

PHOS-ZORB

Hazard Alert Code:
MODERATE

Chemwatch SDS++

Revision No: 4

Chemwatch 4658-61

Issue Date: 23-Dec-2009

CD 2010/1

Section 1 - CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME

Phos-Zorb

STATEMENT OF HAZARDOUS NATURE

Considered a Hazardous Substance according to the criteria of the New Zealand Hazardous Substances New Organisms legislation.
Not considered a dangerous substance according to directive 1999/45/EC and its amendments.
CONSIDERED A HAZARDOUS SUBSTANCE ACCORDING TO OSHA 29 CFR 1910.1200.
NON-HAZARDOUS SUBSTANCE. NON-DANGEROUS GOODS. According to NOHSC Criteria, and ADG Code.

PRODUCT USE

■ Used according to manufacturer's directions. For product 109.

SUPPLIER

Company: Mars Fishcare Inc

Address:

50 East Hamilton Street

Chalfont

PA, 18914

USA

Telephone: +1 215 822 8181

Fax: +1 215 822 1906

Section 2 - HAZARDS IDENTIFICATION

HAZARD RATINGS

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

GHS Classification

Eye Irritation Category 2B

EMERGENCY OVERVIEW

HAZARD

WARNING

Determined by Chemwatch using GHS criteria:

H320

Causes eye irritation

PRECAUTIONARY STATEMENTS

Prevention

Wash thoroughly after handling.

Response

IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.

If eye irritation persists: Get medical advice/attention.

EUROPEAN CLASSIFICATION - SAFETY

Safety Codes	Safety Phrases
S22	■ Do not breathe dust.
S24	■ Avoid contact with skin.
S39	■ Wear eye/ face protection.
S26	■ In case of contact with eyes, rinse with plenty of water and contact Doctor or Poisons Information Center.

EUROPEAN/AUSTRALIAN CLASSIFICATION - RISK

None under normal operating conditions.

AUSTRALIAN CLASSIFICATION - SAFETY

Safety Codes	Safety Phrases
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- S22 Do not breathe dust.
S24 Avoid contact with skin.
S39 Wear eye/face protection.
S26 In case of contact with eyes, rinse with plenty of water and contact Doctor or Poisons Information Center.

CANADIAN WHMIS SYMBOLS



Section 3 - COMPOSITION / INFORMATION ON INGREDIENTS

NAME	CAS RN	%
activated alumina	1344-28-1.	100

Section 4 - FIRST AID MEASURES

SWALLOWED

-
- Immediately give a glass of water.
- First aid is not generally required. If in doubt, contact a Poisons Information Center or a doctor.

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 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.
- Other measures are usually unnecessary.

NOTES TO PHYSICIAN

-
- Manifestation of aluminum toxicity include hypercalcemia, anemia, Vitamin D refractory osteodystrophy and a progressive encephalopathy (mixed dysarthria-apraxia of speech, asterixis, tremulousness, myoclonus, dementia, focal seizures). Bone pain, pathological fractures and proximal myopathy can occur.
- Symptoms usually develop insidiously over months to years (in chronic renal failure patients) unless dietary aluminum loads are excessive.
- Serum aluminum levels above 60ug/ml indicate increased absorption. Potential toxicity occurs above 100 ug/ml and clinical symptoms are present when levels exceed 200 ug/ml.
- Deferoxamine has been used to treat dialysis encephalopathy and osteomalacia. CaNa2EDTA is less effective in chelating aluminum. [Ellenhorn and Barceloux: Medical Toxicology]

Section 5 - FIRE FIGHTING MEASURES

EXTINGUISHING MEDIA

- - There is no restriction on the type of extinguisher which may be used.
- Use extinguishing media suitable for surrounding area.

FIRE FIGHTING

-
- Alert Emergency Responders and tell them location and nature of hazard.
- Wear breathing apparatus plus protective gloves for fire only.
- Prevent, by any means available, spillage from entering drains or water course.
- Use fire fighting procedures suitable for surrounding 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.

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- Equipment should be thoroughly decontaminated after use.

FIRE/EXPLOSION HAZARD

-
- Non combustible.
- Not considered to be a significant fire risk, however containers may burn.

May emit poisonous fumes.

May emit corrosive fumes.

FIRE INCOMPATIBILITY

- None known.

PERSONAL PROTECTION

Glasses:

Chemical goggles.

Gloves:

PVC chemical resistant type.

Respirator:

Particulate

Section 6 - ACCIDENTAL RELEASE MEASURES

MINOR SPILLS

-
- Clean up all spills immediately.
- Avoid breathing dust and contact with skin and eyes.
- Wear protective clothing, gloves, safety glasses and dust respirator.
- Use dry clean up procedures and avoid generating dust.
- Sweep up, shovel up or vacuum up (consider explosion-proof machines designed to be grounded during storage and use).
- Place spilled material in clean, dry, sealable, labeled container.

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.

Personal Protective Equipment advice is contained in Section 8 of the MSDS.

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.

SUITABLE CONTAINER

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

STORAGE INCOMPATIBILITY

- None known.

STORAGE REQUIREMENTS

- Observe manufacturer's storing and handling recommendations.

SAFE STORAGE WITH OTHER CLASSIFIED CHEMICALS

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

Section 8 - EXPOSURE CONTROLS / PERSONAL PROTECTION

EXPOSURE CONTROLS

Source	Material	TWA ppm	TWA mg/m ³	STEL ppm	STEL mg/m ³	Peak ppm	Peak mg/m ³	TWA F/CC	Notes
Spain Occupational Exposure Limit for Chemical Agents	activated alumina (Aluminium oxide)				10				
New Zealand Workplace Exposure Standards (WES)	activated alumina (Aluminium oxide)		10						(d)
Mexico Maximum Permissible Exposure Limits	activated alumina (CORUNDUM (Al ₂ O ₃))		10						
Mexico Maximum Permissible Exposure Limits	activated alumina (ÓXIDO DE ALUMINIO)		10						
Australia Exposure Standards	activated alumina (Aluminium oxide (a))		10						(see Chapter 14)
Canada - Ontario Occupational Exposure Limits	activated alumina (alpha-Alumina (total dust))		10						
Portugal Occupational exposure limits to chemical agents (Portuguese)	activated alumina (Óxido de alumínio)		10						A4; (TWA (E))
Canada - Alberta Occupational Exposure Limits	activated alumina (Alumina (Aluminum oxide))		10						
Malaysia Permissible Exposure Limits	activated alumina (Aluminium oxide)		10						The value is for particulate matter containing no asbestos and <1% crystalline silica.
Poland Workplace Maximum Allowable Concentration (Polish)	activated alumina (Tritlenek glinu - w przeliczeniu na Al:- dymy, pył respirabilny)		1,2						
Russia Maximum Allowed Concentrations (PDK) of Harmful Substances in the Air of Workplace Zone (Russian)	activated alumina (диАлюминий триоксид (в виде аэрозоля дезинтеграции))					6			
Hungary Occupational Exposure Limits (Hungarian)	activated alumina (ALUMÍNIUM-OXID)		6						(TWA (resp))
Poland Workplace Maximum Allowable Concentration (Polish)	activated alumina (Tritlenek glinu - w przeliczeniu na Al:- dymy, pył całkowity)		2,5						
Switzerland Occupational Exposure Limits (German)	activated alumina (Aluminiumoxid-Rauch)		a		24				NIOSH s. Anhang 1.3.6.
Switzerland Occupational Exposure Limits (German)	activated alumina (Aluminium als Metall, -oxid, u. -hydroxid)		a						NIOSH s. Anhang 1.3.6.
Russia Maximum Allowed Concentrations (PDK) of Harmful Substances in the Air of Workplace Zone (Russian)	activated alumina (Электрокорунд)					6			
Russia Maximum Allowed Concentrations (PDK) of Harmful Substances in the Air of Workplace Zone (Russian)	activated alumina (Электрокорунд хромистый)					6			
Canada - Quebec Permissible Exposure Values for Airborne Contaminants (French)	activated alumina (Aluminium, oxyde d' (exprimée en Al))		10						Pt, note 1

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US - Vermont Permissible Exposure Limits Table Z-1-A Transitional Limits for Air Contaminants	activated alumina (alpha-Alumina - Respirable fraction)	5		
US - Vermont Permissible Exposure Limits Table Z-1-A Final Rule Limits for Air Contaminants	activated alumina (alpha-Alumina - Total dust)	10		
US - Tennessee Occupational Exposure Limits - Limits For Air Contaminants	activated alumina (alpha-Alumina Respirable fraction)	5		
US - Vermont Permissible Exposure Limits Table Z-1-A Transitional Limits for Air Contaminants	activated alumina (alpha-Alumina - Total dust)	15		
Denmark Limit values for air pollutants (English)	activated alumina (Aluminiumoxid, beregnet som Al, total (2005))	5		
Denmark Limit values for air pollutants (English)	activated alumina (Aluminiumoxid, beregnet som Al, respirabel (2005))	2		
US - Vermont Permissible Exposure Limits Table Z-1-A Final Rule Limits for Air Contaminants	activated alumina (alpha-Alumina - Respirable fraction)	5		
Korea (South) Occupational Exposure Standards (Korean)	activated alumina (α-알루미나)	10		
US - Tennessee Occupational Exposure Limits - Limits For Air Contaminants	activated alumina (alpha-Alumina Total dust)	10		
US - Minnesota Permissible Exposure Limits (PELs)	activated alumina (alpha-Alumina - Total dust)	10		
US - Minnesota Permissible Exposure Limits (PELs)	activated alumina (alpha-Alumina - Respirable fraction)	5		
China (Hong Kong) Occupational Exposure Limits	activated alumina (Aluminum oxide)	10		D
Singapore Permissible Exposure Limits of Toxic Substances	activated alumina (Aluminium oxide)	10		
US - Idaho - Limits for Air Contaminants	activated alumina (alpha-Alumina Total dust)	15		
US - Idaho - Limits for Air Contaminants	activated alumina (alpha-Alumina Respirable fraction)	5		
Austria Occupational Exposure Limits - Maximum Workplace Concentrations (MAK) (German)	activated alumina (Aluminiumoxid und Aluminiumhydroxid)	5	10	(TWA (A)); (STEL (A))
Austria Occupational Exposure Limits - Maximum Workplace Concentrations (MAK) (German)	activated alumina (Aluminiumoxid-Rauch (gemessen als Alveolarstaub))	5	10	(TWA (A)); (STEL (A))
Iceland Occupational Exposure Limits (Icelandic)	activated alumina (Áloxíð, sem Al) -	10		
Slovak Republic Highest Admissible Exposure Limits (Slovak)	activated alumina (oxid hliníty dym)		1,5	(STEL (R))
US - Hawaii Air Contaminant Limits	activated alumina (Alumina - Total dust)	10	20	
Greece Occupational Exposure Limits	activated alumina (Αργίλιο μεταλλικό & οξείδιο του αργιλίου)	10 (εισπν.); 5 (αναπν.)		
Slovak Republic Highest Admissible Exposure Limits (Slovak)	activated alumina (hliník- oxid hliníty)	1,5		(TWA (R))
US - Alaska Limits for Air Contaminants	activated alumina (alpha-Alumina - Respirable fraction)	5		
US - Michigan Exposure	activated alumina (alpha-Alumina	10		

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Limits for Air Contaminants	(aluminum oxide) - Total dust)			
US - Hawaii Air Contaminant Limits	activated alumina (Alumina - Respirable fraction)	5		
US - Alaska Limits for Air Contaminants	activated alumina (alpha-Alumina - Total dust)	10		
Greece Occupational Exposure Limits	activated alumina (Αλουμίνα, α-)	10 (αναπν); 5 (εισπν.)		
Spain Occupational Exposure Limit for Chemical Agents (Spanish)	activated alumina (Óxido de aluminio)	10		
US - Washington Permissible exposure limits of air contaminants	activated alumina (alpha-Alumina (Aluminum oxide) - Total particulate)	10	20	
Canada - Yukon Permissible Concentrations for Airborne Contaminant Substances	activated alumina (Alundum (Al) ₂ (O) ₃)	(See Table 11)		
Canada - Yukon Permissible Concentrations for Airborne Contaminant Substances	activated alumina ((Corundum (Al) ₂ (O) ₃ (l))	(See Table 11)		
Japan Occupational Exposure Limits for Dusts (Japanese)	activated alumina (アルミナ)	0.5		吸入性粉塵*
Japan Occupational Exposure Limits for Dusts (Japanese)	activated alumina (アルミナ)	2		総粉塵**
US - Washington Permissible exposure limits of air contaminants	activated alumina (alpha-Alumina (Aluminum oxide) - Respirable fraction)	5	10	
Canada - Saskatchewan Occupational Health and Safety Regulations - Contamination Limits	activated alumina (Aluminum oxide)	10	20	
US - Michigan Exposure Limits for Air Contaminants	activated alumina (alpha-Alumina (aluminum oxide) - Respirable fraction)	5		
US - Wyoming Toxic and Hazardous Substances Table Z1 Limits for Air Contaminants	activated alumina (alpha-Alumina- Total dust)	15		
China Occupational Exposure Limits for Hazardous Agents in the Workplace - Dust	activated alumina (铝尘 氧化铝粉尘)	4		
US OSHA Permissible Exposure Levels (PELs) - Table Z1	activated alumina (alpha-Alumina - Total dust)	15		
US OSHA Permissible Exposure Levels (PELs) - Table Z1	activated alumina (alpha-Alumina - Respirable fraction)	5		
US - Wyoming Toxic and Hazardous Substances Table Z1 Limits for Air Contaminants	activated alumina (alpha-Alumina- Respirable fraction)	5		
Canada - Quebec Permissible Exposure Values for Airborne Contaminants (English)	activated alumina (Aluminum oxide (as Al))	10		
Czech Republic Occupational Exposure Limits - Dusts predominately with fibrogenic effect (Czech)	activated alumina (gama-oxid hlinitý)	0,1		PELr (mg.m-3) respirabilní frakce (Fr); Fr = 100 % b)
Indonesia Threshold Limit Value for chemical substances in the workplace (Bahasa Indonesian)	activated alumina (Aluminium oksida)	10		(TWA (A4)((e)))
Denmark Limit values for air pollutants (Danish)	activated alumina (Aluminiumoxid, beregnet som Al, total (2005))		5	
US - Oregon Permissible Exposure Limits (Z1)	activated alumina (alpha Alumina Total Dust)	10		*
US - Oregon Permissible Exposure Limits (Z1)	activated alumina (alpha Alumina Respirable Fraction)	5		*

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Japan Occupational Exposure Limits for Dusts	activated alumina (Alumina)	2		Total dust**
France Threshold Limit Values for Occupational Exposure - VLE/VME (French)	activated alumina (Aluminium (trioxyde de di-))	10		
Denmark Limit values for air pollutants (Danish)	activated alumina (Aluminiumoxid, beregnet som Al, respirabel (2005))		2	
Japan Occupational Exposure Limits for Dusts	activated alumina (Alumina)	0.5		Respirable dust*
Korea (South) Occupational Exposure Standards (Respirable microdust / Total dust) (Korean)	activated alumina (기타분진(유리 규산 1%이하)- 알파 알루미나)	10		
Italy Occupational Exposure Limits	activated alumina (Aluminium - Insoluble compounds)	1		TLV Basis: Pneumoconiosis; lower respiratory tract irritation; neurotoxicity
Canada - Nova Scotia Occupational Exposure Limits	activated alumina (Aluminium - Insoluble compounds)	1		TLV Basis: Pneumoconiosis; lower respiratory tract irritation; neurotoxicity
US ACGIH Threshold Limit Values (TLV)	activated alumina (Aluminium - Insoluble compounds)	1		TLV Basis: Pneumoconiosis; lower respiratory tract irritation; neurotoxicity
Canada - Prince Edward Island Occupational Exposure Limits	activated alumina (Aluminium - Insoluble compounds)	1		TLV Basis: Pneumoconiosis; lower respiratory tract irritation; neurotoxicity
South Africa Hazardous Chemical Substances - Recommended Limits	activated alumina (Aluminium Oxides)	5		[respirable dust]
Belgium Occupational Exposure Limits (French)	activated alumina (Aluminium (oxyde d') (en Al))			10
South Africa Hazardous Chemical Substances - Recommended Limits	activated alumina (Aluminium Oxides)	10		[total inhalable dust]
Germany Recommended Exposure Limits - MAK Values (German)	activated alumina (Aluminium-, Aluminiumoxid- und Aluminiumhydroxid- haltige Stäube (alveolengängige Fraktion))	1,5		
Germany Recommended Exposure Limits - MAK Values (German)	activated alumina (Aluminium-, Aluminiumoxid- und Aluminiumhydroxid- haltige Stäube (einatembare Fraktion))	4		
Canada - Northwest Territories Occupational Exposure Limits (French)	activated alumina (Poudres d'aluminium à usage pyrotechnique)	5	10	
Canada - Northwest Territories Occupational Exposure Limits (French)	activated alumina (Fumées de soudage de l'aluminium)	5	10	
Finland Occupational Exposure Levels - Concentrations Known to be Harmful (Swedish)	activated alumina (Aluminium, svetsrök)	1,5		Al
UK Workplace Exposure Limits (WELs)	activated alumina (Aluminium oxides inhalable dust)	10		
UK Workplace Exposure Limits (WELs)	activated alumina (Aluminium oxides respirable dust)	4		
Canada - British Columbia Occupational Exposure Limits	activated alumina (Aluminium metal and insoluble compounds, Respirable, Revised 2008)	10		
Estonia Limit values for chemical hazards in the working environment	activated alumina (Alumiinium, metalliline ja oksiidid kogu tolm)	10		1

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(Estonian)

Estonia Limit values for chemical hazards in the working environment (Estonian)	activated alumina (Aluminium, metalliline ja oksiidid peentolm)	4					
Sweden Occupational Exposure Limit Values and Measures against Air Contaminants (English)	activated alumina (Aluminium* and oxide (as Al) - respirable dust)	2	-	-	-	-	
South Africa Occupational Exposure Limits for Airborne Pollutants	activated alumina (Aluminium oxides - respirable particulate)	5					Note [c]
Sweden Occupational Exposure Limit Values and Measures against Air Contaminants (English)	activated alumina (Aluminium* and oxide (as Al) - total dust)	5	-	-	-	-	
Egypt Occupational Exposure Limits	activated alumina (Aluminium Metal and Oxides - Pyro Powders)	5					
Egypt Occupational Exposure Limits	activated alumina (Aluminium Metal and Oxides - Soldering Smoke Fumes)	5					
Egypt Occupational Exposure Limits	activated alumina (Aluminium Metal and Oxides)	10		20			
Ireland Occupational Exposure Limits	activated alumina (Aluminium oxides; total inhalable dust)	10					
Ireland Occupational Exposure Limits	activated alumina (Aluminium oxides; respirable dust)	4					
South Africa Occupational Exposure Limits for Airborne Pollutants	activated alumina (Aluminium oxides - inhalable particulate)	10					See
Canada - Northwest Territories Occupational Exposure Limits (English)	activated alumina (Aluminum metal & oxide)	10		20			
Canada - Northwest Territories Occupational Exposure Limits (French)	activated alumina (Aluminium métallique et oxyde d'aluminium)	10		20			
Sweden Occupational Exposure Limit Values (Swedish)	activated alumina (Aluminium och oxid (som Al) - totaldamm)	5					1
Sweden Occupational Exposure Limit Values (Swedish)	activated alumina (Aluminium och oxid (som Al) - respirabelt damm)	2					1
Estonia Limit values for chemical hazards in the working environment (English)	activated alumina (Aluminium, metal and oxide - respirable dust)	4					1
Czech Republic Occupational Exposure Limits - Dusts predominately with nonspecific effect (Czech)	activated alumina (hliník a jeho oxidy (s výjimkou gama Al ₂ O ₃))	10,0					
Estonia Limit values for chemical hazards in the working environment (English)	activated alumina (Aluminium, metal and oxide - total dust)	10					1
Bulgaria Limit values for the chemical agents in the air at the working environment	activated alumina (Aluminum (metal powder and oxides))	10,0					
Bulgaria Limit values for the chemical agents in the air at the working environment	activated alumina (Aluminum (metal powder and oxides) respirable fraction)	1,5					
Egypt Occupational Exposure Limits	activated alumina (Aluminium Metal and Oxides - Soluble Salts)	2					
US ACGIH Threshold Limit Values (TLV)	activated alumina (Particles (Insoluble or Poorly Soluble) [NOS] Inhalable particles)	10					See Appendix B current TLV/BEI Book
Canada - Prince Edward Island Occupational Exposure Limits	activated alumina (Particles (Insoluble or Poorly Soluble) [NOS] Respirable particles)	3					See Appendix B current TLV/BEI Book

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Canada - British Columbia Occupational Exposure Limits	activated alumina (Particles (Insoluble or Poorly Soluble) Not Otherwise Classified (PNOC))	10 (N)	
US ACGIH Threshold Limit Values (TLV)	activated alumina (Particles (Insoluble or Poorly Soluble) [NOS] Respirable particles)	3	See Appendix B current TLV/BEI Book
Canada - Prince Edward Island Occupational Exposure Limits	activated alumina (Particles (Insoluble or Poorly Soluble) [NOS] Inhalable particles)	10	See Appendix B current TLV/BEI Book
Italy Occupational Exposure Limits	activated alumina (Particles (Insoluble or Poorly Soluble) [NOS] Respirable particles)	3	See Appendix B current TLV/BEI Book
Italy Occupational Exposure Limits	activated alumina (Particles (Insoluble or Poorly Soluble) [NOS] Inhalable particles)	10	See Appendix B current TLV/BEI Book
Canada - Nova Scotia Occupational Exposure Limits	activated alumina (Particles (Insoluble or Poorly Soluble) [NOS] Respirable particles)	3	See Appendix B current TLV/BEI Book
Canada - Nova Scotia Occupational Exposure Limits	activated alumina (Particles (Insoluble or Poorly Soluble) [NOS] Inhalable particles)	10	See Appendix B current TLV/BEI Book

MATERIAL DATA

PHOS-ZORB:

Not available

ACTIVATED ALUMINA:

■ The TLV is based on the exposures to aluminum chloride and the amount of hydrolyzed acid and the corresponding acid TLV to provide the same degree of freedom from irritation. Workers chronically exposed to aluminum dusts and fumes have developed severe pulmonary reactions including fibrosis, emphysema and pneumothorax. A much rarer encephalopathy has also been described.

For aluminium oxide:

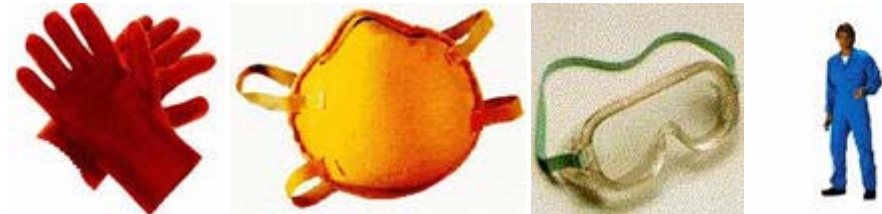
The experimental and clinical data indicate that aluminium oxide acts as an "inert" material when inhaled and seems to have little effect on the lungs nor does it produce significant organic disease or toxic effects when exposures are kept under reasonable control.

[Documentation of the Threshold Limit Values], ACGIH, Sixth Edition.

NOTE: This substance has been classified by the ACGIH as A4 NOT classifiable as causing Cancer in humans.

- measured as the respirable fraction of the aerosol.

PERSONAL PROTECTION



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

■ 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
- fluorocarbon
- polyvinyl chloride

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

Wear chemical protective gloves, eg. PVC.

Wear safety footwear or safety gumboots, eg. Rubber.

OTHER

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

RESPIRATOR

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

* - Negative pressure demand ** - Continuous flow

Explanation of Respirator Codes:

Class 1 low to medium absorption capacity filters.

Class 2 medium absorption capacity filters.

Class 3 high absorption capacity filters.

PAPR Powered Air Purifying Respirator (positive pressure) cartridge.

Type A for use against certain organic gases and vapors.

Type AX for use against low boiling point organic compounds (less than 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 containing highly toxic materials, e.g. beryllium.

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

For further information consult site specific CHEMWATCH data (if available), or your Occupational Health and Safety Advisor.

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.
- 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:

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

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

Type of Contaminant:

Air Speed:

direct spray, spray painting in shallow booths, drum filling, conveyer loading, crusher dusts, gas discharge (active generation into zone of rapid air motion)

1-2.5 m/s (200-500 f/min.)

grinding, abrasive blasting, tumbling, high speed wheel generated dusts (released at high initial velocity into zone of very high rapid air motion).

2.5-10 m/s (500-2000 f/min.)

Within each range the appropriate value depends on:

Lower end of the range

Upper end of the range

- Room air currents minimal or favorable to capture
- Contaminants of low toxicity or of nuisance value only.
- Intermittent, low production.
- Large hood or large air mass in motion

- Disturbing room air currents
- Contaminants of high toxicity
- High production, heavy use
- 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

APPEARANCE

Off-white granules with a characteristic odour; insoluble in water.

PHYSICAL PROPERTIES

Does not mix with water.

Floats on water.

State	Divided Solid	Molecular Weight	Not Applicable
Melting Range (°C)	2038	Viscosity	Not Applicable
Boiling Range (°C)	Not Applicable	Solubility in water (g/L)	Immiscible

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Flash Point (°C)	Not Applicable	pH (1% solution)	Not Applicable
Decomposition Temp (°C)	Not Available	pH (as supplied)	Not Applicable
Autoignition Temp (°C)	Not Applicable	Vapor Pressure (kPa)	Not Applicable
Upper Explosive Limit (%)	Not Applicable	Specific Gravity (water=1)	0.62 -
Lower Explosive Limit (%)	Not Applicable	Relative Vapor Density (air=1)	0.83 -
Volatile Component (%vol)	Not Applicable	Evaporation Rate	Not Applicable

Section 10 - CHEMICAL STABILITY

CONDITIONS CONTRIBUTING TO INSTABILITY

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

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

Section 11 - TOXICOLOGICAL INFORMATION

POTENTIAL HEALTH EFFECTS

ACUTE HEALTH EFFECTS

SWALLOWED

■ The material has NOT been classified as "harmful by ingestion". This is because of the lack of corroborating animal or human evidence. The material may still be damaging to the health of the individual, following ingestion, especially where pre-existing organ (e.g. liver, kidney) damage is evident. Present definitions of harmful or toxic substances are generally based on doses producing mortality (death) rather than those producing morbidity (disease, ill-health). Gastrointestinal tract discomfort may produce nausea and vomiting. In an occupational setting however, unintentional ingestion is not thought to be cause for concern.

EYE

■ There is some evidence to suggest that this material can cause eye irritation and damage in some persons.

SKIN

■ The material is not thought to produce adverse health effects or skin irritation following contact (as classified using animal models). Nevertheless, good hygiene practice requires that exposure be kept to a minimum and that suitable gloves be used in an occupational setting. 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 adverse health effects or irritation of the respiratory tract (as classified using animal models). Nevertheless, good hygiene practice requires that exposure be kept to a minimum and that suitable control measures be used in an occupational setting. Not normally a hazard due to non-volatile nature of product.

CHRONIC HEALTH EFFECTS

■ 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. Limited evidence suggests that repeated or long-term occupational exposure may produce cumulative health effects involving organs or biochemical systems.

TOXICITY AND IRRITATION

■ Not available. Refer to individual constituents.

ACTIVATED ALUMINA:

■ No significant acute toxicological data identified in literature search.

Section 12 - ECOLOGICAL INFORMATION

Refer to data for ingredients, which follows:

PHOS-ZORB:

- DO NOT discharge into sewer or waterways.

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ACTIVATED ALUMINA:

■ 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.

■ For aluminium and its compounds and salts:

Environmental fate:

Aluminium occurs in the environment in the form of silicates, oxides and hydroxides, combined with other elements such as sodium, fluorine and arsenic complexes with organic matter.

Acidification of soils releases aluminium as a transportable solution. Mobilisation of aluminium by acid rain results in aluminium becoming available for plant uptake.

As an element, aluminum cannot be degraded in the environment, but may undergo various precipitation or ligand exchange reactions. Aluminum in compounds has only one oxidation state (+3), and would not undergo oxidation-reduction reactions under environmental conditions. Aluminum can be complexed by various ligands present in the environment (e.g., fulvic and humic acids). The solubility of aluminum in the environment will depend on the ligands present and the pH.

The trivalent aluminum ion is surrounded by six water molecules in solution. The hydrated aluminum ion, $[Al(H_2O)_6]^{3+}$, undergoes hydrolysis, in which a stepwise deprotonation of the coordinated water ligands forms bound hydroxide ligands (e.g., $[Al(H_2O)_5(OH)]^{2+}$, $[Al(H_2O)_4(OH)_2]^+$). The speciation of aluminum in water is pH dependent. The hydrated trivalent aluminum ion is the predominant form at pH levels below 4. Between pH 5 and 6, the predominant hydrolysis products are $Al(OH)_2^+$ and $Al(OH)_2^+$, while the solid $Al(OH)_3$ is most prevalent between pH 5.2 and 8.8. The soluble species $Al(OH)_4^-$ is the predominant species above pH 9, and is the only species present above pH 10. Polymeric aluminum hydroxides appear between pH 4.7 and 10.5, and increase in size until they are transformed into colloidal particles of amorphous $Al(OH)_3$, which crystallise to gibbsite in acid waters. Polymerisation is affected by the presence of dissolved silica; when enough silica is present, aluminum is precipitated as poorly crystallised clay mineral species.

Hydroxylaluminum compounds are considered amphoteric (e.g., they can act as both acids and bases in solution). Because of this property, aluminum hydroxides can act as buffers and resist pH changes within the narrow pH range of 4-5.

Monomeric aluminum compounds, typified by aluminum fluoride, chloride, and sulfate, are considered reactive or labile compounds, whereas polymeric aluminum species react much more slowly in the environment. Aluminum has a stronger attraction for fluoride in an acidic environment compared to other inorganic ligand.

The adsorption of aluminum onto clay surfaces can be a significant factor in controlling aluminum mobility in the environment, and these adsorption reactions, measured in one study at pH 3.0-4.1, have been observed to be very rapid. However, clays may act either as a sink or a source for soluble aluminum depending on the degree of aluminum saturation on the clay surface.

Within the pH range of 5-6, aluminum complexes with phosphate and is removed from solution. Because phosphate is a necessary nutrient in ecological systems, this immobilization of both aluminum and phosphate may result in depleted nutrient states in surface water.

Plant species and cultivars of the same species differ considerably in their ability to take up and translocate aluminum to above-ground parts. Tea leaves may contain very high concentrations of aluminum, >5,000 mg/kg in old leaves. Other plants that may contain high levels of aluminum include Lycopodium (Lycopodiaceae), a few ferns, Symplocos (Symplocaceae), and Orites (Proteaceae). Aluminum is often taken up and concentrated in root tissue. In sub-alpine ecosystems, the large root biomass of the Douglas fir, *Abies amabilis*, takes up aluminum and immobilizes it, preventing large accumulation in above-ground tissue. It is unclear to what extent aluminum is taken up into root food crops and leafy vegetables. An uptake factor (concentration of aluminum in the plant/concentration of aluminum in soil) of 0.004 for leafy vegetables and 0.00065 for fruits and tubers has been reported, but the pH and plant species from which these uptake factors were derived are unclear. Based upon these values, however, it is clear that aluminum is not taken up in plants from soil, but is instead biodiluted.

Aluminum concentrations in rainbow trout from an alum-treated lake, an untreated lake, and a hatchery were highest in gill tissue and lowest in muscle. Aluminum residue analyses in brook trout have shown that whole-body aluminum content decreases as the fish advance from larvae to juveniles. These results imply that the aging larvae begin to decrease their rate of aluminum uptake, to eliminate aluminum at a rate that exceeds uptake, or to maintain approximately the same amount of aluminum while the body mass increases. The decline in whole-body aluminum residues in juvenile brook trout may be related to growth and dilution by edible muscle tissue that accumulated less aluminum than did the other tissues.

The greatest fraction of the gill-associated aluminum was not sorbed to the gill tissue, but to the gill mucus. It is thought that mucus appears to retard aluminum transport from solution to the membrane surface, thus delaying the acute biological response of the fish. It has been reported that concentrations of aluminum in whole-body tissue of the Atlantic salmon exposed to high concentrations of aluminum ranging from 3 ug/g (for fish exposed to 33 ug/L) to 96 ug/g (for fish exposed to 264 ug/L) at pH 5.5. After 60 days of exposure, BCFs ranged from 76 to 190 and were directly related to the aluminum exposure concentration. In acidic waters (pH 4.6-5.3) with low concentrations of calcium (0.5-1.5 mg Ca/L), labile aluminum between 25 and 75 ug/L is toxic. Because aluminum is toxic to many aquatic species, it is not bioaccumulated to a significant degree (BCF <300) in most fish and shellfish; therefore, consumption of contaminated fish does not appear to be a significant source of aluminum exposure in humans.

Bioconcentration of aluminum has also been reported for several aquatic invertebrate species. BCF values ranging from 0.13 to 0.5 in the whole-body were reported for the snail. Bioconcentration of aluminum has also been reported for aquatic insects.

Ecotoxicity:

Freshwater species pH >6.5

Fish: Acute LC50 (48-96 h) 5 spp: 0.6 (*Salmo salar*) - 106 mg/L; Chronic NOEC (8-28 d): 7 spp, NOEC, 0.034-7.1 mg/L. The lowest measured chronic figure was an 8-d LC50 of 0.17 mg/L for *Micropterus* sp.

Amphibian: Acute LC50 (4 d): *Bufo americanus*, 0.86-1.66 mg/L; Chronic LC50 (8-d) 2.28 mg/L

Crustaceans LC50 (48 h): 1 sp 2.3-36 9 mg/L; Chronic NOEC (7-28 d) 3 spp, 0.136-1.72 mg/L

Algae EC50 (96 h): population growth, 0.46-0.57 mg/L; 2 spp, chronic NOEC, 0.8-2.0 mg/L

Freshwater species pH <6.5 (all between pH 4.5 and 6.0)

Fish LC50 (24-96 h): 4 spp, 0.015 (*S. trutta*) - 4.2 mg/L; chronic data on *Salmo trutta*, LC50 (21-42 d) 0.015- 0.105 mg/L

Amphibians LC50 (4-5 d): 2 spp, 0.540-2.670 mg/L (absolute range 0.40-5.2 mg/L)

Alga: 1 sp NOEC growth 2.0 mg/L

Among freshwater aquatic plants, single-celled plants are generally the most sensitive to aluminium. Fish are generally more sensitive to aluminium than aquatic invertebrates. Aluminium is a gill toxicant to fish, causing both ionoregulatory and respiratory effects.

The bioavailability and toxicity of aluminium is generally greatest in acid solutions. Aluminium in acid habitats has been observed to be toxic to fish and phytoplankton. Aluminium is generally more toxic over the pH range 4.4-5.4, with a maximum toxicity occurring around pH 5.0-5.2. The inorganic single unit

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aluminium species (Al(OH)₂⁺) is thought to be the most toxic. Under very acid conditions, the toxic effects of the high H⁺ concentration appear to be more important than the effects of low concentrations of aluminium; at approximately neutral pH values, the toxicity of aluminium is greatly reduced. The solubility of aluminium is also enhanced under alkaline conditions, due to its amphoteric character, and some researchers found that the acute toxicity of aluminium increased from pH 7 to pH 9. However, the opposite relationship was found in other studies. The uptake and toxicity of aluminium in freshwater organisms generally decreases with increasing water hardness under acidic, neutral and alkaline conditions. Complexing agents such as fluoride, citrate and humic substances reduce the availability of aluminium to organisms, resulting in lower toxicity. Silicon can also reduce aluminium toxicity to fish.

Drinking Water Standards:

aluminium: 200 ug/l (UK max.)

200 ug/l (WHO guideline)

chloride: 400 mg/l (UK max.)

250 mg/l (WHO guideline)

fluoride: 1.5 mg/l (UK max.)

1.5 mg/l (WHO guideline)

nitrate: 50 mg/l (UK max.)

50 mg/l (WHO guideline)

sulfate: 250 mg/l (UK max.)

Soil Guideline: none available.

Air Quality Standards: none available.

Section 13 - DISPOSAL CONSIDERATIONS

-
- Recycle wherever possible or consult manufacturer for recycling options.
- Consult Waste Management Authority for disposal.
- Bury residue in an authorized landfill.
- Recycle containers where possible, or dispose of in an authorized landfill.

Section 14 - TRANSPORTATION INFORMATION

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

Section 15 - REGULATORY INFORMATION

REGULATIONS

Regulations for ingredients

activated alumina (CAS: 1344-28-1) is found on the following regulatory lists;

"Australia Exposure Standards", "Australia High Volume Industrial Chemical List (HVICL)", "Australia Inventory of Chemical Substances (AICS)", "Austria Occupational Exposure Limits - Maximum Workplace Concentrations (MAK) (German)", "Canada - Alberta Occupational Exposure Limits", "Canada - Ontario Occupational Exposure Limits", "Canada - Quebec Permissible Exposure Values for Airborne Contaminants (English)", "Canada - Quebec Permissible Exposure Values for Airborne Contaminants (French)", "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)", "Canada Toxicological Index Service - Workplace Hazardous Materials Information System - WHMIS (French)", "Chemwatch Candidate List of Very High Concern - List of Substance Subject to Authorization", "China (Hong Kong) Occupational Exposure Limits", "China Inventory of Existing Chemical Substances", "China Occupational Exposure Limits for Hazardous Agents in the Workplace - Dust", "Czech Republic Occupational Exposure Limits - Dusts predominately with fibrogenic effect (Czech)", "Denmark Limit values for air pollutants (Danish)", "Denmark Limit values for air pollutants (English)", "EU Directive 2002/72/EC Plastic materials and articles intended to come into contact with foodstuffs - Annex III Section A Incomplete list of additives fully harmonised at Community level", "European Customs Inventory of Chemical Substances - ECICS (Danish)", "European Customs Inventory of Chemical Substances - ECICS (Dutch)", "European Customs Inventory of Chemical Substances - ECICS (Finnish)", "European Customs Inventory of Chemical Substances - ECICS (French)", "European Customs Inventory of Chemical Substances - ECICS (German)", "European Customs Inventory of Chemical Substances - ECICS (Greek)", "European Customs Inventory of Chemical Substances - ECICS (Italian)", "European Customs Inventory of Chemical Substances - ECICS (Portuguese)", "European Customs Inventory of Chemical Substances - ECICS (Spanish)", "European Customs Inventory of Chemical Substances - ECICS (Swedish)", "European Customs Inventory of Chemical Substances (English)", "European Union - European Inventory of Existing Commercial Chemical Substances (EINECS) (English)", "European Union - European Inventory of Existing Commercial Chemical Substances (EINECS) (French)", "European Union - European Inventory of Existing Commercial Chemical Substances (EINECS) (German)", "European Union - European Inventory of Existing Commercial Chemical Substances (EINECS) (Spanish)", "European Union (EU) Inventory of Ingredients used in Cosmetic Products", "France Threshold Limit Values for Occupational Exposure - VLE/VME (French)", "Greece Occupational Exposure Limits", "Hungary Occupational Exposure Limits (Hungarian)", "Iceland Occupational Exposure Limits (Icelandic)", "Indonesia Threshold Limit Value for chemical substances in the workplace (Bahasa Indonesian)", "International Council of Chemical Associations (ICCA) - High Production Volume List", "Japan Chemical Substances Control Law - Existing/New Chemical Substances", "Japan GHS Classifications (Japanese)", "Japan Industrial Safety and Health Law (ISHL) - Notifiable Substances (Japanese)", "Japan Occupational Exposure Limits for Dusts", "Japan Occupational Exposure Limits for Dusts (Japanese)", "Korea (South) Existing Chemicals List (KECL)", "Korea (South) GHS Classifications (Korean)", "Korea (South) Occupational Exposure Standards (Korean)", "Latvia Occupational Exposure Limit Values (OELV) for Chemical Substances in the Work Environment Atmosphere (Latvian)", "Malaysia Permissible Exposure Limits", "Mexico Maximum Permissible Exposure Limits", "New Zealand Inventory of Chemicals (NZIoC)", "New Zealand Workplace Exposure Standards (WES)", "OECD Representative List of High Production Volume (HPV) Chemicals", "Philippines Inventory of Chemicals and Chemical Substances (PICCS)", "Poland Workplace Maximum Allowable Concentration (Polish)", "Portugal Occupational exposure limits to chemical agents (Portuguese)", "Russia Maximum Allowed Concentrations (PDK) of Harmful Substances in the Air of Workplace Zone (Russian)", "Singapore Permissible Exposure Limits of Toxic Substances", "Slovak Republic Highest Admissible Exposure Limits (Slovak)", "Spain Occupational Exposure Limit for Chemical Agents", "Spain Occupational Exposure Limit for Chemical Agents (Spanish)", "Switzerland Occupational Exposure Limits (German)", "US - Alaska Limits for Air Contaminants", "US - California Air Toxics ""Hot Spots"" List (Assembly Bill 2588) Substances for which emissions must be quantified", "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 (Z1)", "US - Pennsylvania - Hazardous Substance List", "US - Rhode Island Hazardous

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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 DOE Temporary Emergency Exposure Limits (TEELs)", "US EPCRA Section 313 Chemical List", "US FDA CFSAN Color Additive Status List 5", "US List of Lists - Consolidated List of Chemicals Subject to the Emergency Planning and Community Right-to-Know Act (EPCRA) and Section 112(r) of the Clean Air Act", "US OSHA Permissible Exposure Levels (PELs) - Table Z1", "US Toxic Substances Control Act (TSCA) - Inventory"

No data for Phos-Zorb (CW: 4658-61)

Section 16 - OTHER INFORMATION

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

A list of reference resources used to assist the committee may be found at:

www.chemwatch.net/references.

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

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