine licenced for the appropriate Class, Division and Compatibility Group.
- Rotate stock to prevent ageing. Use on FIFO (first in-first out) basis.
- Observe manufacturer's storing and handling recommendations.
- Store in a cool place in original containers.

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 - Ontario Occupational Exposure Limits	isosorbide dinitrate (Isosorbide dinitrate / Dinitrate d'isosorbide)		0.2						Skin / Peau
Canada - British Columbia Occupational Exposure Limits	isosorbide dinitrate (Particles (Insoluble or Poorly Soluble) Not Otherwise Classified (PNOC))		10 (N)						

US - Tennessee Occupational Exposure Limits - Limits For Air Contaminants	isosorbide dinitrate (Particulates not otherwise regulated Respirable fraction)	5	
US - California Permissible Exposure Limits for Chemical Contaminants	isosorbide dinitrate (Particulates not otherwise regulated Respirable fraction)	5	(n)
US - Oregon Permissible Exposure Limits (Z-1)	isosorbide dinitrate (Particulates not otherwise regulated (PNOR) (f) Total Dust)	- 10	Bold print identifies substances for which the Oregon Permissible Exposure Limits (PELs) are different than the federal Limits. PNOR means "particles not otherwise regulated."
US - Michigan Exposure Limits for Air Contaminants	isosorbide dinitrate (Particulates not otherwise regulated, Respirable dust)	5	
US - Wyoming Toxic and Hazardous Substances Table Z1 Limits for Air Contaminants	isosorbide dinitrate (Particulates not otherwise regulated (PNOR)(f)-Respirable fraction)	5	
US - Oregon Permissible Exposure Limits (Z-1)	isosorbide dinitrate (Particulates not otherwise regulated (PNOR) (f) Respirable Fraction)	- 5	Bold print identifies substances for which the Oregon Permissible Exposure Limits (PELs) are different than the federal Limits. PNOR means "particles not otherwise regulated."

PERSONAL PROTECTION



RESPIRATOR

- Particulate. (AS/NZS 1716 & 1715, EN 1432000 & 1492001, ANSI Z88 or national equivalent)

EYE

- Safety glasses with side shields.
- Chemical goggles.
- Contact lenses may pose a special hazard; soft contact lenses may absorb and concentrate irritants. A written policy document, describing the wearing of lens or restrictions on use, should be created for each workplace or task. This should include a review of lens absorption and adsorption for the class of chemicals in use and an account of injury experience. Medical and first-aid personnel should be trained in their removal and suitable equipment should be readily available. In the event of chemical exposure, begin eye irrigation immediately and remove contact lens as soon as practicable. Lens should be removed at the first signs of eye redness or irritation - lens should be removed in a clean environment only after workers have washed hands thoroughly. [CDC NIOSH Current Intelligence Bulletin 59], [AS/NZS 1336 or national equivalent]

HANDS/FEET

- Wear chemical protective gloves, eg. PVC.
- Wear safety footwear or safety gumboots, eg. Rubber

NOTE

- The material may produce skin sensitisation in predisposed individuals. Care must be taken, when removing gloves and other protective equipment, to avoid all possible skin contact.
- Contaminated leather items, such as shoes, belts and watch-bands should be removed and destroyed.

Suitability and durability of glove type is dependent on usage. Important factors in the selection of gloves include

- frequency and duration of contact,
- chemical resistance of glove material,
- glove thickness and
- dexterity
- Non-sparking footwear essential.

OTHER

For handling explosives or explosive compositions

- Wear close-fitting flame-protection treated clothing closed at the neck and sleeves.
- Cotton underwear, socks and conductive shoes are recommended to avoid human static discharge.

Manufacture may require

- Non-static flame retardant treated clothing
- Access to deluge Safety shower
- Barrier cream.

ENGINEERING CONTROLS

■ Engineering controls are used to remove a hazard or place a barrier between the worker and the hazard. Well-designed engineering controls can be highly effective in protecting workers and will typically be independent of worker interactions to provide this high level of protection.

The basic types of engineering controls are

Process controls which involve changing the way a job activity or process is done to reduce the risk.

Enclosure and/or isolation of emission source which keeps a selected hazard "physically" away from the worker and ventilation that strategically "adds" and "removes" air in the work environment.

Section 9 - PHYSICAL AND CHEMICAL PROPERTIES

PHYSICAL PROPERTIES

Solid.

Does not mix with water.

State	Divided solid	Molecular Weight	236.1
Melting Range (°F)	158	Viscosity	Not Applicable
Boiling Range (°F)	Not available	Solubility in water (g/L)	Partly miscible
Flash Point (°F)	Not available	pH (1% solution)	Not applicable
Decomposition Temp (°F)	Not available.	pH (as supplied)	Not applicable
Autoignition Temp (°F)	Not available.	Vapor 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)	>1
Volatile Component (%vol)	Not available.	Evaporation Rate	Not available

APPEARANCE

Crystalline solid; does not mix well with water (0.11%). Soluble in acetone, chloroform.

Section 10 - CHEMICAL STABILITY

CONDITIONS CONTRIBUTING TO INSTABILITY

- Presence of shock and friction
- Presence of heat source and ignition source

STORAGE INCOMPATIBILITY

- Avoid contact with other explosives, pyrotechnics, solvents, adhesives, paints, cleaners and unauthorized metals, plastics, packing equipment and materials.
- Avoid contamination with acids, alkalis, reducing agents, amines and phosphorus.
- Explosion hazard may follow contact with incompatible materials
- Avoid reaction with oxidizing agents

DO NOT store as dry material. Avoid storage with other chemicals.

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

Section 11 - TOXICOLOGICAL INFORMATION

isosorbide dinitrate

TOXICITY AND IRRITATION

■ Contact allergies quickly manifest themselves as contact eczema, more rarely as urticaria or Quincke's oedema. The pathogenesis of contact eczema involves a cell-mediated (T lymphocytes) immune reaction of the delayed type. Other allergic skin reactions, e.g. contact urticaria, involve antibody-mediated immune reactions. The significance of the contact allergen is not simply determined by its sensitization potential the distribution of the substance and the opportunities for contact with it are equally important. A weakly sensitizing substance which is widely distributed can be a more important allergen than one with stronger sensitizing potential with which few individuals come into contact. From a clinical point of view, substances are noteworthy if they produce an allergic test reaction in more than 1% of the persons tested.

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.

CARCINOGEN

Nitrate or nitrite (ingested) under conditions that result in endogenous nitrosation	International Agency for Research on Cancer (IARC) - Agents Reviewed by the IARC Monographs	Group
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Section 12 - ECOLOGICAL INFORMATION

Harmful to aquatic organisms.

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

Ecotoxicity

Ingredient	Persistence: Water/Soil	Persistence: Air	Bioaccumulation	Mobility
isosorbide dinitrate	HIGH	No Data Available	LOW	HIGH

Section 13 - DISPOSAL CONSIDERATIONS

Disposal Instructions

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

- Containers may still present a chemical hazard/ danger when empty.
- Return to supplier for reuse/ recycling if possible.

Otherwise:

- If container can not be cleaned sufficiently well to ensure that residuals do not remain or if the container cannot be used to store the same product, then puncture containers, to prevent re-use, and bury at an authorised landfill.
- Where possible retain label warnings and MSDS and observe all notices pertaining to the product.

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. In most instances the supplier of the material should be consulted.

- DO NOT allow wash water from cleaning or process equipment to enter drains.
- It may be necessary to collect all wash water for treatment before disposal.
- In all cases disposal to sewer may be subject to local laws and regulations and these should be considered first.
- Where in doubt contact the responsible authority.
- Explosives which are surplus, deteriorated or considered unsafe for transport, storage or use shall be destroyed and the statutory authorities shall be notified.
- Explosives must not be thrown away, buried, discarded or placed with garbage.
- This material may be disposed of by burning or detonation but the operation must be performed under the control of a person competent in the destruction of explosives.

Disposal by detonation:

- The explosives to be destroyed must be placed in direct contact with fresh priming charge in a hole which is at least 0.6 metre deep and then adequately stemmed.
- No detonators shall be inserted into defective explosives.
- Personnel must be evacuated to a safe distance prior to initiation/firing of the charge.

Disposal by burning:

- Make a sawdust bed or trail adequate for the quantity of explosives to be burned, approximately 400 mm wide and 40 mm deep, upon which the explosive will be laid.
- If sawdust is not available, newspaper may be used.
- Normal precautions shall be taken to avoid the spread of fire.
- Individual trails should not be closer together than 600 mm and should contain not more than 12 kg of explosive.
- Trails should be side by side, NOT in-line, and not more than four should be set up at one time.
- Remove any explosive that is not to be burnt to a distance of at least 300 metre.
- Sufficient diesel oil (never petrol or other highly flammable liquid) should be used to thoroughly wet the sawdust (or paper) at least 4 litre per trail is recommended.
- Light the trail from a long, rolled paper wick which should be placed downwind and in contact with the end 1m of trail that is not covered with explosive. The wind should blow so that the flame from the wick (and later from the burning explosive) will blow away from the unburned explosive as detonation is more likely to occur if the explosive is preheated by the flame.
- If plastic igniter cord (slow) is available, its use for lighting is recommended instead of paper. One end should be coiled into the sawdust or under the paper and the other end lit from a minimum distance of 7m from the trail.
- Retire at least 300m or to a safe place.
- DO NOT return to the site for at least 30 minutes after the burning has apparently finished.
- If the fire goes out do not approach for at least 15 minutes after all trace of fire has gone.
- DO NOT add more diesel oil unless certain that the flame is completely extinguished.

[DYNQ].

- Recycle wherever possible.
- Consult manufacturer for recycling options or consult local or regional waste management authority for disposal if no suitable treatment or disposal facility can be identified.
- Dispose of by: burial in a land-fill specifically licenced to accept chemical and / or pharmaceutical wastes or Incineration in a licenced apparatus (after admixture with suitable combustible material)
- Decontaminate empty containers. Observe all label safeguards until containers are cleaned and destroyed.

Section 14 - TRANSPORTATION INFORMATION

DOT:

Symbols:	G	Hazard class or Division:	1.1A
Identification Numbers:	UN0473	PG:	II
Label Codes:	1.1A	Special provisions:	111
Packaging: Exceptions:	None	Packaging: Non-bulk:	62
Packaging: Exceptions:	None	Quantity limitations: Passenger aircraft/rail:	Forbidden
Quantity Limitations: Cargo aircraft only:	Forbidden	Vessel stowage: Location:	12
Vessel stowage: Other:	None		

Hazardous materials descriptions and proper shipping names:

Substances, explosive, n.o.s

Air Transport IATA:

ICAO/IATA Class:	1.1A	ICAO/IATA Subrisk:	None
UN/ID Number:	0473	Packing Group:	-
Special provisions:	None		

Cargo Only

Packing Instructions:	Forbidden	Maximum Qty/Pack:	Forbidden
Passenger and Cargo		Passenger and Cargo	
Packing Instructions:	Forbidden	Maximum Qty/Pack:	Forbidden
Passenger and Cargo		Passenger and Cargo	
Limited Quantity		Limited Quantity	
Packing Instructions:	Forbidden	Maximum Qty/Pack:	Forbidden

Shipping name: SUBSTANCES, EXPLOSIVE, N.O.S.(contains isosorbide dinitrate)

Maritime Transport IMDG:

IMDG Class:	1.1A	IMDG Subrisk:	None
UN Number:	0473	Packing Group:	None
EMS Number:	F-B,S-Y	Special provisions:	178 274
Limited Quantities:	0		

Shipping name: SUBSTANCES, EXPLOSIVE, N.O.S.(contains isosorbide dinitrate)

Section 15 - REGULATORY INFORMATION

isosorbide dinitrate (CAS: 87-33-2) is found on the following regulatory lists;

"Canada - Ontario Occupational Exposure Limits", "Canada Domestic Substances List (DSL)", "US Toxic Substances Control Act (TSCA) - Chemical Substance Inventory"

Section 16 - OTHER INFORMATION

LIMITED EVIDENCE

■ Skin contact may produce health damage*.

■ May produce skin discomfort*.

* (limited evidence).

Denmark Advisory list for selfclassification of dangerous substances

Substance	CAS	Suggested codes
isosorbide dinitrate	87- 33- 2	Xn; R22

■ 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.

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Issue Date: Dec-31-2010

Print Date: Jan-18-2012