



# SZABO SCANDIC

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## Produktinformation



Forschungsprodukte & Biochemikalien



Zellkultur & Verbrauchsmaterial



Diagnostik & molekulare Diagnostik



Laborgeräte & Service

Weitere Information auf den folgenden Seiten!  
See the following pages for more information!



### Lieferung & Zahlungsart

siehe unsere [Liefer- und Versandbedingungen](#)

### Zuschläge

- Mindermengenzuschlag
- Trockeneiszuschlag
- Gefahrgutzuschlag
- Expressversand

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# Yttrium(III) tris(isopropoxide)

sc-253846



The Power is Question

## Material Safety Data Sheet

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

### Section 1 - CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

#### PRODUCT NAME

Yttrium(III) tris(isopropoxide)

#### STATEMENT OF HAZARDOUS NATURE

CONSIDERED A HAZARDOUS SUBSTANCE ACCORDING TO OSHA 29 CFR 1910.1200.

#### NFPA



#### SUPPLIER

Santa Cruz Biotechnology, Inc.  
2145 Delaware Avenue  
Santa Cruz, California 95060  
800.457.3801 or 831.457.3800

#### EMERGENCY:

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

#### PRODUCT USE

■ Intermediate.

#### SYNONYMS

C9-H21-O3-Y, ((CH<sub>3</sub>)<sub>2</sub>CHO)<sub>3</sub>Y, "yttrium tri-isopropylate"

### Section 2 - HAZARDS IDENTIFICATION

#### CHEMWATCH HAZARD RATINGS

	Min	Max	
Flammability:	1		
Toxicity:	2		
Body Contact:	2		Min/Nil=0
Reactivity:	1		Low=1
Chronic:	2		Moderate=2
			High=3
			Extreme=4

#### CANADIAN WHMIS SYMBOLS



## EMERGENCY OVERVIEW RISK

### POTENTIAL HEALTH EFFECTS

#### ACUTE HEALTH EFFECTS

##### SWALLOWED

- Accidental ingestion of the material may be damaging to the health of the individual.
- Following ingestion, a single exposure to isopropyl alcohol produced lethargy and non-specific effects such as weight loss and irritation. Ingestion of near-lethal doses of isopropanol produces histopathological changes of the stomach, lungs and kidneys, incoordination, lethargy, gastrointestinal tract irritation, and inactivity or anaesthesia. Swallowing 10 ml. of isopropanol may cause serious injury; 100 ml. may be fatal if not promptly treated. The adult single lethal doses is approximately 250 ml. The toxicity of isopropanol is twice that of ethanol and the symptoms of intoxication appear to be similar except for the absence of an initial euphoric effect; gastritis and vomiting are more prominent. Ingestion may cause nausea, vomiting, and diarrhoea. There is evidence that a slight tolerance to isopropanol may be acquired.

##### EYE

- There is some evidence to suggest that this material can cause eye irritation and damage in some persons.
- Isopropanol vapour may cause mild eye irritation at 400 ppm. Splashes may cause severe eye irritation, possible corneal burns and eye damage. Eye contact may cause tearing or blurring of vision.

##### SKIN

- Skin contact is not thought to have harmful health effects, however the material may still produce health damage following entry through wounds, lesions or abrasions.
- There is some evidence to suggest that this material can cause inflammation of the skin on contact in some persons.
- 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

- 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.
- Exposure to vapors of some rare earth salts can cause sensitivity to heat, itching, and increased sensitivity of smell and taste. Other effects include inflamed airways and lung, emphysema, regional narrowing of terminal airways and cell changes. Rarely, excess blood flow has occurred following a delay. Lung cancers can also occur.
- The odour of isopropanol may give some warning of exposure, but odour fatigue may occur. Inhalation of isopropanol may produce irritation of the nose and throat with sneezing, sore throat and runny nose. The effects in animals subject to a single exposure, by inhalation, included inactivity or anaesthesia and histopathological changes in the nasal canal and auditory canal.

##### 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. Prime symptom is breathlessness; lung shadows show on X-ray.

Yttrium is a rare earth metal - heavy type (yttrium family). There has been no reports of poisoning in workers, although the metal can cause chest X-ray abnormalities due to its high density. It can cause scarring of the lungs, anemia and changes in blood cell distribution, due to inhalation of their dusts.

Long term or repeated ingestion exposure of isopropanol may produce incoordination, lethargy and reduced weight gain.

Repeated inhalation exposure to isopropanol may produce narcosis, incoordination and liver degeneration. Animal data show developmental effects only at exposure levels that produce toxic effects in the adult animals. Isopropanol does not cause genetic damage in bacterial or mammalian cell cultures or in animals.

There are inconclusive reports of human sensitisation from skin contact with isopropanol. Chronic alcoholics are more tolerant of systemic isopropanol than are persons who do not consume alcohol; alcoholics have survived as much as 500 ml. of 70% isopropanol.

Continued voluntary drinking of a 2.5% aqueous solution through two successive generations of rats produced no reproductive effects.

NOTE: Commercial isopropanol does not contain "isopropyl oil". An excess incidence of sinus and laryngeal cancers in isopropanol production workers has been shown to be caused by the byproduct "isopropyl oil". Changes in the production processes now ensure that no byproduct is formed. Production changes include use of dilute sulfuric acid at higher temperatures.

## Section 3 - COMPOSITION / INFORMATION ON INGREDIENTS

NAME	CAS RN	%
yttrium(III) isopropoxide	2172-12-5	>98
may hydrolyse in water/ moisture to		

## Section 4 - FIRST AID MEASURES

### SWALLOWED

· 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. · Seek medical advice.

### EYE

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

### SKIN

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

### INHALED

· If dust is inhaled, remove from contaminated area. · Encourage patient to blow nose to ensure clear passage of breathing. · If irritation or discomfort persists seek medical attention.

### NOTES TO PHYSICIAN

- For acute or short term repeated exposures to isopropanol:
  - Rapid onset respiratory depression and hypotension indicates serious ingestions that require careful cardiac and respiratory monitoring together with immediate intravenous access.
  - Rapid absorption precludes the usefulness of emesis or lavage 2 hours post-ingestion. Activated charcoal and cathartics are not clinically useful. Ipecac is most useful when given 30 mins. post-ingestion.
  - There are no antidotes.
  - Management is supportive. Treat hypotension with fluids followed by vasopressors.
  - Watch closely, within the first few hours for respiratory depression; follow arterial blood gases and tidal volumes.
  - Ice water lavage and serial hemoglobin levels are indicated for those patients with evidence of gastrointestinal bleeding.

## 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

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

### FIRE FIGHTING

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

### GENERAL FIRE HAZARDS/HAZARDOUS COMBUSTIBLE PRODUCTS

- Combustible solid which burns but propagates flame with difficulty.
  - Avoid generating dust, particularly clouds of dust in a confined or unventilated space as dusts may form an explosive mixture with air, and any source of ignition, i.e. flame or spark, will cause fire or explosion. Dust clouds generated by the fine grinding of the solid are a particular hazard; accumulations of fine dust may burn rapidly and fiercely if ignited.
  - Dry dust can be charged electrostatically by turbulence, pneumatic transport, pouring, in exhaust ducts and during transport.
  - Build-up of electrostatic charge may be prevented by bonding and grounding.
  - Powder handling equipment such as dust collectors, dryers and mills may require additional protection measures such as explosion venting.
- Combustion products include: carbon monoxide (CO), carbon dioxide (CO<sub>2</sub>), metal oxides, other pyrolysis products typical of burning organic material.

May emit poisonous fumes.

May emit corrosive fumes.

### FIRE INCOMPATIBILITY

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

### PERSONAL PROTECTION

Glasses:

Chemical goggles.

Gloves:

Respirator:

Type A-P Filter of sufficient capacity

## Section 6 - ACCIDENTAL RELEASE MEASURES

### MINOR SPILLS

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

### MAJOR SPILLS

- Moderate hazard.

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

## Section 7 - HANDLING AND STORAGE

### PROCEDURE FOR HANDLING

- Avoid all personal contact, including inhalation.
  - Wear protective clothing when risk of exposure occurs.
  - Use in a well-ventilated area.
  - Prevent concentration in hollows and sumps.
  - DO NOT enter confined spaces until atmosphere has been checked.
  - DO NOT allow material to contact humans, exposed food or food utensils.
  - Avoid contact with incompatible materials.
  - When handling, DO NOT eat, drink or smoke.
  - Keep containers securely sealed when not in use.
  - Avoid physical damage to containers.
  - Always wash hands with soap and water after handling.
  - Work clothes should be laundered separately.
  - Launder contaminated clothing before re-use.
  - Use good occupational work practice.
  - Observe manufacturer's storing and handling recommendations.
  - Atmosphere should be regularly checked against established exposure standards to ensure safe working conditions are maintained.
- Empty containers may contain residual dust which has the potential to accumulate following settling. Such dusts may explode in the presence of an appropriate ignition source.
- Do NOT cut, drill, grind or weld such containers.
  - In addition ensure such activity is not performed near full, partially empty or empty containers without appropriate workplace safety authorisation or permit.

### RECOMMENDED STORAGE METHODS

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

### STORAGE REQUIREMENTS

- Observe manufacturer's storing and handling recommendations.

### SAFE STORAGE WITH OTHER CLASSIFIED CHEMICALS



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

## Section 8 - EXPOSURE CONTROLS / PERSONAL PROTECTION

### EXPOSURE CONTROLS

Source	Material	TWA ppm	TWA mg/m <sup>3</sup>	STEL ppm	STEL mg/m <sup>3</sup>	Notes
Canada - Alberta Occupational Exposure Limits	yttrium(III) isopropoxide (Yttrium metal & compounds, as Y)		1			
Canada - British Columbia Occupational Exposure Limits	yttrium(III) isopropoxide (Yttrium and compounds, as Y)		1			
Canada - Ontario Occupational Exposure Limits	yttrium(III) isopropoxide (Yttrium, metal and compounds (as yttrium))		1			
Canada - Saskatchewan Occupational Health and Safety Regulations - Contamination Limits	yttrium(III) isopropoxide (Yttrium metal and compounds, (as Y))		1		3	
Canada - Nova Scotia Occupational Exposure Limits	yttrium(III) isopropoxide (Yttrium - Compounds (as Y))		1			TLV Basis: pulmonary fibrosis
Canada - Quebec Permissible Exposure Values for Airborne Contaminants (English)	yttrium(III) isopropoxide (Yttrium, metal and compounds (as Y))		1			
Canada - Alberta Occupational Exposure Limits	yttrium(III) hydroxide (Yttrium metal & compounds, as Y)		1			
Canada - British Columbia Occupational Exposure Limits	yttrium(III) hydroxide (Yttrium and compounds, as Y)		1			
Canada - Ontario Occupational Exposure Limits	yttrium(III) hydroxide (Yttrium, metal and compounds (as yttrium))		1			
Canada - Saskatchewan Occupational Health and Safety Regulations - Contamination Limits	yttrium(III) hydroxide (Yttrium metal and compounds, (as Y))		1		3	
Canada - Nova Scotia Occupational Exposure Limits	yttrium(III) hydroxide (Yttrium - Compounds (as Y))		1			TLV Basis: pulmonary fibrosis
Canada - Quebec Permissible Exposure Values for Airborne Contaminants (English)	yttrium(III) hydroxide (Yttrium, metal and compounds (as Y))		1			
Canada - British Columbia Occupational Exposure Limits	isopropanol (Isopropanol (Isopropyl alcohol) Revised 2003)	200		400		
Canada - Ontario Occupational Exposure Limits	isopropanol (Isopropanol, also known as Isopropyl alcohol)	200		400		
US - Minnesota Permissible Exposure Limits (PELs)	isopropanol (Isopropyl alcohol)	400	980	500	1225	

US ACGIH Threshold Limit Values (TLV)	isopropanol (2-Propanol)	200		400			TLV Basis: eye & upper respiratory tract irritation; central nervous system impairment
US NIOSH Recommended Exposure Limits (RELs)	isopropanol (Isopropyl alcohol)	400	980	500	1225		
Canada - Alberta Occupational Exposure Limits	isopropanol (2-Propanol (Isopropyl alcohol, isopropanol))	200	492	400	984		
US - Tennessee Occupational Exposure Limits - Limits For Air Contaminants	isopropanol (Isopropyl alcohol)	400	980	500	1225		
US - Vermont Permissible Exposure Limits Table Z-1-A Transitional Limits for Air Contaminants	isopropanol (Isopropyl alcohol)	400	980				
US - Vermont Permissible Exposure Limits Table Z-1-A Final Rule Limits for Air Contaminants	isopropanol (Isopropyl alcohol)	400	980	500	1225		
US - California Permissible Exposure Limits for Chemical Contaminants	isopropanol (Isopropyl alcohol)	400	980	500	1225		
US - Idaho - Limits for Air Contaminants	isopropanol (Isopropyl alcohol)	400	980				
US - Hawaii Air Contaminant Limits	isopropanol (Isopropyl alcohol)	400	980	500	1,225		
US - Alaska Limits for Air Contaminants	isopropanol (Isopropyl alcohol)	400	980	500	1225		
US - Michigan Exposure Limits for Air Contaminants	isopropanol (Isopropyl alcohol)	400	980	500	1225		
Canada - Yukon Permissible Concentrations for Airborne Contaminant Substances	isopropanol (Isopropyl alcohol - Skin)	400	980	500	1,225		
US - Washington Permissible exposure limits of air contaminants	isopropanol (Isopropyl alcohol)	400		500			
Canada - Saskatchewan Occupational Health and Safety Regulations - Contamination Limits	isopropanol (Isopropyl alcohol)	200		400			
US - Oregon Permissible Exposure Limits (Z-1)	isopropanol (Isopropyl alcohol)	400	980				
US - Wyoming Toxic and Hazardous Substances Table Z1 Limits for Air Contaminants	isopropanol (Isopropyl alcohol)	400	980				
Canada - Quebec Permissible Exposure Values for Airborne Contaminants (English)	isopropanol (Isopropyl alcohol)	400	985	500	1230		
US OSHA Permissible Exposure Levels (PELs) - Table Z1	isopropanol (Isopropyl alcohol)	400	980				
Canada - Northwest Territories Occupational Exposure Limits (English)	isopropanol (Isopropyl alcohol - Skin)	400	983	500	1228		

Canada - Nova Scotia Occupational Exposure Limits	isopropanol (2-Propanol)	200	400	TLV Basis: eye & upper respiratory tract irritation; central nervous system impairment
Canada - Prince Edward Island Occupational Exposure Limits	isopropanol (2-Propanol)	200	400	TLV Basis: eye & upper respiratory tract irritation; central nervous system impairment

## ENDOELTABLE

### EMERGENCY EXPOSURE LIMITS

Material Revised IDLH Value (mg/m3) Revised IDLH Value (ppm)

isopropanol 2,000 [LEL]

### NOTES

Values marked LEL indicate that the IDLH was based on 10% of the lower explosive limit for safety considerations even though the relevant toxicological data indicated that irreversible health effects or impairment of escape existed only at higher concentrations.

## MATERIAL DATA

YTTRIUM(III) HYDROXIDE:

YTTRIUM(III) ISOPROPOXIDE:

■ The recommended TLV-TWA takes into account the fibrogenic activity of yttrium which cannot be accounted for on the basis of tissue solubility but rather to the specific chemical action of yttrium. Exposure to the vapors of some rare earth salts reportedly produces sensitivity to heat, itching and an increased perception of odor and taste. Other effects may include bronchiolitis, subacute bronchitis, acute transient chemical pneumonitis, focal hypertrophic emphysema, regional bronchiolar stricturing and cellular eosinophilia. In rare fatal cases of exposure to the rare-earth fluoride and/or oxide mixtures, delayed chemical hyperemia has occurred. Lung granulomas have also been seen in experimental animals.

ISOPROPANOL:

YTTRIUM(III) ISOPROPOXIDE:

■ Odour Threshold Value: 3.3 ppm (detection), 7.6 ppm (recognition)

Exposure at or below the recommended isopropanol TLV-TWA and STEL is thought to minimise the potential for inducing narcotic effects or significant irritation of the eyes or upper respiratory tract. It is believed, in the absence of hard evidence, that this limit also provides protection against the development of chronic health effects. The limit is intermediate to that set for ethanol, which is less toxic, and n-propyl alcohol, which is more toxic, than isopropanol.

## PERSONAL PROTECTION



Consult your EHS staff for recommendations

### EYE

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

### HANDS/FEET

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

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

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

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

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

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

- polychloroprene
- nitrile rubber
- butyl rubber
- fluorocautchouc
- polyvinyl chloride



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

**OTHER**

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

**RESPIRATOR**

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

**RESPIRATOR**

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

\* - Negative pressure demand \*\* - Continuous flow

Explanation of Respirator Codes:

Class 1 low to medium absorption capacity filters.

Class 2 medium absorption capacity filters.

Class 3 high absorption capacity filters.

PAPR Powered Air Purifying Respirator (positive pressure) cartridge.

Type A for use against certain organic gases and vapors.

Type AX for use against low boiling point organic compounds (less than 65°C).

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

The local concentration of material, quantity and conditions of use determine the type of personal protective equipment required.

Use appropriate NIOSH-certified respirator based on informed professional judgement. In conditions where no reasonable estimate of exposure can be made, assume the exposure is in a concentration IDLH and use NIOSH-certified full face pressure demand SCBA with a minimum service life of 30 minutes, or a combination full facepiece pressure demand SAR with auxiliary self-contained air supply. Respirators provided only for escape from IDLH atmospheres shall be NIOSH-certified for escape from the atmosphere in which they will be used.

**ENGINEERING CONTROLS**

· Local exhaust ventilation is required where solids are handled as powders or crystals; even when particulates are relatively large, a certain proportion will be powdered by mutual friction.

· Exhaust ventilation should be designed to prevent accumulation and recirculation of particulates in the workplace.

· If in spite of local exhaust an adverse concentration of the substance in air could occur, respiratory protection should be considered. Such protection might consist of:

(a): particle dust respirators, if necessary, combined with an absorption cartridge;

(b): filter respirators with absorption cartridge or canister of the right type;

(c): fresh-air hoods or masks

· Build-up of electrostatic charge on the dust particle, may be prevented by bonding and grounding.

· Powder handling equipment such as dust collectors, dryers and mills may require additional protection measures such as explosion venting.

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

Type of Contaminant:	Air Speed:
direct spray, spray painting in shallow booths, drum filling, conveyer loading, crusher dusts, gas discharge (active generation into zone of rapid air motion)	1-2.5 m/s (200-500 f/min.)
grinding, abrasive blasting, tumbling, high speed wheel generated dusts (released at high initial velocity into zone of very high rapid motion).	2.5-10 m/s (500-2000 f/min.)

Within each range the appropriate value depends on:

Lower end of the range	Upper end of the range
1: Room air currents minimal or favorable to capture	1: Disturbing room air currents
2: Contaminants of low toxicity or of nuisance value only	2: Contaminants of high toxicity
3: Intermittent, low production.	3: High production, heavy use
4: Large hood or large air mass in motion	4: Small hood-local control only

Simple theory shows that air velocity falls rapidly with distance away from the opening of a simple extraction pipe. Velocity generally decreases with the square of distance from the extraction point (in simple cases). Therefore the air speed at the extraction point should be adjusted, accordingly, after reference to distance from the contaminating source. The air velocity at the extraction fan, for example, should be a minimum of 4-10 m/s (800-2000 f/min) for extraction of crusher dusts generated 2 meters distant from the extraction point. Other mechanical considerations, producing performance deficits within the extraction apparatus, make it essential that theoretical air velocities are multiplied by factors of 10 or more when extraction systems are installed or used.

## Section 9 - PHYSICAL AND CHEMICAL PROPERTIES

### PHYSICAL PROPERTIES

Solid.

State	Divided solid	Molecular Weight	266.17
Melting Range (°F)	Not available	Viscosity	Not Applicable
Boiling Range (°F)	Not available.	Solubility in water (g/L)	Reacts
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)	Not applicable.
Volatile Component (%vol)	Negligible	Evaporation Rate	Not applicable

### APPEARANCE

Off-white powder; hydrolyses in water.

■ log Kow (Sangster 1997) 0.05 log Kow -0.16- 0.28 Chronic aquatic toxicity has also been shown to be of low concern, based on 16- to 21-day NOEC values of 141 to 30 mg/L, respectively, for a freshwater invertebrate. Bioconcentration of IPA in aquatic organisms is not expected to occur based on a measured log octanol/water partition coefficient (log Kow) of 0.05, a calculated bioconcentration factor of 1 for a freshwater fish, and the unlikelihood of constant, long-term exposures.

Material	Value

## Section 10 - CHEMICAL STABILITY

### CONDITIONS CONTRIBUTING TO INSTABILITY

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

### STORAGE INCOMPATIBILITY

- Segregate from alcohol, water.
- Avoid reaction with oxidizing agents.
- NOTE: May develop pressure in containers; open carefully. Vent periodically.

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

## Section 11 - TOXICOLOGICAL INFORMATION

YTTRIUM(III) ISOPROPOXIDE

### TOXICITY AND IRRITATION

- No significant acute toxicological data identified in literature search.

### CARCINOGEN

ISOPROPYL ALCOHOL (STRONG-ACID PROCESS)	US Environmental Defense Scorecard Suspected Carcinogens	Reference(s)	IARC
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## Section 12 - ECOLOGICAL INFORMATION

Refer to data for ingredients, which follows:

YTTRIUM(III) HYDROXIDE:

ISOPROPANOL:

YTTRIUM(III) ISOPROPOXIDE:

■ DO NOT discharge into sewer or waterways.

YTTRIUM(III) HYDROXIDE:

YTTRIUM(III) ISOPROPOXIDE:

■ For lanthanoids (formerly lanthanides; syn rare earth metals and their salts):

Environmental fate:

The natural occurrence of rare earths in the lithosphere is well established at a concentration level of a few hundred part per million. They are therefore not "rare".

Rare earth chlorides are very poorly soluble in water. Modeled water solubilities range from 10<sup>-2</sup> to 10<sup>-5</sup> mg/l. They are expected to strongly sorb to soil and not expected to volatilise.

Water: Lanthanoid emissions to the environment increase as a result of the growing industrial applications of these elements. However, robust data to evaluate the environmental fate of lanthanoids are scarce.

Changing environmental conditions may influence the fate and bioavailability of lanthanoids (part of the rare earth elements [Ln]) in estuaries. Equilibrium model calculations indicate that dissolved lanthanoids are complexed mainly to carbonates and dissolved organic matter. In the water phase, the relative abundance of the free ion, LnCO<sub>3</sub>, and humic complexes decreases from lanthanum to lutetium, whereas the relative abundance of Ln(CO<sub>3</sub>)<sub>2</sub> increases. Cerium and europium anomalies were found in water. Europium anomalies were also found in some biota. The biota sediment accumulation factors (BSAFs) decreased across the series from lanthanum to lutetium. Regression analysis revealed that alkalinity correlated negatively with lanthanide uptake. This suggests that increasing complexation reduced bioavailability under the prevailing conditions. The BSAFs did not depend on salinity or pH, which may simplify sediment-quality criteria for fresh versus saline waters. Field BSAFs were significantly lower than laboratory values for the same sediments, which is explained by adaptation of the organisms to lanthanides.

Plant uptake: Lanthanum concentrations in plants and medium and the amounts sorbed to glass vessels were quantified by using the radioisotope <sup>140</sup>La. The amount of La adsorbed on the glass reached values of 25% of the total La present. A model was formulated to describe La uptake in exponentially growing duckweed in the presence of an adsorptive surface. Growth-induced dilution appeared more efficient in lowering plant La concentrations than actual elimination. An elimination study revealed two compartments, of which the smallest eliminated 50 times faster than the bigger compartment, which eliminated mainly by growth dilution. The average bioconcentration factor was 2,000 L/kg fresh weight and 30,000 L/kg dry weight, comparable with those of other higher plants. At the applied concentration of 10 nM, no effects were observed on duckweed growth. However, the high bioconcentration factor warrants monitoring of lanthanide emissions.

Ecotoxicity:

For cerium oxide (a typical oxide of this group):

Fish LC50 (96 h): fathead minnow >50000 mg/l (low toxicity)

Green algae IC25: 34484 mg/l (low toxicity)

Daphnia LC50 (48 h): Ceriodaphnia dubia >50000 mg/l (low toxicity)

Rare earth chlorides exhibit acute aquatic toxicity at concentrations exceeding 100 ppm and chronic toxicity, persisting for more than 21 days, at concentrations greater than 30 ppm (based on structure activity relationships - QSAR). Industrial processes have little impact on altering background levels. Lanthanum 3+ is toxic to some aquatic organisms.

Dissolved lanthanum is very toxic to species of Daphnia in both chronic and acute tests. It may also be toxic to other species. In a lanthanum bioassay test conducted with solutions of lanthanum chloride made up in water at lanthanum concentrations between (nominally) 750 ug/L and 48 mg/L, 100% mortality of eastern rainbow fish was found for all nominal lanthanum concentrations, indicating a 96 hour LC50 significantly less than the nominal 750 ug/L (measured as 600 ug/L) NICNAS Full Public Report NA/899)

There seems little doubt that dissolved lanthanum has at least high acute and chronic toxicity to fresh water fish and to various species of Daphnia in soft water, although water quality parameters appear to have a very large effect on the toxicity. In sufficiently hard water free lanthanum may be precipitated reducing lanthanum availability to aquatic species and mitigating toxicity.

Similarly, the lanthanum ion is expected to have high affinity for the negatively charged humic material present in most natural waters. This mechanism will also remove lanthanum from the water column.

YTTRIUM(III) HYDROXIDE:

■ 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 health 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.

ISOPROPANOL:

■ log Kow (Sangster 1997): 0.05

■ log Pow (Verschueren 1983): - 0.5714285

■ BOD5: 60%

■ BOD20: 78%

■ COD: 2.23

■ ThOD: 2.4

■ Half- life Soil - High (hours): 168

■ Half- life Soil - Low (hours): 24

■ Half- life Air - High (hours): 72

■ Half- life Air - Low (hours): 6.2

- Half- life Surface water - High (hours): 168
- Half- life Surface water - Low (hours): 24
- Half- life Ground water - High (hours): 336
- Half- life Ground water - Low (hours): 48
- Aqueous biodegradation - Aerobic - High (hours): 168
- Aqueous biodegradation - Aerobic - Low (hours): 24
- Aqueous biodegradation - Anaerobic - High (hours): 672
- Aqueous biodegradation - Anaerobic - Low (hours): 96
- Photooxidation half- life water - High (hours): 1.90E+05
- Photooxidation half- life water - Low (hours): 4728
- Photooxidation half- life air - High (hours): 72
- Photooxidation half- life air - Low (hours): 6.2

■ For isopropanol (IPA):

log Kow : -0.16- 0.28

Half-life (hr) air : 33-84

Half-life (hr) H2O surface water : 130

Henry's atm m<sup>3</sup> /mol: 8.07E-06

BOD 5: 1.19,60%

COD : 1.61-2.30,97%

ThOD : 2.4

BOD 20: >70% \* [Akzo Nobel]

Environmental Fate

Based on calculated results from a level 1 fugacity model, IPA is expected to partition primarily to the aquatic compartment (77.7%) with the remainder to the air (22.3%). IPA has been shown to biodegrade rapidly in aerobic, aqueous biodegradation tests and therefore, would not be expected to persist in aquatic habitats. IPA is also not expected to persist in surface soils due to rapid evaporation to the air. In the air, physical degradation will occur rapidly due to hydroxy radical (OH) attack. Overall, IPA presents a low potential hazard to aquatic or terrestrial biota.

IPA is expected to volatilise slowly from water based on a calculated Henry's Law constant of  $7.52 \times 10^{-6}$  atm.m<sup>3</sup> /mole. The calculated half-life for the volatilisation from surface water (1 meter depth) is predicted to range from 4 days (from a river) to 31 days (from a lake). Hydrolysis is not considered a significant degradation process for IPA. However, aerobic biodegradation of IPA has been shown to occur rapidly under non-acclimated conditions, based on a result of 49% biodegradation from a 5 day BOD test. Additional biodegradation data developed using standardized test methods show that IPA is readily biodegradable in both freshwater and saltwater media (72 to 78% biodegradation in 20 days).

IPA will evaporate quickly from soil due to its high vapor pressure (43 hPa at 20°C), and is not expected to partition to the soil based on a calculated soil adsorption coefficient (log Koc) of 0.03.

IPA has the potential to leach through the soil due to its low soil adsorption

In the air, isopropanol is subject to oxidation predominantly by hydroxy radical attack. The room temperature rate constants determined by several investigators are in good agreement for the reaction of IPA with hydroxy radicals. The atmospheric half-life is expected to be 10 to 25 hours, based on measured degradation rates ranging from 5.1 to  $7.1 \times 10^{-12}$  cm<sup>3</sup> /molecule-sec, and an OH concentration of  $1.5 \times 10^6$  molecule/cm<sup>3</sup>, which is a commonly used default value for calculating atmospheric half-lives. Using OH concentrations representative of polluted ( $3 \times 10^6$ ) and pristine ( $3 \times 10^5$ ) air, the atmospheric half-life of IPA would range from 9 to 126 hours, respectively. Direct photolysis is not expected to be an important transformation process for the degradation of IPA.

Ecotoxicity:

IPA has been shown to have a low order of acute aquatic toxicity. Results from 24- to 96-hour LC50 studies range from 1,400 to more than 10,000 mg/L for freshwater and saltwater fish and invertebrates. In addition, 16-hour to 8-day toxicity threshold levels (equivalent to 3% inhibition in cell growth) ranging from 104 to 4,930 mg/L have been demonstrated for various microorganisms.

Chronic aquatic toxicity has also been shown to be of low concern, based on 16- to 21-day NOEC values of 141 to 30 mg/L, respectively, for a freshwater invertebrate. Bioconcentration of IPA in aquatic organisms is not expected to occur based on a measured log octanol/water partition coefficient (log Kow) of 0.05, a calculated bioconcentration factor of 1 for a freshwater fish, and the unlikelihood of constant, long-term exposures.

Toxicity to Plants

Toxicity of IPA to plants is expected to be low, based on a 7-day toxicity threshold value of 1,800 mg/L for a freshwater algae, and an EC50 value of 2,100 mg/L from a lettuce seed germination test.

### Ecotoxicity

Ingredient	Persistence: Water/Soil	Persistence: Air	Bioaccumulation	Mobility
isopropanol	LOW	MED	LOW	HIGH

## Section 13 - DISPOSAL CONSIDERATIONS

### 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.

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.

## Section 14 - TRANSPORTATION INFORMATION

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

## Section 15 - REGULATORY INFORMATION

### REGULATIONS

#### ND

Ingredient CAS % de minimus concentration  
isopropanol 67-63-0 1.0

#### **yttrium(III) isopropoxide (CAS: 2172-12-5) is found on the following regulatory lists;**

"Canada - Alberta Occupational Exposure Limits","Canada - British Columbia Occupational Exposure Limits","Canada - Nova Scotia Occupational Exposure Limits","Canada - Ontario Occupational Exposure Limits","Canada - Quebec Permissible Exposure Values for Airborne Contaminants (English)","Canada - Saskatchewan Occupational Health and Safety Regulations - Contamination Limits","US - California Occupational Safety and Health Regulations (CAL/OSHA) - Hazardous Substances List","US - Minnesota Hazardous Substance List"

Regulations for ingredients

#### **yttrium(III) hydroxide (CAS: 16469-22-0) is found on the following regulatory lists;**

"Canada Non-Domestic Substances List (NDSL)","US Toxic Substances Control Act (TSCA) - Inventory"

#### **isopropanol (CAS: 67-63-0) is found on the following regulatory lists;**

"Canada - Alberta Ambient Air Quality Objectives","Canada - Alberta Occupational Exposure Limits","Canada - British Columbia Occupational Exposure Limits","Canada - Northwest Territories Occupational Exposure Limits (English)","Canada - Nova Scotia Occupational Exposure Limits","Canada - Ontario Occupational Exposure Limits","Canada - Prince Edward Island Occupational Exposure Limits","Canada - Prince Edward Island Occupational Exposure Limits - Carcinogens","Canada - Quebec Permissible Exposure Values for Airborne Contaminants (English)","Canada - Saskatchewan Industrial Hazardous Substances","Canada - Saskatchewan Occupational Health and Safety Regulations - Contamination Limits","Canada - Yukon Permissible Concentrations for Airborne Contaminant Substances","Canada Domestic Substances List (DSL)","Canada Ingredient Disclosure List (SOR/88-64)","Canada National Pollutant Release Inventory (NPRI)","Canada Toxicological Index Service - Workplace Hazardous Materials Information System - WHMIS (English)","GESAMP/EHS Composite List - GESAMP Hazard Profiles","IMO IBC Code Chapter 18: List of products to which the Code does not apply","IMO MARPOL 73/78 (Annex II) - List of Other Liquid Substances","IMO Provisional Categorization of Liquid Substances - List 2: Pollutant only mixtures containing at least 99% by weight of components already assessed by IMO","International Agency for Research on Cancer (IARC) - Agents Reviewed by the IARC Monographs","International Fragrance Association (IFRA) Survey: Transparency List","OECD Representative List of High Production Volume (HPV) Chemicals","US - Alaska Limits for Air Contaminants","US - California Air Toxics ""Hot Spots"" List (Assembly Bill 2588) Substances for which emissions must be quantified","US - California Occupational Safety and Health Regulations (CAL/OSHA) - Hazardous Substances List","US - California OEHHA/ARB - Acute Reference Exposure Levels and Target Organs (RELs)","US - California OEHHA/ARB - Chronic Reference Exposure Levels and Target Organs (CRELs)","US - California Permissible Exposure Limits for Chemical Contaminants","US - California Toxic Air Contaminant List Category II","US - Connecticut Hazardous Air Pollutants","US - Hawaii Air Contaminant Limits","US - Idaho - Limits for Air Contaminants","US - Michigan Exposure Limits for Air Contaminants","US - Minnesota Hazardous Substance List","US - Minnesota Permissible Exposure Limits (PELs)","US - New Jersey Right to Know Hazardous Substances","US - Oregon Permissible Exposure Limits (Z-1)","US - Pennsylvania - Hazardous Substance List","US - Rhode Island Hazardous Substance List","US - Tennessee Occupational Exposure Limits - Limits For Air Contaminants","US - Vermont Permissible Exposure Limits Table Z-1-A Final Rule Limits for Air Contaminants","US - Vermont Permissible Exposure Limits Table Z-1-A Transitional Limits for Air Contaminants","US - Washington Permissible exposure limits of air contaminants","US - Wyoming Toxic and Hazardous Substances Table Z1 Limits for Air Contaminants","US ACGIH Threshold Limit Values (TLV)","US ACGIH Threshold Limit Values (TLV) - Carcinogens","US DOE Temporary Emergency Exposure Limits (TEELs)","US DOT Coast Guard Bulk Hazardous Materials - List of Flammable and Combustible Bulk Liquid Cargoes","US EPA High Production Volume Program Chemical List","US EPA Master Testing List - Index I Chemicals Listed","US EPA Master Testing List - Index II Chemicals Removed","US EPCRA Section 313 Chemical List","US FDA Indirect Food Additives: Adhesives and Components of Coatings - Substances for Use Only as Components of Adhesives - Adhesives","US Food Additive Database","US List of Lists - Consolidated List of Chemicals Subject to EPCRA, CERCLA and Section 112(r) of the Clean Air Act","US NFPA 30B Manufacture and Storage of Aerosol Products - Chemical Heat of Combustion","US NIOSH Recommended Exposure Limits (RELs)","US OSHA Permissible Exposure Levels (PELs) - Table Z1","US Postal Service (USPS) Hazardous Materials Table: Postal Service Mailability Guide","US Spacecraft Maximum Allowable Concentrations (SMACs) for Airborne Contaminants","US Toxic Substances Control Act (TSCA) - Inventory","US TSCA Section 4/12 (b) - Sunset Date/Status","US TSCA Section 8 (d) - Health and Safety Data Reporting"

## Section 16 - OTHER INFORMATION

### LIMITED EVIDENCE

- Ingestion may produce health damage\*.
- Cumulative effects may result following exposure\*.
- May produce discomfort of the eyes, respiratory tract and skin\*.

\* (limited evidence).

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■ 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](http://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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