

# 3049-5-XX0-00-TS-002

## Binder Raw Materials - Technical Specification

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00	Revision 0	GMA	BER	INFO	MLG	25/09/20
01						
02						
03						
04						
05						

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## 1 RAW MATERIALS FOR PHENOLIC RESIN BASED BINDER

Here below the chemical and physical characteristics of the raw materials to be used to prepare the Binder for Glass Wool production.

Other suppliers raw materials can be used after STM Technologies approval.

### 1.1 PHENOLIC RESIN WITH UREA

Product Data		Units
Appearance	Reddish brown liquid	
Dry solid content (resin + urea)	46 - 50	wt%
Urea content	16 (35 % of above dry solid content)	wt%
Viscosity at 25°C	10 - 13 cps	cPoise
Density at 25°C	1.165 – 1.200	g/cm <sup>3</sup>
pH at 20°C	8.5 – 9.5	
Free formaldehyde	< 0,8	%
Free phenol	< 0,8	%
Water compatibility	unlimited	g/g
Storage temperature	12	°C

See annexes for reference Technical Data Sheet and Safety Data Sheet

Possible suppliers: Dynea, Hexion (Bakelite), MKS Marmara

### 1.2 AMMONIA SOLUTION

Product Data		Units
Appearance	Colourless, transparent and irritating smell liquid not containing insoluble materials	
Density at 25°C	Max. 0.932	g/cm <sup>3</sup>
Ammonium content	Min. 18	wt%

See annexes for reference Technical Data Sheet and Safety Data Sheet

### 1.3 AMMONIUM SULFATE

NOTE: normally not used

Product Data		Units
Appearance	White crystalline powder	
Purity	Min. 99	wt%
Iron	Max. 50	ppm
Moisture content	Max. 1.00	%
Ashes	Max. 500	ppm
Free H <sub>2</sub> SO <sub>4</sub>	Max. 0.12	%
Water solubility at 20°C	760	g/l

See annexes for reference Technical Data Sheet and Safety Data Sheet

### 1.4 SILANE A – 1100 (gamma-Aminopropyltriethoxysilane)

Product Data		Units
Appearance	Colourless liquid	
Density at 25°C	Max. 0.950	g/cm <sup>3</sup>
Refractive index nd <sub>25°C</sub>	1.420	
Purity	more than 99	wt%

See annexes for reference Technical Data Sheet and Safety Data Sheet

### 1.5 MULREX 88 (Oil-water emulsion)

NOTE: compatible with liquid phenolic resin

Product Data		Units
Appearance	Clear yellow emulsion	
Solid content	51÷53	wt%
pH	7.5÷8.5	
Dynamic viscosity	600	Needle N.3 at 100 rpm

See annexes for reference Technical Data Sheet.

Possible supplier Exxon - Mobil

## 1.6 SILICONE EMULSION (Polydimethylsiloxane)

NOTE: to be used just for special hydro repellent products.

Product Data		Units
Appearance	Aqueous emulsion	
Density at 25°C	0.950	<i>g/cm<sup>3</sup></i>
pH	6.5±1.0	

See annexes for reference Technical Data Sheet.

## 1.7 PHENOLIC RESIN WITH UREA Technical Data Sheet

### Technical Data Sheet

**Prefere® 72 5250M**

**Insulation Resins**



#### Application

Prefere 72 5250M has been designed specifically as a binding agent for insulation products.

Properties	Typical values	Standard
Free Formaldehyde	<0,4%	DIN EN ISO 11402
Free Phenol	<0.6%	DIN EN ISO 8974
pH –Value	8,5-9,0	DIN EN ISO 8975
Solid Content [135°C/1h]	48-50%	DIN EN ISO 3251
Water dilutability	>1:20	DIN EN ISO 8989

#### Form of delivery and packaging

Tank truck (bulk)

#### Storage

Liquid resins age when stored. The condensation continues slowly. Storage life depends on storage temperature.

The average storage life is about 3 weeks at 20°C.

The storage life indicated above is a guideline based on our experience. Any user of our products should conduct individual tests in order to fully understand possible changes to the product performance owing to transport and storage conditions.

#### Handling and safety requirements

Detailed information is available in the safety data sheet for the product.

#### Common indications

We ensure compliance with the indicated parameters at the time of delivery only. Our technical staff is at your disposal. All technical recommendations have to be adjusted to industrial working conditions in each mill. The recommendations given above are based on conscientious experiments and attempts to advise in the best way. Due to the great variety of different applications and of working conditions in the mills we do not guarantee for a certain application but recommend testing prior to use.

**Prefere Resins  
Austria GmbH**  
Hafenstrasse 77  
A-3500 Krems

**Prefere Resins  
Finland Oy**  
Olytysemäentie 16  
PO Box 80  
FI-49401 Hamina

**Prefere Resins  
France SAS**  
10, Rue Comtesse  
P.O. Box 5  
FR-62117 Brebières

**Prefere Resins  
Germany GmbH**  
Berliner Straße 9-10  
D-15537 Erkner

**Prefere Resins  
Poland Sp. z o.o.**  
Ul. Fabryczna 4  
Trzemeszno  
PL-62-240

**Prefere Resins  
Romania S.R.L.**  
Strada Gării Nr 4  
Resnov Jud. Brasov  
RO-505400

**Prefere Resins  
UK Ltd.**  
Aycliffe Industrial Park  
Heighington Lane  
DL5 6UE Newton Aycliffe

Date of release: 20.07.2016

[www.prefere.com](http://www.prefere.com)

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## 1.8 AMMONIA SOLUTION Technical Data Sheet



Our manufacturing plant is located at M.I.D.C Rabale (Chemical Zone), Navi Mumbai placed at an equidistant of 40 kms from Mumbai(Bombay) - the business capital of India and Nhava Sheva port.

The plant has a capacity of producing 15 M.T. per day of AMMONIA SOLUTION 23-25%.

The finished product can be supplied in

- HDPE DRUMS ( 99 kgs & 180 kgs Net capacity),
- HDPE Jerry cans (30 kgs Net capacity) or
- Road Tankers (9/10 M.T. Net capacity)

### Specification of Liquor Ammonia 23-25%

**The liquor ammonia is clear and colourless & is the only liquor ammonia manufactured in India that passes FCC IV**

Description	A clear, colourless liquid, odour strongly Pungent and characteristic.
Assay	Content of Ammonia (NH <sub>3</sub> ) = 25.00% w/w. min.
Residue on evaporation	0.044 % w/v.
Content of oil	0.008 % w/v.
Non Volatile Matter	0.02 % W/W Max.
Chloride as Cl	0.005% W/W Max.
Sulphate as So <sub>4</sub>	NIL
Phosphate Po <sub>4</sub>	NIL
Copper as Cu	0.00008% W/W Max
Iron as Fe	0.0002% W/W Max
Arsenic as As	NIL
Food Chemicals Codex Test (Readily Oxidisable Substance)	Complies
Lead	Less Than 0.5 PPM ( by AAS) [ Limit : as per FCC IV heavy metals as Lead not more than 5 PPM]
Sodium as Na	0.0181% Max ( By Flame photometry)
Calcium as Ca	0.0077% ( By Flamephotometry)
Magnesium as Mg	0.00067% ( By AAS)



## 1.9 AMMONIA SOLUTION Safety Data Sheet

**SIEMENS**

Water Technologies

### Material Safety Data Sheet

#### SECTION 1 – CHEMICAL PRODUCT AND COMPANY INFORMATION

**Product Name:** Ammonium Hydroxide Solutions  
**Part Number:** none **Chemical Family:** Ammonia solution, aqua ammonia

**Manufacturer's Name:** Siemens Water Technologies Corp.  
**Address:** 181 Thorn Hill Road, Warrendale, PA 15086  
**Product/Technical Information Phone Number:** (412) 772-0044  
**Medical/Handling Emergency Phone Number:** Call CHEMTREC at 800/424-9300  
 24 hours a day  
**Transportation Emergency Phone Number:** Call CHEMTREC at 800/424-9300  
 24 hours a day

**Issue Date:** September 26, 2000

#### SECTION 2 – COMPOSITION INFORMATION

<u>Chemical Name</u>	<u>Percent by Weight</u>	<u>CAS#</u>
Ammonium Hydroxide*	varies	1336-21-6

\*No other ingredients are considered hazardous per OSHA's Hazard Communication Standard (29CFR1900.1200).

#### SECTION 3 – HAZARDS IDENTIFICATION

**Appearance & Odor:** Clear, colorless liquid with strong ammonia odor

**Emergency Overview:** INHALATION MAY BE FATAL as a result of spasm, inflammation and edema of the larynx and bronchi, chemical pneumonitis and pulmonary edema. Material is extremely destructive to tissue of the mucous membranes and upper respiratory tract, eyes and skin. Prolonged eye contact may cause permanent damage to the cornea or blindness.

Ingestion is harmful and may be fatal.

Contact with skin may cause severe irritation or burns.

**Fire & Explosion Hazards:** Gives off toxic vapors when heated. Flammable vapors may accumulate in confined spaces.

**Primary Route(s) of Exposure:** inhalation, ingestion, skin contact, eye contact

**Inhalation – Acute Effects:** Inhalation can severely irritate the nose, throat, mucous membranes and lungs causing coughing, wheezing and shortness of breath. Exposure to high concentrations of ammonia vapor (above approximately 2500 ppm) is life threatening, causing severe damage to the respiratory tract and resulting in bronchitis, chemical pneumonitis, and pulmonary edema, which can be fatal.

**Skin Contact – Acute Effects:** Skin contact can result in severe irritation and burns; contact with the liquid results in cryogenic burns as well.

**Material Safety Data Sheet**

**Eye Contact – Acute Effects:** Eye contact with ammonia vapor is severely irritating, and exposure of the eyes to ammonium hydroxide can result in serious damage including burns and may cause permanent eye injury and blindness.

**Ingestion – Acute Effects:** May be fatal if swallowed. Ingestion of ammonium hydroxide burns the mouth, throat, and gastrointestinal tract and can lead to severe abdominal pain, nausea, vomiting, collapse and death.

**SECTION 4 – FIRST AID MEASURES**

**Inhalation First Aid:** Remove affected person from area to fresh air and provide oxygen if breathing is difficult. Give artificial respiration ONLY if breathing has stopped and give CPR ONLY if there is no breathing and no pulse. Obtain medical attention.

**Skin Contact First Aid:** Immediately remove clothing from affected area and wash skin for 15 minutes with flowing water. Clothing and shoes should be discarded or washed before reuse. Obtain medical attention immediately. DO NOT instruct person to neutralize affected skin area.

**Eye Contact First Aid:** Immediately irrigate eyes with flowing water continuously for 15 minutes while holding eyes open. Contacts should be removed before or during flushing. Obtain medical attention immediately. DO NOT instruct person to neutralize.

**Ingestion First Aid:** If swallowed, do NOT induce vomiting. If conscious, give large amounts of water - follow with diluted vinegar, fruit juice or whites of eggs (beaten, with water). If spontaneous vomiting occurs, have affected person lean forward with head down to avoid breathing in of vomitus. Rinse mouth again and give more water to drink. Obtain medical attention.

**Medical Conditions Aggravated:** Persons with pulmonary disorders, pre-existing eye disorders or impaired respiratory function may be more susceptible to the effects of this material.

**Note to Physician:** Treat patient symptomatically.

**SECTION 5 – FIRE FIGHTING MEASURES**

**Flash Point/Method:** non-flammable

**Auto Ignition Temperature:** not applicable

**Upper/Lower Explosion Limits:** not applicable

**Extinguishing Media:** Use extinguishing media appropriate for surrounding fire.

**Fire Fighting Procedures:** Firefighters should wear proper protective equipment and self-contained (positive pressure if available) breathing apparatus with full facepiece. Use water to keep fire-exposed containers cool.

**Material Safety Data Sheet**

**Fire & Explosion Hazards:** Gives off toxic vapors when heated. Flammable vapors may accumulate in confined spaces.

**Hazardous Products of Decomposition and/or Combustion:** Burning may produce ammonia and oxides of nitrogen.

**NFPA Ratings:**  
HEALTH- 3 FLAMMABILITY- 1 REACTIVITY- 0 OTHER- none

**SECTION 6 – ACCIDENTAL RELEASE MEASURES**

Ventilate area. Keep unnecessary and unprotected people away from area of spill. Wear appropriate personal protective equipment. Carefully neutralize spill with dilute acetic acid or take up with alkali spill kit. Absorb neutralized caustic residue with clay, vermiculite or other inert substance and package in a suitable container for disposal. Flush area with large amounts of water.

DO NOT DUMP INTO ANY SEWERS, ON THE GROUND OR INTO ANY BODY OF WATER. All disposal methods must be in compliance with all Federal, State, Local and Provincial laws and regulations.

Regulations may vary in different locations. Waste characterizations and compliance with applicable laws are the responsibility solely of the waste generator.

**SECTION 7 – HANDLING AND STORAGE**

**Handling:** Follow good handling and housekeeping practices to prevent spills. Use with adequate exhaust ventilation to draw vapors away from workers' breathing zones.

**Storage:** Keep container tightly closed. Store in a cool, dry, corrosion-proof area. Store below 80 °F. Keep separate from incompatible materials.

**General Comments:** Containers of this material may be hazardous when empty since they retain product residues (vapors, liquid); observe all warnings and precautions listed for the product.

**SECTION 8 –PERSONAL PROTECTION/ EXPOSURE CONTROL**

**Respiratory Protection:** Use appropriate NIOSH/MSHA-approved respirator

**Skin Protection:** Wear impervious protective clothing, including boots, gloves, lab coat, apron or coveralls, as appropriate, to prevent skin contact. Neoprene and nitrile rubber are recommended materials.

**Eye Protection:** Wear chemical safety goggles and/or full face shield.

**Ventilation Protection:** Use local exhaust to meet TLV requirement. Use only in an approved fume hood.

## Material Safety Data Sheet

**Other Protection:** Safety showers, with quick opening valves which stay open, and eye wash fountains, or other means of washing the eyes with a gentle flow of cool to tepid tap water, should be readily available in all areas where this material is handled or stored.

Water should be supplied through insulated and heat-traced lines to prevent freeze-ups in cold weather.

### Exposure Limits:

OSHA PEL-TWA: 50 ppm

NIOSH REL-TWA: 25 ppm; STEL: 35 ppm

ACGIH TLV-TWA: 25 ppm; STEL: 35 ppm

## SECTION 9 – PHYSICAL AND CHEMICAL PROPERTIES

**Appearance & Odor:** Clear, colorless liquid with strong ammonia odor.

**Vapor Pressure:** 115 @ 20°C, 68°F

**Vapor Density (Air=1):** 0.60

**Boiling Point:** 36°C, 97°F

**Melting Point:** -72°C, -98°F

**Specific Gravity:** <1

**Solubility in Water:** Complete in all proportions

**Volatile Percentage:** ND\*

**pH:** 11-12

**Flash Point/method:** NA\*\*

**Auto Ignition Temperature:** NA

**Upper/Lower Explosion Limits:** NA

**Other:** ND

\*ND=Not determined

\*\*NA=Not applicable

## SECTION 10 – STABILITY AND REACTIVITY

**Stability:** Stable under normal conditions of use and storage.

**Incompatibilities:** acids, acrolein, dimethyl sulfate, halogens, silver nitrate, propylene oxide, nitromethane, silver oxide, silver permanganate, oleum, beta-propiolactone, most common metals, mercury, strong oxidants, copper and copper alloys

**Polymerization:** Will not occur.

**Decomposition:** Burning may produce ammonia and oxides of nitrogen.

**Conditions to Avoid:** Heat, sunlight, sources of ignition and incompatible materials.



**Material Safety Data Sheet****SECTION 11 – TOXICOLOGICAL INFORMATION**

**Inhalation – Acute:** Inhalation can severely irritate the nose, throat, mucous membranes and lungs causing coughing, wheezing and shortness of breath. Exposure to high concentrations of

ammonia vapor (above approximately 2500 ppm) is life threatening, causing severe damage to the respiratory tract and resulting in bronchitis, chemical pneumonitis, and pulmonary edema, which can be fatal.

**Inhalation – Chronic:** Repeated exposure to low concentrations may cause bronchitis to develop with cough, phlegm and/or shortness of breath. Chronic exposure to ammonia can cause respiratory irritation and damage.

**Skin Contact – Acute:** Skin contact can result in severe irritation and burns; contact with the liquid results in cryogenic burns as well.

**Skin Contact – Chronic:** Repeated skin contact can cause dryness, itching and redness.

**Eye Contact – Acute:** Eye contact with ammonia vapor is severely irritating, and exposure of the eyes to ammonium hydroxide can result in serious damage including burns and may cause permanent eye injury and blindness.

**Ingestion – Acute:** May be fatal if swallowed. Ingestion of ammonium hydroxide burns the mouth, throat, and gastrointestinal tract and can lead to severe abdominal pain, nausea, vomiting, collapse and death. The oral LD50 (rat) is 350 mg/kg.

**Ingestion – Chronic:** There are no known chronic ingestion effects.

**Carcinogenicity/Mutagenicity:** There are no known carcinogenic/mutagenic effects.

**Reproductive Effects:** There are no known reproductive effects.

**Neurotoxicity:** There are no known neurotoxic effects.

**Other Effects:** There are no other known toxic effects.

**Target Organs:** Target organs include the eyes, skin, respiratory and digestive tracts.

**SECTION 12 – ECOLOGICAL INFORMATION**

This material is expected to be very toxic to aquatic life.

**SECTION 13 – DISPOSAL CONSIDERATIONS**

Material that cannot be used or chemically reprocessed and empty containers should be disposed of in accordance with all applicable regulations. Product containers should be thoroughly emptied before disposal. Generators of waste material are required to evaluate all waste for compliance with RCRA and any local disposal procedures and regulations.

**NOTE:** State and local regulations may be more stringent than federal regulations.



**SIEMENS**

Water Technologies

**Material Safety Data Sheet**

**SECTION 14 – TRANSPORTATION INFORMATION**

DOT Shipping Description: see shipping papers

**SECTION 15 – REGULATORY INFORMATION**

CERCLA SECTION 103 (40CFR302.4): yes RQ: 1000 lbs

SARA SECTION 302 (40CFR355.30): no

SARA SECTION 304 (40CFR355.40): no

SARA SECTION 313 (40CFR372.65): no

SARA HAZARD CATEGORIES, SARA SECTIONS 311/312 (40CFR370.21):

ACUTE: yes CHRONIC: yes FIRE: no REACTIVE: no SUDDEN RELEASE: no

OSHA PROCESS SAFETY (29CFR1910.119): yes TQ: 15000 lbs

CALIFORNIA PROPOSITION 65: no

Ammonium Hydroxide Solutions, Page 6 of 6

**SECTION 16 – OTHER INFORMATION**

**Disclaimer:** The information contained herein is based on data considered accurate.

However, no warranty is expressed or implied regarding the accuracy of these data or the results to be obtained from the user thereof. It is the buyer's responsibility to ensure that its activities comply with federal, state, provincial and local laws.

## 1.10 AMMONIUM SULFATE Technical Data Sheet

### DSM Fibre Intermediates

#### Product Data Sheet

#### Ammonium sulphate, technical grade

CAS No.: 7783-20-2

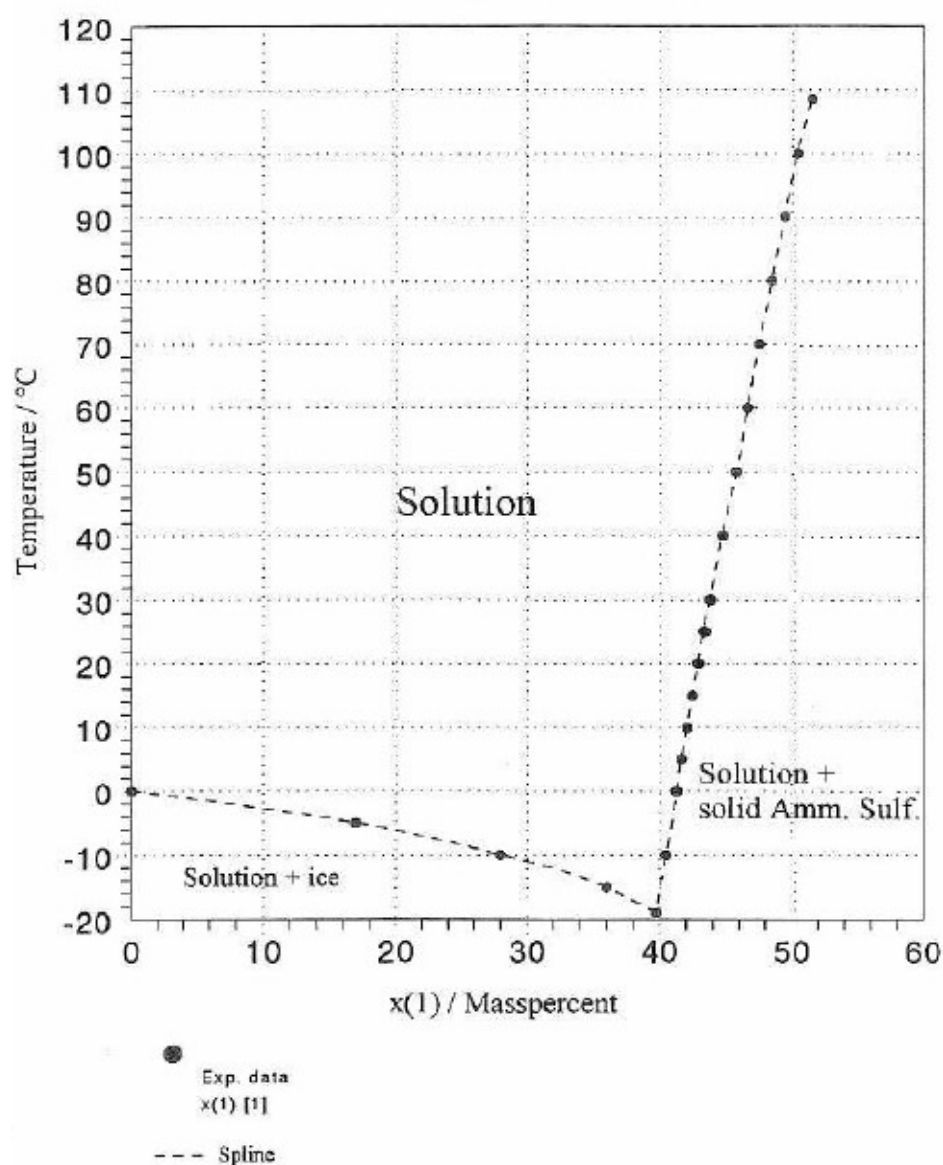
Formula	(NH <sub>4</sub> ) <sub>2</sub> SO <sub>4</sub>	
	Molecular weight	: 132.14
Appearance	Crystals, white colour Non-hygroscopic	
Specifications	Assay	: min. 99% by mass AS-1401-SU
	Ammonia-nitrogen	: min. 21% by mass AS-1401-SU
	Free acid (as H <sub>2</sub> SO <sub>4</sub> )	: max. 0.01% by mass AS-0643-SU
	Water	: max. 0.2% by mass AS-1993-SU
	Sulphate ash	: max. 0.05% by mass AS-1998-SU
	Iron (total)	: max. 5 mg/kg AS-1379-SU
	Heavy metals (as Pb)	: max. 5 mg/kg AS-0206-SU
Characteristics	Particle Size	Average & Tolerances
	> 2,00	2 ± 2%
	1,41 - 2,00	18 ± 10%
	1,01 - 1,40	36 ± 10%
	0,50 - 1,00	37 ± 15%
	< 0,50	7 ± 4%
Solubility	Readily soluble in water	
Main applications	Ammonium sulphate, technical grade is a common ingredient in a variety of applications like: - Nutritive constituent in fermentation processes - Flameproofing formulations - Animal Feed - Water treatment - Dyeing of textiles - Spinning bath and tanning processes - Metal treatment	
Packing	25 kg bags, 50 kg bags and various sizes big bags	
Hazardous Chemicals Classification	IMCO class	: non-restricted
	ADR/VRG	: non-restricted
Toxicity	LD50 Oral(rat)	: 3000 mg/kg
Hazards	Contact with eyes and skin, should be avoided.	
Handling	No hazards with handling: however prolonged contact with skin should be avoided. Store in a dry area separated from strong bases. Process the product as quickly as possible, the product hardens during storage.	

DSM Fibre Intermediates.  
P.O. Box 43  
6130 AA Sittard, the Netherlands  
Telephone: (31) 46 4770035 / Telefax: (31) 46 4770033

\*All data, suggestions and information supplied by or on behalf of DSM with respect to its products are based on research and deemed to be reliable. However, since DSM has no influence on the use, processing and application of the same, DSM can accept no responsibility whatsoever in this respect. The buyer shall check the quality and all other properties of the product and assumes all responsibilities arising from the use of the products and the information related thereto.  
DSM accepts no liability arising from any infringement of rights to trademarks, patents etc. owned or controlled by third parties that is the result of manufacturing, application or sale of products by the buyer. Edition: July 2001

## DSM Fibre Intermediates

## Product Data Sheet

Solid-Liquid Equilibrium  
Ammonium sulphate (1) / Water (2)



## DSM Fibre Intermediates

### Business Development & Technology

To:  
To Whom It May Concern:

From:  
Technical Service Caprolactam

#### Shelf life Technical Ammonium Sulphate

This document informs about the shelf life of Technical Ammonium Sulphate.





- We don't have reference data.
- No guarantee data is available.
- TAS will not change during storage, except for the **water content**.
- The water content (if > 0.05 w%) will influence the caking effect.
- No other effects are known.
- If well stored under dry conditions, the water content will remain within specifications for a period of 6 months approximately. As storage and transport conditions are not under the responsibility of DSM, we don't guarantee a shelf life.

DSM Technical Service Caprolactam

## 1.11 AMMONIUM SULFATE Safety Data Sheet



# Material Safety Data Sheet

NFPA Classification	DOT / TDG Pictograms	WHMIS Classification	HMIS	PROTECTIVE CLOTHING
 Health 1 Flammability 0 Reactivity 0 Specific Hazard 0			Health 1 Flammability 0 Reactivity 0 PPE E	

Section I. Chemical Product and Company Identification			
PRODUCT NAME/ TRADE NAME	Ammonium Sulfate, Granular Grades		
SYNONYM	This Material Safety Data Sheet applies to the following Agrium products:  20-0-0-24 Granular Ammonium Sulfate 20.5-0-0-24 Granular Ammonium Sulfate 21-0-0-24 Granular Ammonium Sulfate	MSDS NUMBER:	16001
CHEMICAL NAME	Ammonium sulfate	REVISION NUMBER	1.0
CHEMICAL FAMILY	Ammonium salt.	MSDS prepared by the Environment, Health and Safety Department on:	September 18, 2006
CHEMICAL FORMULA	(NH <sub>4</sub> ) <sub>2</sub> SO <sub>4</sub>	<b>24 HR EMERGENCY TELEPHONE NUMBER:</b>  Transportation: 1-800-792-8311 Medical: 1-888-670-8123	
MATERIAL USES	Agricultural industry: Fertilizer. Industrial applications: Manufacture of specialty fertilizers.		
MANUFACTURER	Various	SUPPLIER	Agrium North American Wholesale 13131 Lake Fraser Drive, S.E. Calgary, Alberta, Canada, T2J 7E8  Agrium U.S. Inc. Suite 1700, 4582 South Ulster St. Denver, Colorado, U.S.A., 80237

Section II. Hazardous Ingredients								
		Exposure Limits (ACGIH)						
NAME	CAS #	TLV-TWA mg/m <sup>3</sup>	TLV-TWA ppm	STEL mg/m <sup>3</sup>	STEL ppm	CEIL mg/m <sup>3</sup>	CEIL ppm	% by Weight
Ammonium sulfate	7783-20-2	N/A						>98
ACGIH TLV notations: -- No assigned TLV (C) - Ceiling - the concentration not to be exceeded at any time (R) - measured as the Respirable fraction of the aerosol (I) - measured as the Inhalable fraction of the aerosol (T) - measured as the Thoracic fraction of the aerosol								
TOXICOLOGICAL DATA ON INGREDIENTS	Ammonium Sulfate TFI Product Testing Program Results: Acute oral LD <sub>50</sub> , rat: >2,000-4,250 mg/kg Acute oral LD <sub>50</sub> , mouse: 640 mg/kg Acute dermal LD <sub>50</sub> : >2,000 mg/kg (rat, mouse)  Ecotoxicity: Acute toxicity to fish, Coho salmon, rainbow trout, largemouth bass, bluegill, fathead minnow, 24-96 hr LC <sub>50</sub> : >90->1500 mg/L							
Continued on Next Page								

Ammonium Sulfate, Granular Grades	Page Number: 2
<p>Acute toxicity to aquatic invertebrates, <i>Daphnia magna</i>, 50-96 hr LC<sub>50</sub>: &gt;433 mg/L  Amphipod, 96 hrs, LC<sub>50</sub>=40-62 mg/L  Snails, 48-96 hrs, LC<sub>50</sub>=&gt;100-700 mg/L</p> <p>Toxicity to aquatic plants, <i>Chlorella vulgaris</i>, 21 days, NOEC=250 mg N/L  Chronic toxicity to fish, Rainbow trout, 12 &amp; 35 days, LC<sub>50</sub>: 0.26-0.68 mg unionized NH<sub>3</sub>/L  Pink salmon, 21, 40, &amp; 61 days, NOEC=1.2mg unionized NH<sub>3</sub>/L  Channel catfish, 6 months, LOEC=100-500 mg/L</p>	

Section III. Hazards Identification.	
POTENTIAL ACUTE HEALTH EFFECTS	This product may irritate eyes and skin upon prolonged or repeated contact. Over-exposure by inhalation may cause respiratory tract irritation. Ingestion of this substance may produce irritation of the gastro-intestinal tract, characterized by burning and diarrhea.
POTENTIAL CHRONIC HEALTH EFFECTS	<p>CARCINOGENIC EFFECTS: NONE by ACGIH, EPA, IARC, NTP, OSHA.</p> <p>MUTAGENIC EFFECTS: NONE by ACGIH, EPA, IARC, NTP, OSHA.</p> <p>TERATOGENIC EFFECTS: NONE by ACGIH, EPA, IARC, NTP, OSHA.</p> <p>There is no known effect from chronic exposure to this product.</p>

Section IV. First Aid Measures	
EYE CONTACT	May cause eye irritation by mechanical abrasion. Check for and remove any contact lenses. Immediately flush eyes with running water for at least 15 minutes, keeping eyelids open. Obtain medical attention if irritation persists.
MINOR SKIN CONTACT	May cause skin irritation. Wash contaminated skin with soap and water. Cover dry or irritated skin with a good quality skin lotion. If irritation persists, seek medical attention.
EXTENSIVE SKIN CONTACT	No additional information.
MINOR INHALATION	Repeated or prolonged inhalation of dust may lead to respiratory irritation. Loosen tight clothing around the individual's neck and waist. Allow the person to rest in a well ventilated area. Obtain medical attention if irritation persists.
SEVERE INHALATION	In emergency situations use proper respiratory protection to evacuate affected individuals to a safe area as soon as possible. Loosen tight clothing around the person's neck and waist. Oxygen may be administered if breathing is difficult. If the person is not breathing, perform artificial respiration. Obtain immediate medical attention.
SLIGHT INGESTION	If conscious, have person drink several glasses of water or milk and induce vomiting. NEVER induce vomiting or give anything by mouth to an unconscious person. Obtain medical attention.
EXTENSIVE INGESTION	No additional information.

Section V. Fire and Explosion Data	
THE PRODUCT IS	Non-flammable.
AUTO-IGNITION TEMPERATURE	Not applicable.
FLASH POINT	Not applicable.
FLAMMABILITY LIMITS	Not applicable.
PRODUCTS OF COMBUSTION	Material will not burn. Undergoes thermal decomposition at elevated temperatures to release toxic and combustible gases: ammonia, nitrogen oxides (NO, NO <sub>2</sub> ...), sulfur oxides (SO <sub>2</sub> , SO <sub>3</sub> ...)
FIRE HAZARD IN THE PRESENCE OF VARIOUS SUBSTANCES	Not applicable.
Continued on Next Page	

<i>Ammonium Sulfate, Granular Grades</i>		Page Number: 3
<b>EXPLOSION HAZARD IN THE PRESENCE OF VARIOUS SUBSTANCES</b>	This product is non-explosive. Sensitizer. Increases explosion hazard of ammonium nitrate when mixed together.	
<b>FIRE FIGHTING MEDIA AND INSTRUCTIONS</b>	Material will not burn. Undergoes thermal decomposition at elevated temperatures to release toxic and combustible gases. Use extinguishing media suitable for surrounding materials.	
<b>SPECIAL REMARKS ON FIRE HAZARDS</b>	Non combustible. Flammable/toxic gases will form at elevated temperatures (>280 °C) by thermal decomposition (ammonia, sulfur oxides, nitrogen oxides). A self contained breathing apparatus should be used to avoid inhalation of toxic fumes.	
<b>SPECIAL REMARKS ON EXPLOSION HAZARDS</b>	No additional remark.	

<i>Section VI. Accidental Release Measures</i>	
<b>SMALL SPILL</b>	Use appropriate tools to put the spilled solid in a suitable container for intended use or disposal.
<b>LARGE SPILL</b>	Prevent additional discharge of material, if possible to do so without hazard. Prevent spills from entering sewers, watercourses, wells, etc. Product will promote algae growth which may degrade water quality and taste. Notify downstream water users. Sulfate in potable drinking water should be maintained below 500mg/L (Canada) and 250 mg/L (U.S.). Will dissolve and disperse in water. Reclaiming material may not be viable. Recover and place material in suitable containers for recycle, reuse, or disposal. Ensure disposal complies with government requirements and local regulations.


<i>Section VII. Handling and Storage</i>	
<b>PRECAUTIONS</b>	Avoid contact with skin and eyes. Do not breathe dust. Do not ingest. Use process enclosures, local exhaust ventilation, or other engineering controls to keep airborne levels below recommended exposure limits. Keep away from incompatible materials.
<b>STORAGE</b>	Keep away from food, drink and animal feed. Store in a dry, cool and well ventilated area. Keep out of reach of children.





<i>Section VIII. Exposure Controls/Personal Protection</i>	
<b>ENGINEERING CONTROLS</b>	Use process enclosures, local exhaust ventilation, or other engineering controls to keep airborne levels below recommended exposure limits. If user operations generate dust, use ventilation to keep exposure to airborne contaminants below the exposure limit.
<b>PERSONAL PROTECTION</b>	The selection of personal protective equipment varies, depending upon conditions of use. Wear appropriate respiratory protection for dust/mist when ventilation is inadequate. A filtering facepiece dust mask is recommended for most applications if respiratory protection is needed. Where skin and eye contact may occur as a result of brief periodic exposures, wear long sleeved clothing, coveralls, chemical resistant gloves, and safety glasses with side shields.
<b>PERSONAL PROTECTION IN CASE OF LARGE RELEASE</b>	No additional information.
<b>EXPOSURE LIMITS</b>	OSHA PEL: 15 mg/m <sup>3</sup> , total dust, 5 mg/m <sup>3</sup> respirable, for Particulates Not Otherwise Regulated (nuisance particulates).  Federal, State or Provincial exposure limits may vary by jurisdiction. Consult local authorities for acceptable exposure limits in your area.

*Continued on Next Page*

Ammonium Sulfate, Granular Grades		Page Number: 4	
Section IX. Physical and Chemical Properties			
PHYSICAL STATE AND APPEARANCE	Solid white crystalline granules.		
MOLECULAR WEIGHT	132.14	COLOR	White.
pH (10% SOLN/WATER)	3-4	ODOR	Odorless.
BOILING POINT	Decomposes.	ODOR THRESHOLD	~17 PPM (recognition) as ammonia.
MELTING POINT	235°C (455°F)	TASTE	Acrid.
CRITICAL TEMPERATURE	Not available.	VOLATILITY	Not applicable.
SPECIFIC GRAVITY g/cc	0.913 (Water = 1)	SOLUBILITY	Easily soluble in hot water. Soluble in cold water.
BULK DENSITY kg/m <sup>3</sup> ; lbs/ft <sup>3</sup>	Loose: ~913 kg/m <sup>3</sup> ; 57 lbs/ft <sup>3</sup> ; Tapped: ~945 kg/m <sup>3</sup> ; 59 lbs/ft <sup>3</sup>	DISPERSION PROPERTIES	See solubility in water.
VAPOR PRESSURE	Not applicable.	WATER/OIL DIST. COEFF.	Not available.
VAPOR DENSITY	Not applicable.		
Section X. Stability and Reactivity Data			
STABILITY	The product is stable.		
INSTABILITY TEMPERATURE	Not available.		
CONDITIONS OF INSTABILITY	No additional remark.		
INCOMPATIBILITY WITH VARIOUS SUBSTANCES	Slightly reactive with oxidizing agents,metals, alkalis, or moisture. Non-reactive with reducing agents, combustible materials, organic materials, acids.		
CORROSIVITY	A mineral salt. Highly corrosive to aluminum, zinc, and copper. Slightly corrosive to steel and 304 stainless steel. Non-corrosive to 316 stainless steel.		
SPECIAL REMARKS ON REACTIVITY	Avoid contact with moisture. Hydrolysis will slowly produce acids corrosive to metals.		
SPECIAL REMARKS ON CORROSIVITY	Incompatible with copper alloys. Corrosive to brass. Corrosive to ferrous metals and alloys. Contact your sales representative or a metallurgical specialist to ensure compatibility with your equipment.		
Section XI. Toxicological Information			
SIGNIFICANT ROUTES OF EXPOSURE	Ingestion. Inhalation.		
TOXICITY TO ANIMALS	See Section II.		
SPECIAL REMARKS ON TOXICITY TO ANIMALS	The product itself and its products of degradation are not toxic under normal conditions of use. Will release ammonium ions. Ammonia is a toxic hazard to fish. May be harmful to livestock and wildlife if ingested. Clean up all spilled material, especially where bulk fertilizer loading of equipment occurs.		
OTHER EFFECTS ON HUMANS	Our data base contains no additional remark on the toxicity of this product		
SPECIAL REMARKS ON CHRONIC EFFECTS ON HUMANS	No additional remark.		
SPECIAL REMARKS ON OTHER EFFECTS ON HUMANS	No additional remark.		
Continued on Next Page			



<b>Ammonium Sulfate, Granular Grades</b>		<b>Page Number: 5</b>
<b>Section XII. Ecological Information</b>		
<b>ECOTOXICITY</b>	Non-persistent. Non-cumulative when applied using normal agricultural practices. The product itself and its products of degradation are not harmful under normal conditions of careful and responsible use.  Aquatic/Marine Toxicity: Will disperse with current. Release to watercourses may cause effects down stream from the point of release. Will release ammonium ions. Ammonia is a toxic hazard to fish. Avoid spills or release to watercourses. U.S. D.O.T.: This material is NOT listed as a Marine pollutant.	
<b>BOD and COD</b>	Not available.	
<b>PRODUCTS OF DEGRADATION</b>	Nitrogen oxides (NO, NO <sub>2</sub> ...). Sulfur oxides (SO <sub>2</sub> , SO <sub>3</sub> ...).	
<b>TOXICITY OF THE PRODUCTS OF DEGRADATION</b>	The product itself and its products of degradation are not harmful under normal conditions of use. Avoid spills or releases to watercourses.	
<b>SPECIAL REMARKS ON THE PRODUCTS OF DEGRADATION</b>	Product will promote algae growth which may degrade water quality and taste. Notify downstream water users. Sulfate in potable drinking water should be maintained below 250mg/L (U.S.) and 500 mg/L (Canada). Will dissolve and disperse in water. Reclaiming material may not be viable.	
<b>Section XIII. Disposal Considerations</b>		
<b>WASTE DISPOSAL OR RECYCLING</b>	Recover and place material in a suitable container for intended use or disposal. Recycle to process, if possible. Ensure disposal complies with government requirements and local regulations.	
<b>Section XIV. Transport Information</b>		
<b>DOT / TDG CLASSIFICATION</b>	Not controlled under TDG (Canada) or D.O.T. (U.S.A.)	
<b>PIN and Shipping Name</b>	Not applicable.	
<b>SPECIAL PROVISIONS FOR TRANSPORT</b>	Exempt Material	
<b>DOT (U.S.A) (Pictograms)</b>		
<b>Section XV. Other Regulatory Information and Pictograms</b>		
<b>OTHER REGULATIONS</b>	CANADIAN ENVIRONMENTAL PROTECTION ACT (CEPA): This product is on the Domestic Substances List (DSL), and acceptable for use under the provisions of CEPA. TSCA (Toxic Substance Control Act): This product is listed on the TSCA Inventory. CERCLA/SUPERFUND, 40 CFR 117.302: This product contains no Reportable Quantity (RQ) Substances. This product is not considered as a priority pollutant as regulated under the Clean Water Act. This material contains the following chemicals subject to the reporting requirements of SARA 313 and 40 CFR 372: Aqueous ammonia from water dissociable ammonium ions, 10% of which is reportable under this listing, as AS CAS# 7783-20-2. Refer to EPA doc 745-R-00-005 and the specific product analysis for your product to determine your reporting requirements under this regulation. Not controlled under WHMIS (Canada). This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and is not subject to control under WHMIS (Canada), or the Hazcom Standard (US).	
<b>OTHER CLASSIFICATIONS</b>	<b>HCS (U.S.A.)</b>	Not controlled under the HCS (United States).
	<b>DSCL (EEC)</b>	Not controlled under DSCL (Europe).
<b>Continued on Next Page</b>		

Ammonium Sulfate, Granular Grades		Page Number: 6
National Fire Protection Association (U.S.A.)	Hazards presented under acute emergency conditions only:	<div><div>Health</div><div></div><div><div>Fire Hazard</div><div>Reactivity</div><div>Specific Hazard</div></div></div>
TDG (Pictograms - Canada)		
DSCL (Europe) (Pictograms)		
ADR (Europe) (Pictograms)		
<b>Section XVI. Other Information</b>		
REFERENCES	<ul style="list-style-type: none"><li>-Transportation of Dangerous Goods Act and Clear Language Regulations, current revision.</li><li>-Canada Gazette Part II, Vol. 122, No. 2 Registration SOR/88-64 31 December, 1987 Hazardous Products Act "Ingredient Disclosure List".</li><li>-Domestic Substances List, Canadian Environmental Protection Act.</li><li>-29 CFR Part 1910</li><li>-33 CFR Parts 151, 153, 154, 158</li><li>-40 CFR Parts 1-799</li><li>-48 CFR Part 153</li><li>-49 CFR Parts 1-199</li><li>-American Conference of Governmental Industrial Hygienists, Threshold Limit Values for Chemical Substances, 2006.</li><li>-NFPA 704, National Fire Codes Online, National Fire Protection Association, current edition at time of MSDS preparation.</li><li>-Corrosion Data Survey, Sixth Edition, 1985, National Association of Corrosion Engineers</li><li>-TOMES® System: Heitland G &amp; Hurlbut KM (Eds) (electronic version): MICROMEDEX, Greenwood Village, Colorado, USA. Available at: <a href="http://csi.micromedex.com">http://csi.micromedex.com</a> (2006). The TOMES® System includes MEDITEXT® Medical Management; HAZARTEXT® Hazard Management; INFOTEXT® Documents; ERG2000 Emergency Response Guidebook Documents; REPROTEXT®: Heitland G &amp; Hurlbut KM (Eds); CHRIS Hazardous Chemical Data: U.S. Department of Transportation, U.S. Coast Guard, Washington, D.C. (2006); HSDB: Hazardous Substances Data Bank. National Library of Medicine, Bethesda, Maryland (2006); IRIS: Integrated Risk Information System. U.S. Environmental Protection Agency, Washington, D.C. (2006); NIOSH: Pocket Guide to Chemical Hazards. National Institute for Occupational Safety and Health, Cincinnati, Ohio (2006); OHMTADS: Oil and Hazardous Materials Technical Assistance Data System. U.S. Environmental Protection Agency, Washington, D.C. (2006); REPROTOX®: Scialli A.R. Georgetown University Medical Center and Reproductive Toxicology Center, Columbia Hospital for Women Medical Center, Washington, D.C. (2006); RTECS®: Registry of Toxic Effects of Chemical Substances. National Institute for Occupational Safety and Health, Cincinnati, Ohio (2006); and SHEPARD'S: Shepard T.H.: Shepard's Catalog of Teratogenic Agents (2006).</li><li>-The Fertilizer Institute Product Testing Program Results, March 2003</li><li>-Michigan Office of Regulatory Reform R325.51101et seq</li></ul>	
OTHER SPECIAL CONSIDERATIONS	Rev data: All granular ammonium sulfate grades represented on this one sheet. HMIS ratings included.	
FOR FURTHER SAFETY, HEALTH, OR ENVIRONMENTAL INFORMATION ON THIS PRODUCT, CONTACT	AGRIUM Wholesale Environment, Health and Safety Telephone (780) 998-6906 or Fax (780) 998-6677	
Continued on Next Page		

**NOTICE TO READER**

*The buyer assumes all risk in connection with the use of this material. The buyer assumes all responsibility for ensuring this material is used in a safe manner in compliance with applicable environmental, health and safety laws, policies and guidelines. Agrium Inc. assumes no responsibility or liability for the information supplied on this sheet, including any damages or injury caused thereby. Agrium Inc. does not warrant the fitness of this material for any particular use and assumes no responsibility for injury or damage caused directly or indirectly by or related to the use of the material. The information contained in this sheet is developed from what Agrium Inc. believes to be accurate and reliable sources, and is based on the opinions and facts available on the date of preparation.*



## 1.12 SILANE A-1100 Technical Data Sheet

### SILQUEST® A-1100® Silane

**Crompton**  
OSi Specialties

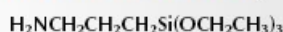
#### ■ Introduction

Silquest A-1100® silane, *gamma*-Aminopropyltriethoxysilane, is a versatile amino-functional coupling agent used over a broad range of applications to provide superior bonds between inorganic substrates and organic polymers.

#### ■ Product Description

The silicon-containing portion of the molecule provides strong bonding to substrates. The primary amine function reacts with a wide array of thermoset, thermoplastic and elastomeric materials. Silquest A-1100 silane has the following structural formula:

#### Silquest A-1100 Silane Structure



#### ■ Typical Physical Properties

Physical Form	Liquid
Color	Clear, colorless
Specific Gravity at 25/25°C.	0.9500
Boiling Point at 760 mm Hg, °C (°F)	220 (428)
Refractive Index, $n_D^{25^\circ\text{C}}$	1.420
Flash Point, Pensky-Martens Closed Cup <sup>(1)</sup> , °C (°F)	96 (205)

(1) ASTM Method D 93

#### Solubility

Silquest A-1100 silane is completely and immediately soluble in water (with reaction), alcohol and aromatic and aliphatic hydrocarbons. Ketones are not recommended as diluents. Hydrolysis is noticeably exothermic and releases ethanol.

*OSi Specialties, a Crompton business, is a leading producer of organofunctional silanes and specialty silicones for the transportation, construction, electronics, consumer care, textile, agricultural and other major industries. We have set the pace and the standard in these industries, earning a global reputation for technical innovation and support.*

*Specialty silicones, such as silicone surfactants, antifoams, organomodified and reactive fluids, emulsions and others, provide improved performance and unique properties in a wide variety of industries, including coatings, paints and inks, personal care and textiles. Silicone surfactants and catalysts are the essential ingredients in the manufacture of polyurethane foams.*

*Silanes are widely used as coupling agents, adhesion promoters and crosslinkers in the manufacture of tires and rubber, coatings, adhesives and sealants, electrical components, thermoplastics, glass fiber reinforced plastics and many other products.*

*Major plants and technical centers in the United States, Europe, Asia and Latin America support sales in nearly 100 countries worldwide.*

Visit our website at [www.cromptoncorp.com](http://www.cromptoncorp.com)



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Fax: +1.607.754.7517

## SILQUEST<sup>®</sup> A-1100<sup>®</sup> Silane

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### ■ Applications and Performance

#### Coatings, Adhesives and Sealants

This aminosilane is an excellent adhesion promoter in acrylic coatings, adhesives and sealants. With polysulfide, urethane, RTV silicones, epoxy, nitrile, and phenolic adhesives and sealants, the product improves pigment dispersion and maximizes adhesion to glass, aluminum and steel.

#### Glass-Reinforced Resin Systems

In glass-reinforced thermosets, Silquest A-1100<sup>®</sup> silane enhances the flexural, compressive and interlaminar shear strengths before and after exposure to humidity. This product greatly improves wet electrical properties. Glass-reinforced thermoplastics, polyamides, polyesters and polycarbonates exhibit increased flexural and tensile strengths before and after wet exposure when this silane is used.

#### Glass Fiber and Mineral Wool Insulation

As a phenolic resin binder additive, Silquest A-1100 silane imparts moisture resistance and allows recovery after compression.

#### Mineral-Filled Resin Systems

Silquest A-1100 silane maximizes the physical and electrical properties of mineral-filled phenolics, epoxies, polyamides, polybutylene terephthalate and a host of other thermoset and thermoplastic composites. Filler wetting and dispersibility in the polymer matrix are also improved.

#### Foundry Applications

In shell molding, this silane strengthens the bond between the phenolic binder and foundry sand.

#### Grinding Wheels

The product promotes an improved, water-resistant bond between the abrasive grit and phenolic resin binder.

### ■ Product Safety

When considering the use of any OSI Specialties products in a particular application, review our latest Material Safety Data Sheets and ensure that the use intended can be accomplished safely. For Material Safety Data Sheets and other product safety information, contact the OSI Specialties sales office nearest you. Before handling any of the products mentioned in the text, please obtain available product safety information and take necessary steps to ensure safety of use.

## SILQUEST® A-1100® Silane

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### ■ Emergency Service

OSi Specialties maintains an around-the-clock emergency service for its products. As well, the American Chemistry Council (CHEMTREC), Transport Canada (CANUTEC), and the Chemical Emergency Agency Service maintain an around-the-clock emergency service for all chemical products:

Location	OSi Specialties Products	All Chemical Products
Mainland U.S., Puerto Rico	800.809.9998	CHEMTREC: 800.424.9300
Alaska, Hawaii	304.926.8418 (collect)	CHEMTREC: 800.424.9300
Canada	304.926.8418 (collect)	CANUTEC: 613.996.6666 (collect) or CHEMTREC: 800.424.9300
Europe, Middle East, Africa	+32.(0)14.58.45.45 (Belgium)	CHEMTREC: +1-703.527.3887 (collect)
Latin America, Asia/Pacific, all other locations worldwide	+304.926.8418 (collect)	CHEMTREC: +1-703.527.3887 (collect)

At sea, radio U.S. Coast Guard, which can directly contact OSi Specialties at 800.809.9998, or CHEMTREC at 800.424.9300.

DO NOT WAIT. Phone if in doubt. You will be referred to a specialist for advice.

**Literature Hotline 1.800.295.2392**  
Outside the U.S.A. and Canada call +1.607.786.8131 (Hours: 8:00 a.m. to 5:00 p.m. EST)

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## Principal Locations

Worldwide Sales Offices		Phone	Fax
Asia	12 Science Park Drive #03-04 The Mendel Singapore Science Park Singapore 118225	65.6774.4800	65.6770.5148
Brazil	Av. Juscelino Kubitschek, 1830 10º andar - Torre I São Paulo - SP - Brazil 04543-900	55.11.3896.1500	55.11.3078.2969
Canada	565 Coronation Drive West Hill, Ontario M1E 2K3	416.724.3628	416.284.6077
Europe, Africa and Middle East	7, rue du Pré-Bouvier CH-1217 Meyrin, Switzerland	41.22.989.2111	41.22.989.2393
Mexico	Av. Insurgientes Sur, 1685 11-B Col. Guadalupe Inn Mexico, D.F. 01020	52.5.480.0800	52.5.661.9433

United States Sales Offices		Toll Free U.S.	Phone	Fax
California	One Park Plaza, Suite 360 Irvine, CA 92614	800.441.3280	949.553.6500	949.553.6501
Georgia	6525 The Corners Parkway Suite 311 Norcross, GA 30092	800.622.4435	770.242.9500	770.242.9511
Illinois	Westwood of Lisle 2443 Warrenville Road, Suite 100 Lisle, IL 60532	800.287.8310	630.245.1610	630.245.1617

Worldwide Customer Service Centers				
Canada	1893 rue Moreau Street Montreal, Quebec H1W 2L8	Within U.S. & Canada Outside U.S. & Canada	800.363.0496 514.524.0999	514.524.7504
Europe, Africa and Middle East	Nieuwe Weg 1 B-2070 Zwijndrecht, Belgium		+32.(0)32.50.26.00	+32.(0)32.50.26.50
U.S.A.	318-24 Fourth Avenue, Plaza IV P.O. Box 38002 South Charleston, WV 25303-3802		<b>Silanes</b> 800.523.5862 <b>Specialty Silicones</b> 800.334.4674	304.746.1623 304.746.1623

Worldwide Literature Hotline		800.295.2392	+1.607.786.8131	+1.607.754.7517
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The information contained herein is correct to the best of our knowledge. Your attention is directed to the pertinent Material Safety Data Sheets for the products mentioned herein. All sales are subject to Crompton Corporation's standard terms and conditions of sale, copies of which are available on request and are printed on the reverse of Crompton invoices. Except as expressly provided in Crompton Corporation's standard terms and conditions of sale, no warranty, express or implied, including warranties of merchantability or fitness for a particular purpose, is made with respect to the products described herein. Nothing contained herein shall constitute permission or recommendation to practice any invention covered by a patent without a license from the owner of the patent.

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## 1.13 MULREX 88 Technical Data Sheet



# Mulrex 88 - Oil Emulsion

## Product Description

Mulrex 88 is a fine homogeneous dispersion of petroleum oil particles in water, held in suspension with carefully selected and balanced emulsifiers.

The quality of ExxonMobil wax emulsions is assured for every delivery. These products are produced and controlled according to the ExxonMobil Product Quality Management System, EN ISO 9000 or equivalent standards.

## Applications

Mulrex 88 has been designed to provide effective dust control in the manufacture and use of glass wool and mineral wool insulating materials. Mulrex 88 has a specially designed emulsifier system that ensures good compatibility with phenolic resins and other binders used by the industry and also has a good stability with hard water.

The flash point of the oil phase minimises fire hazards during oven curing of wool mats, while its low volatility reduces or eliminates fumes, smoke and stack deposits. The oil also lubricates the fibres, thereby reducing fibre breakage and thus minimising short fibre dust, which is injurious to health. In all applications, typically between 0.3 and 0.6% of oil is required for good dust control. Where loose pellets are being manufactured, the Mulrex 88 emulsion may be sprayed directly onto the hot, newly formed fibres. In the case of mats or felts, Mulrex 88 is usually premixed with the phenolic resin binder and the mixture is applied at or just after the point of fibre formation.

## Properties and Specifications

Property	Method	Typical	Specification	
			Min	Max
Appearance	Visual	Yellow Fluid Emulsion		
Emulsifier Type	-	Anionic, Acid Stable		
Base Material	-	Mineral Oil		
Solids Content, % wt	AM-S 1435		51	55
Brookfield Viscosity No 2 Spindle/10rpm, (mPa.s)	AM-S 1428		500	1500
pH	AM-S 1436	8.0		

Typical values may vary within modest ranges and specifications may be subject to change.



### **Health and Safety**

Detailed health and safety information for this product is provided in the Material Safety Data Sheet (MSDS), available upon request through your local sales representative or from [www.ExxonMobil.com](http://www.ExxonMobil.com)

### **Storage and Handling**

Storage temperatures should not be allowed to fall below 4oC as freezing can irrevocably damage the emulsion. Also, temperatures should not be allowed to rise above 40oC as skinning and phase separation can occur. The optimum storage and handling range is 15-30oC. Storage tanks should be shaded and drums should not be left in direct sunlight or adjacent to hot areas.

### **Further Information**

ExxonMobil supplies a full range of waxes, wax emulsions, white oils, process oils, bitumen and a full range of lubricants, fuels and chemical products worldwide. Please contact your local ExxonMobil representative, or contact us at [www.ExxonMobil.com](http://www.ExxonMobil.com), for more information on other products.

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## 1.14 SILICONE SILRES BS 1042 Technical Data Sheet



### Characteristics

SILRES® BS 1042 is an aqueous emulsion of a reactive polydimethylsiloxane. It is used to impart water-repellency to glass wool mat or rock wool mat bound with phenolic resin or to low-density bulk goods such as perlite or vermiculite.

### Application

To impart water repellency to glass wool or rock wool, SILRES® BS 1042 can be mixed with the phenolic resin solution or other additives. As the shelf life of the various mixtures greatly depends on the composition of the phenolic resin or the additives, no general comments can be made on compatibility.

With suitable equipment, SILRES® BS 1042 can either be applied at the same time as or shortly before application of the binder.

Treatment of glass wool mat or rock wool mat with SILRES® BS 1042 after drying and hardening is not recommended.

### Processing

SILRES® BS 1042 is applied by spraying. For this purpose it can be diluted with any quantity of water. The usual amount of SILRES® BS 1042 applied ranges between 0.2 and 2 % based on the weight of material to be treated.

The quantity of SILRES® BS 1042 to be applied depends on the desired water repellency of the end product; a general recommendation cannot be given. Individual tests must always be conducted in order to define the necessary quantity. Excess SILRES® BS 1042 will cause a significant deterioration of the water-repellent effect in perlite or similar materials.

To impart water repellency to perlite or similarly porous materials, SILRES® BS 1042 is applied by spraying as

well. It can be sprayed onto the warm material in order to avoid an additional drying process. Prolonged heating of the siliconized material must however be avoided.

### Guide formulation for laboratory tests to make perlite water-repellent

Mix 0.80 g SILRES® BS 1042 with 400 g of deionized water. Thoroughly stir 200 g of perlite with this impregnating solution in a mixer until the liquid has been completely absorbed. Fill the moist material into a large dish and dry in a drying oven at 50 °C for seven days.

Fill the impregnated perlite into fine-meshed nylon sacks and immerse in deionized water. The sacks must be covered by 5 cm of water.

Weigh the samples at fixed intervals. The results show that the perlite absorbs about 5 % of its dry weight in water after one day. Untreated perlite absorbs far more than 100 % of its dry weight in water in the same period.

### Storage

SILRES® BS 1042 has a shelf life of at least 6 months when stored between 0 °C and 30 °C in the tightly closed original container. The containers must be protected against sunlight. The 'Best use before end' date of each batch appears on the product label.

Storage beyond the date specified on the label does not necessarily mean that the product is no longer usable. In this case however, the properties required for the intended use must be checked for quality assurance reasons.

### Safety information

Detailed safety information is contained in each material data safety sheet, which can be obtained from our sales offices.

### Product data

Appearance			white liquid
Active substance content, approx.			
Density at 25 °C, approx.		[g/cm³]	1.0
pH, approx.			5 - 7
Flash point, approx.	DIN 51758	[°C]	> 60
Ignition point, approx.	DIN 51794	[°C]	410
* These figures are intended as a guide and should not be used in preparing specifications.			

## 2 RAW MATERIALS FOR BIOBINDER

Here below the chemical and physical characteristics of the raw materials to be used to prepare the Biobinder for Glass Wool production.

Other suppliers raw materials can be used after STM Technologies approval. Note that some additives as Mineral oil, silane, silicone and ammonia, are in common with phenolic resin based binder.

### 2.1 DEXTROSE MONOHYDRATE

Product Data		Units
Appearance	Crystalline powder	
Bulk density at 25°C	600 - 875	$g/dm^3$
Dextrose content	99,5	%

See annexes for reference Technical Data Sheet and Safety Data Sheet

### 2.2 AMMONIUM SULFAMATE

Product Data		Units
Appearance	White odourless solid	

See annexes for reference Technical Data Sheet and Safety Data Sheet

### 2.3 CITRIC ACID MONOHYDRATE

Product Data		Units
Appearance	Crystalline powder	

See annexes for reference Technical Data Sheet and Safety Data Sheet

### 2.4 AMMONIA SOLUTION

Product Data		Units
Appearance	Colourless, transparent and irritating smell liquid not containing insoluble materials	
Density at 25°C	Max. 0.932	$g/cm^3$
Ammonium content	Min. 18	wt%

See annexes for reference Technical Data Sheet and Safety Data Sheet



## 2.5 SILANE A – 1100 (gamma-Aminopropyltriethoxysilane)

Product Data		Units
Appearance	Colourless liquid	
Density at 25°C	Max. 0.950	<i>g/cm<sup>3</sup></i>
Refractive index nd25°C	1.420	
Purity	more than 99	<i>wt%</i>

See annexes for reference Technical Data Sheet and Safety Data Sheet

## 2.6 MULREX 88 (Oil-water emulsion)

NOTE: compatible with liquid phenolic resin

Product Data		Units
Appearance	Clear yellow emulsion	
Solid content	51÷53	<i>wt%</i>
pH	7.5÷8.5	
Dynamic viscosity	600	<i>Needle N.3 at 100 rpm</i>

See annexes for reference Technical Data Sheet.

## 2.7 SILICONE EMULSION (Polydimethylsiloxane)

NOTE: to be used just for special hydro repellent products.

Product Data		Units
Appearance	Aqueous emulsion	
Density at 25°C	0.950	<i>g/cm<sup>3</sup></i>
pH	6.5±1.0	

See annexes for reference Technical Data Sheet.

## 2.8 DEXTROSE MONOHYDRATE SPECIFICATIONS



### DEXTROSE MONOHYDRATE

#### Definition

This product is a dextrose monohydrate, produced by enzymatic hydrolysis of starch, followed by purification, concentration, crystallisation and drying. It is a white powder with a refreshing sweet taste and bland odour.

#### Characteristics

Characteristic	Min	Max	Method Description
Moisture(%)	<u>7</u>	<u>9</u>	Oven - A0102 (Ref ISO 1741/6496)
Dextrose on DS (%)	<u>99.5</u>		HPLC - A0210 (Ref. ISO 10504)
S02 (mg/kg) 61a)		<u>10</u>	Iodine titration - A0901 (Ref. CRA E-67/E-
pH	<u>3</u>	<u>6</u>	pH - A0922 (Ref. CRA F-42)
Conductivity, 28 Brix(μS/cm)		20	Conductivity meter -A1202
Black specks (n/100g)		10	Visual - A0601
Bulk density compacted (g/dm <sup>3</sup> )	600	875	Gravimetric - A1101
Bulk density loose (g/dm <sup>3</sup> )	550	850	Gravimetric - A1101
Percentage on sieve 53 μm (%)	70		Vibrational sieve - A1113
Percentage on sieve 150 μm (%)	10	80	Vibrational sieve - A1113
Percentage on sieve 250 μm (%)		40	Vibrational sieve - A1113
Total mesophilic count (n/10g)		1.000	Membrane filtration - A1922 (Ref. ICUMSA GS 2/3-41)
Yeasts (n/10g)		100	Membrane filtration - A1925 (Ref. ICUMSA GS 2/3-47)
Moulds (n/10g)		100	Membrane filtration - A1925 (Ref. ICUMSA GS 2/3-47)

Registered Office: Bank Chambers, High Street, Cranbrook, Kent. TN17 3EG. Reg. No. 3605607.

The characteristics followed that are in bold or underlined will be reported on in the Certificate of Analysis.

The characteristics with a minimum or maximum value are guaranteed specifications.

#### **Shelf life & Storage Conditions**

Total product shelf life of bulk delivered material is 24 months after production date if stored under recommended storage conditions.

Total Product Shelf Life in unopened packaging is 24 months after production date. It is printed as "Best before date" on the packaging.

Store in a clean and dry environment, away from odorous materials, at < 60% relative humidity.

#### **Labelling**

For EU Countries: Dextrose Labelling is advised

#### **General Information**

This product complies with the requirements of Legislation in force in the EU on Foods and Food Ingredients. These include Regulations on Labelling, Hygiene, Additives, Contaminants and Pesticides.

The manufacturing plant must be minimum ISO 9001:2002 and HACCP Certified by an External Body.

All ingredients used in the manufacture of this product must be GMO Free, and Conform to the requirements on GMO's in force in the EU.

Version No.: 03

Date of Issue: 23 July 2015

Issued by: Stephen Blanchard

Signed:





**ROQUETTE**  
America, Inc.

**SPECIFICATIONS**

Ref: D60-142810

**DEXTROSE**

PAGE 1/1

**DEFINITION :**

dextrose monohydrate

CAS no: 50-99-7  
RINRCS : 200-075-1

**SPECIFICATIONS :**

APPEARANCE	Crystalline powder, white and odorless.
IDENTIFICATION	Passes test
TASTE	Sweet
LOSS ON DRYING/WATER CONTENT	8.0 - 9.0 %
DEXTROSE ASSAY (dry basis)	99.5 % min.
SPECIFIC OPTICAL ROTATION	+52.6 to +53.2 deg
RESIDUE ON IGNITION	0.1 % max.
SO2	0.002% max.
STARCH	Passes test
CHLORIDE	0.015% max.
LEAD	0.1 mg/kg max.
ARSENIC (as is)	1 mg/kg max.

**CONFORMITY :**

Food Chemicals Codex: Dextrose

MCL,MMC: ROQUETTE Methods

QUALITY ASSURANCE / HUMAN FOOD

April 10, 2009

**CORPORATE HEADQUARTERS** 1417 EXCHANGE STREET, P.O. BOX 6647, KEOKUK, IA 52632-6647 (319) 524-5757 FAX (319) 526-2486  
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Primex Agro India Pvt. Ltd.  
Primex Agro Synergies Ltd. (U.K)



**PRODUCT SPECIFICATIONS - DEXTROSE MONOHYDRATE (Food grade)**

Parameters :	Specifications :
Appearance	White Crystalline Powder, free from visible impurities. Odourless with sweet taste. Free from any added colouring matter.
Solubility	Freely soluble in water, easily soluble in boiling water.
Clarity (20% w/v solution)	Clear, and free from extraneous matter.
Moisture, % w/v	7.00 – 9.00 %
Sulphated Ash, % DB	0.1% Max.
Acidity (ml of 0.02N NaoH / 5gms)	1.25 ml Max
Specific Volume(packed), ml/ 100 gm	135 - 160
Chlorides, ppm	100.00 Max.
Sulphur Dioxide, ppm.	70.00 Max.
Dextrin & less soluble sugars.	Absent. A clear solution is obtained which does not produce any deposition on cooling.
Specific optical Rotation at 20oC ( 10% w/v Solution )	+52.5o – +53.5o
Sieve Analysis retention + 30 mesh	10.00 Max.

**Microbiological Analysis :**

Total Plate Count c.f.u / gm: 500 Max/gm.

E.coli in 25 gm: Absent

Salmonella in 25 gm: Absent

**Storage & Preservation :**

To be stored on above ground on clean, dry and dust free area. Maintain ambient temperature. Keep away from water, direct sunlight and flames.

**Expiry :** 2 years from the date of manufacture.

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For latest specifications, please feel free to contact us.

**Primex Agro India Pvt. Ltd.**

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## HAMBURG FRUCTOSE



### DEXTROSE MONOHYDRATE (D)

**Product Specification**

**DEFINITION**

CAS-No.	50-99-7	Taric-Code	1702 3050 10
EINECS-No.	200-075-1	E-No.	—

**DESCRIPTION**

Appearance	White crystal or crystalline powder
Solubility	Freely soluble in water and sparingly soluble in alcohol
Odour	Special smell of maltodextrin and no foreign odour
Taste	Sweet or slightly sweet, no other taste
Color	White or no color
Moisture	7.0 - 9.5 %
Specific Rotation	+52.0~53.5
Dextrose Equivalent	≥99.0
pH	4.0-8.5
Residue on ignition	≤0.06 % ash
Heavy metals	Less than 5ppm
Cu	≤5.0 mg/kg
Pb	≤0.5 mg/kg
As	≤1.0 mg/kg
Protein	Confirms
Mold and Yeast	Less than 20 pcs/g
Acidity	Less than 1.2 ml
Chlorides	≤20 ppm
Sulphate	≤20 ppm
Molysite	≤20 ppm
Sulfur Dioxide Residual	≤20 mg/kg
Particle size	24mesh size: 100%through 24 mesh size More than 90% through 40 mesh Around 77% through 80 mesh size

**MISCELLANEOUS:**

Origin:	China
Certification:	Kosher, Halal and Non-GMO
Packaging:	25 kg net food grade bags
Storage:	To be stored in closed original packaging in a cool , dry and ventilated place, kept away from light and heat
Shelf life:	24 months unopened when properly stored under the recommended conditions.

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The information given above is set in good faith for guidance only and may not be interpreted as a warranty whatsoever. The users are obliged to conduct their own tests in order to determine the suitability for their own particular purposes. For the commercial use of this product, including the labelling and the description of any food in which it may be incorporated, it remains at the user's/food manufacture's responsibility to identify and fulfil all general and specific legal requirements.

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ph. +49(0)40 / 23 7008 20 • [www.hamburgfructose.com](http://www.hamburgfructose.com)

## 2.9 AMMONIUM SULFAMATE SPECIFICATIONS

### Ammonium Sulfamate (CAS 7773-06-0)

Applicazione:	A weakly oxidizing agent employed as a broad-spectrum herbicide
Numero CAS:	7773-06-0
Purezza:	≥98%
Peso molecolare:	114.12
Formula molecolare:	$\text{NH}_4\text{SO}_3\text{NH}_2$
Supplemental Information:	This is classified as a Dangerous Good for transport and may be subject to additional shipping charges.

\* Vedere Certificato di Analisi per informazioni sul lotto specifico (incluso il contenuto d'acqua).





Health	2
Fire	0
Reactivity	0
Personal Protection	E

## Material Safety Data Sheet Ammonium sulfamate MSDS

### Section 1: Chemical Product and Company Identification

<b>Product Name:</b> Ammonium sulfamate	<b>Contact Information:</b>
<b>Catalog Codes:</b> SLA1345	<b>Sciencelab.com, Inc.</b>
<b>CAS#:</b> 7773-06-0	14025 Smith Rd.
<b>RTECS:</b> WO8125000	Houston, Texas 77396
<b>TSCA:</b> TSCA 8(b) inventory: Ammonium sulfamate	<b>US Sales:</b> 1-800-901-7247
<b>CMF:</b> Not applicable.	<b>International Sales:</b> 1-281-441-4400
<b>Synonym:</b> Sulfamic acid salt	<b>Order Online:</b> <a href="http://ScienceLab.com">ScienceLab.com</a>
<b>Chemical Name:</b> Sulfamic acid salt	<b>CHEMTREC (24HR Emergency Telephone), call:</b>
<b>Chemical Formula:</b> NH <sub>4</sub> OSO <sub>2</sub> NH <sub>2</sub>	1-800-424-9300
	<b>International CHEMTREC, call:</b> 1-703-527-3887
	<b>For non-emergency assistance, call:</b> 1-281-441-4400

### Section 2: Composition and Information on Ingredients

#### Composition:

Name	CAS #	% by Weight
Ammonium sulfamate	7773-06-0	100

**Toxicological Data on Ingredients:** Ammonium sulfamate: ORAL (LD50): Acute: 2000 mg/kg [Rat].

### Section 3: Hazards Identification

#### Potential Acute Health Effects:

Very hazardous in case of eye contact (irritant). Hazardous in case of skin contact (irritant), of ingestion, of inhalation. Slightly hazardous in case of skin contact (sensitizer). Inflammation of the eye is characterized by redness, watering, and itching.

#### Potential Chronic Health Effects:

Very hazardous in case of eye contact (irritant). Hazardous in case of skin contact (irritant), of ingestion. Slightly hazardous in case of skin contact (sensitizer). **CARCINOGENIC EFFECTS:** Not available. **MUTAGENIC EFFECTS:** Not available. **TERATOGENIC EFFECTS:** Not available. **DEVELOPMENTAL TOXICITY:** Not available. The substance is toxic to mucous membranes. Repeated or prolonged exposure to the substance can produce target organs damage.

### Section 4: First Aid Measures

#### Eye Contact:

Check for and remove any contact lenses. In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Cold water may be used. Get medical attention immediately.

**Skin Contact:**

In case of contact, immediately flush skin with plenty of water. Cover the irritated skin with an emollient. Remove contaminated clothing and shoes. Cold water may be used. Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention.

**Serious Skin Contact:**

Wash with a disinfectant soap and cover the contaminated skin with an anti-bacterial cream. Seek immediate medical attention.

**Inhalation:**

If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

**Serious Inhalation:** Not available.

**Ingestion:**

Do NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. If large quantities of this material are swallowed, call a physician immediately. Loosen tight clothing such as a collar, tie, belt or waistband.

**Serious Ingestion:** Not available.

### Section 5: Fire and Explosion Data

**Flammability of the Product:** Non-flammable.

**Auto-Ignition Temperature:** Not applicable.

**Flash Points:** Not applicable.

**Flammable Limits:** Not applicable.

**Products of Combustion:** Not available.

**Fire Hazards in Presence of Various Substances:** Not applicable.

**Explosion Hazards in Presence of Various Substances:**

Risks of explosion of the product in presence of mechanical impact: Not available. Risks of explosion of the product in presence of static discharge: Not available.

**Fire Fighting Media and Instructions:** Not applicable.

**Special Remarks on Fire Hazards:** Not available.

**Special Remarks on Explosion Hazards:** Not available.

### Section 6: Accidental Release Measures

**Small Spill:**

Use appropriate tools to put the spilled solid in a convenient waste disposal container. Finish cleaning by spreading water on the contaminated surface and dispose of according to local and regional authority requirements.

**Large Spill:**

Use a shovel to put the material into a convenient waste disposal container. Finish cleaning by spreading water on the contaminated surface and allow to evacuate through the sanitary system. Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.

### Section 7: Handling and Storage

**Precautions:**

Do not ingest. Do not breathe dust. In case of insufficient ventilation, wear suitable respiratory equipment. If ingested, seek medical advice immediately and show the container or the label. Avoid contact with skin and eyes.

**Storage:** Keep container tightly closed. Keep container in a cool, well-ventilated area.

## Section 8: Exposure Controls/Personal Protection

**Engineering Controls:**

Use process enclosures, local exhaust ventilation, or other engineering controls to keep airborne levels below recommended exposure limits. If user operations generate dust, fume or mist, use ventilation to keep exposure to airborne contaminants below the exposure limit.

**Personal Protection:**

Splash goggles. Lab coat. Dust respirator. Be sure to use an approved/certified respirator or equivalent. Gloves.

**Personal Protection in Case of a Large Spill:**

Splash goggles. Full suit. Dust respirator. Boots. Gloves. A self contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

**Exposure Limits:**

TWA: 10 (mg/m<sup>3</sup>) from ACGIH (TLV) [United States] TWA: 15 Consult local authorities for acceptable exposure limits.

## Section 9: Physical and Chemical Properties

**Physical state and appearance:** Solid. (Solid.)

**Odor:** Slight.

**Taste:** Not available.

**Molecular Weight:** 114.12 g/mole

**Color:** Not available.

**pH (1% soln/water):** 6 [Acidic.]

**Boiling Point:** Decomposition temperature: 180°C (320°F)

**Melting Point:** 130°C (266°F)

**Critical Temperature:** Not available.

**Specific Gravity:** Not available.

**Vapor Pressure:** Not applicable.

**Vapor Density:** Not available.

**Volatility:** Not available.

**Odor Threshold:** Not available.

**Water/Oil Dist. Coeff.:** Not available.

**Ionicity (in Water):** Not available.

**Dispersion Properties:** See solubility in water.

**Solubility:**

Easily soluble in cold water, hot water. Insoluble in methanol, diethyl ether, n-octanol.

## Section 10: Stability and Reactivity Data

**Stability:** The product is stable.

**Instability Temperature:** Not available.

**Conditions of Instability:** Not available.

**Incompatibility with various substances:** Slightly reactive to reactive with oxidizing agents, reducing agents, metals, alkalis.

**Corrosivity:**  
Corrosive in presence of steel. Slightly corrosive in presence of aluminum, of zinc, of copper.

**Special Remarks on Reactivity:**  
Do not heat above melting point. Will decompose and form toxic gases if heated.(reacts with heat)+Decomposition

**Special Remarks on Corrosivity:** Not available.

**Polymerization:** Will not occur.

#### Section 11: Toxicological Information

**Routes of Entry:** Eye contact. Inhalation. Ingestion.

**Toxicity to Animals:** Acute oral toxicity (LD50): 2000 mg/kg [Rat].

**Chronic Effects on Humans:** Causes damage to the following organs: mucous membranes.

**Other Toxic Effects on Humans:**  
Hazardous in case of skin contact (irritant), of ingestion, of inhalation. Slightly hazardous in case of skin contact (sensitizer).

**Special Remarks on Toxicity to Animals:** Not available.

**Special Remarks on Chronic Effects on Humans:** Not available.

**Special Remarks on other Toxic Effects on Humans:** Not available.

#### Section 12: Ecological Information

**Ecotoxicity:** Not available.

**BOD5 and COD:** Not available.

**Products of Biodegradation:**  
Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

**Toxicity of the Products of Biodegradation:** The products of degradation are more toxic.

**Special Remarks on the Products of Biodegradation:** Not available.

#### Section 13: Disposal Considerations

**Waste Disposal:**

#### Section 14: Transport Information

**DOT Classification:** Not a DOT controlled material (United States).

**Identification:** : Not available. UNNA: 9089 PG: III

**Special Provisions for Transport:** Not applicable.



### Section 15: Other Regulatory Information

**Federal and State Regulations:**

Pennsylvania RTK: Ammonium sulfamate Massachusetts RTK: Ammonium sulfamate TSCA 8(b) inventory: Ammonium sulfamate CERCLA: Hazardous substances.: Ammonium sulfamate

**Other Regulations:** OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200).

**Other Classifications:**

**WHMIS (Canada):** CLASS D-2B: Material causing other toxic effects (TOXIC).

**DSCL (EEC):**

R22- Harmful if swallowed. R38- Irritating to skin. R41- Risk of serious damage to eyes.

**HMIS (U.S.A.):**

**Health Hazard:** 2

**Fire Hazard:** 0

**Reactivity:** 0

**Personal Protection:** E

**National Fire Protection Association (U.S.A.):**

**Health:** 2

**Flammability:** 0

**Reactivity:** 0

**Specific hazard:**

**Protective Equipment:**

Gloves. Lab coat. Dust respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate. Splash goggles.

### Section 16: Other Information

**References:** Not available.

**Other Special Considerations:** Not available.

**Created:** 10/09/2005 03:58 PM

**Last Updated:** 05/21/2013 12:00 PM

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## 2.10 CITRIC ACID MONOHYDRATE SPECIFICATIONS



3050 Spruce Street  
Saint Louis, Missouri 63103 USA  
Telephone 800-325-5832 • (314) 771-5765  
Fax (314) 286-7828  
email: techserv@sial.com  
sigma-aldrich.com

## Product Information

### Citric acid monohydrate

#### ACS Reagent

Product Number **C1909**

Store at Room Temperature

Exact replacement for Product Code 24,752-9

#### Product Description

Molecular Formula:  $C_6H_8O_7 \cdot H_2O$

Molecular Weight: 210.1

CAS Number: 5949-29-1

Citric acid monohydrate softens at 75 °C and melts at approximately 100 °C.<sup>1</sup>

$pK_a = 3.138, 4.76, 6.40^1$

This product is designated as ACS Reagent grade and meets the specifications of the American Chemical Society (ACS) for reagent chemicals.

Monohydrate crystals lose water of crystallization in dry air or when heated to about 40 to 50 °C.<sup>1</sup>

Citric acid is a key metabolic intermediate. Citrate is the starting point of the tricarboxylic acid cycle. Its concentration also coordinates several other metabolic pathways. Citric acid can form complexes with various cations, particularly with iron and calcium. In animals, citric acid improves the utilization of nutritional calcium. Citric acid is produced commercially by fermentation of carbohydrates derived from corn starch and from beet molasses.<sup>2</sup>

#### Precautions and Disclaimer

For Laboratory Use Only. Not for drug, household or other uses.

#### Preparation Instructions

Citric acid is soluble in water: 54.0% (w/w) at 10 °C, 59.2% (w/w) at 20 °C, and 84.0% (w/w) at 100 °C.<sup>1</sup> The pH of a 0.1 N solution is 2.2 at 25 °C.<sup>1</sup>

#### Storage/Stability

The use of citrate buffers (pH 3-5) in numerous applications indicates excellent stability at room temperature. Dilute solutions of citric acid (non-sterile) may ferment if left at room temperature. Non-sterile solutions should be stable for months stored at 2-8 °C.

#### References

1. The Merck Index, 12th ed., Entry# 2387.
2. Concise Encyclopedia Biochemistry, 2nd ed., Scott, T., and Eagleson, M., Walter de Gruyter (New York, NY: 1988) p. 117.

MES/RXR 5/06

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## **POTENTIAL HEALTH EFFECTS**

**Primary Routes of Entry:** Inhalation, skin contact/absorption and eye contact.

**General Acute Exposure:** Aqua ammonia may cause caustic injury. The severity of injury depends upon the concentration and duration of exposure. The extent of injury ranges from mild skin irritation or cough to severe burns or laryngeal edema and life-threatening pulmonary edema.

### **Inhalation:**

Corrosive! Ammonia vapor is toxic and a severe irritant of the respiratory tract. It may cause a running nose, coughing, chest pain, cessation of respiration and death. It may cause severe breathing difficulties, which may be delayed in onset. **ADDITIONAL MEDICAL INFORMATION:** Bronchospasm, laryngitis, tracheitis, wheezing, dyspnea, and laryngeal stridor may be noted. Mucosal burns to the tracheobronchial tree, Pulmonary Edema, and associated hypoxemia frequently occur following exposure to concentrated ammonia.

### **Skin Contact:**

Corrosive! Aqua ammonia is a severe irritant of the skin. Skin exposure to high concentrations may cause pain and deep and severe burns to the skin. **ADDITIONAL MEDICAL INFORMATION:** Corrosive effects on the skin and other tissues may be delayed, and damage may occur without the sensation or onset of pain. Strict adherence to first aid measures following exposure is essential.

### **Eye Contact:**

Corrosive! Vapors cause irritation. Effects as a result of direct contact with aqua ammonia may range from irritation and lacrimation to severe injury and blindness. **ADDITIONAL MEDICAL INFORMATION:** Eye exposure may result in conjunctivitis, lacrimation and/or corneal irritation. Total corneal epithelial loss may occur.

### **Ingestion:**

Toxic! May cause corrosion to the esophagus and stomach with perforation and peritonitis. Symptoms may include pain in the mouth, chest, and abdomen, with coughing, vomiting and collapse. Ingestion of as little as 3-4 ml of ammonium hydroxide may be fatal.

**Note to the Physician:** Pneumonitis should be anticipated after severe inhalation or ingestion. If severe exposure is suspected, observe for 48-72 hours for delayed pulmonary edema.

### **Carcinogenicity:**

NTP: .....	Not Listed
IARC: .....	Not Listed
OSHA: .....	Not Regulated

**Medical Conditions Aggravated by Exposure:** Chronic respiratory or skin disease.



#### 4. **FIRST AID MEASURES**

**First Aid for Eyes:** Immediately flush eyes with copious amounts of tepid water for at least 15 minutes. If irritation, pain, swelling, excessive tearing, or light sensitivity persists, the patient should be seen in a health care facility and referral to an ophthalmologist considered.

**First Aid for Skin:** Immediately flush exposed area with copious amounts of tepid water for at least 15 minutes followed by washing area thoroughly with soap and water. The patient should be seen in a health care facility if irritation or pain persists.

**First Aid for Inhalation:** Move patient to fresh air. Monitor for respiratory distress. If cough or difficulty in breathing develops, evaluate for respiratory tract irritation, bronchitis, or pneumonitis. If trained to do so administer supplemental oxygen with assisted ventilation as required. Administer artificial respiration if patient is not breathing.

**First Aid for Ingestion:** Call a physician. If conscious, give the patient 4 to 8 ounces of milk or water to drink immediately. Do not induce vomiting.

#### 5. **FIRE FIGHTING MEASURES**

Flash Point .....	Not Applicable
Lower Flammable Limit .....	15.5 % Volume in Air (for NH <sub>3</sub> )
Upper Flammable Limit .....	27.0 % Volume in Air (for NH <sub>3</sub> )
Autoignition Temperature .....	1204° F (651° C) (for NH <sub>3</sub> )

**Extinguishing Media:** Stopping the flow of gas rather than extinguishing the fire is usually the best procedure to follow when escaping gas is burning.

Small Fire: .....	Dry chemical or CO <sub>2</sub>
Large Fire: .....	Water spray, fog or foam

**Special Fire Fighting Procedures:** Use water to keep fire exposed containers cool. Use water fog or foam to reduce vapor concentrations if necessary. Full protective equipment including a self-contained breathing apparatus should be worn in a fire involving the material.

#### 6. **ACCIDENTAL RELEASE MEASURES**

**Spill or Leak Measures:** Stop leak if you can do so without risk. Keep unnecessary people away, isolate hazard area and deny entry. Stay upwind, out of low areas, and ventilate closed spaces before entering. Evaluate the affected area to determine whether to evacuate or shelter-in-place by taping windows and doors, shutting off outside air intake (attic fans, etc.), and placing a wet towel or cloth over the face (if needed). Self-contained breathing apparatus (SCBA) and structural firefighter's protective clothing used in conjunction with water spray will provide limited protection in outdoor releases for short-term exposure. Fully encapsulating, vapor-protective clothing should be worn for spills and leaks with no fire. Use water spray to control vapors.

**CAUTION:**

Runoff from vapor control or dilution of spilled product may cause pollution.

**Determining Spill Size:** Generally, a small spill is one that involves a single, small Package (i.e. up to a 55 gallon drum), small cylinder, or a small (non-continuing) leak from a large container. **Small Spill:**

- a. Flush area with flooding amounts of water.
- b. First isolate 100 feet in all directions and then protect persons downwind 0.1 miles during daylight and 0.1 miles at night (recommended for ammonia vapor).

**Large Spill:**

- a. Dike far ahead of liquid spill for later disposal.
- b. Follow local emergency protocol for handling.
- c. First isolate 200 feet in all directions, then protect persons downwind 0.4 miles during daylight and 1.4 miles at night (recommended for ammonia vapor).

**7. HANDLING AND STORAGE**

**Handling:** Avoid contact with either liquid or vapors. Direct contact with mercury must be avoided. Use proper PPE when working with or around aqua ammonia (See section 8).

**Storage:** Ambient temperature. Store in dry, well-ventilated area away from incompatible materials. Protect against physical damage. Keep out of direct sunlight and away from heat sources.

**8. EXPOSURE CONTROLS, PERSONAL PROTECTION**

**Respiratory Protection Requirements: (for NH<sub>3</sub>)**

<25 ppm:	No protection required.
25 to 35 ppm:	Protection required if the daily TWA is exceeded.
35 to 50 ppm:	Protection required if exposed for more than 15 minutes.
50 to 250 ppm:	Minimum of an air-purifying respirator equipped with ammonia canister(s) or cartridge(s).
250 to 300 ppm:	Minimum of a full-face air-purifying respirator equipped with ammonia canister(s) or cartridge(s).
>300 ppm:	A fresh air supply system must be used (i.e. SCBA)

**Skin Protection Requirements:** Nitrile rubber, neoprene, or PVC gloves and protective clothing should be used.

**Eye Protection Requirements:** Use chemical (indirectly vented) goggles when there is a potential for eye contact. A full-face shield is recommended in addition to goggles for added protection.

**Other Protective Equipment:** Safety shower and eyewash fountain should be provided in the aqua ammonia handling area. When transporting, provide at least 5 gallons of readily accessible, clean water and personal protective equipment.

**Engineering Controls:** Maintain adequate ventilation to keep ammonia concentrations below applicable standards.

**NOTE:** See Section 2 for regulatory exposure limits.

## 9. PHYSICAL AND CHEMICAL PROPERTIES

Physical Form:	Liquid
Color:	Colorless
Odor:	Strong pungent penetrating odor, ammonia.
pH:	12.0 (neat)
Specific Gravity:	0.9277 (@ 20° C)
Vapor Density:	0.60 (@ 15.5° C) for NH <sub>3</sub>
Vapor Pressure:	236 mm Hg (@ 15.5° C)
Molecular Weight:	35.05
Relative Density:	0.9261 kg/l (@ 20° C)

## 10. REACTIVITY

Stability:..... This is a stable material.  
Hazardous Polymerization:..... Will not occur.

**Decomposition:** Will liberate ammonia if heated. Hydrogen is released on heating ammonia above 850° F (454° C). The decomposition temperature may be lowered to 575° F (300° C) by contact with certain metals such as nickel. At 1290° F (690° C) or in the presence of electric spark ammonia decomposes into nitrogen and hydrogen gases, which may form a flammable mixture in the air.

**Conditions to avoid:** Excessive heat.

**Materials to avoid:** Contact with calcium hypochlorite, bleaches, gold, mercury, and silver may form highly explosive products. Contact with iodine, bromine or chlorine may cause violent spattering.



## 11. TOXICOLOGICAL INFORMATION

### Toxicity

#### Acute Oral Toxicity

LD<sub>50</sub> Rat:..... 350 mg/kg bw

LD<sub>50</sub> Cat:..... 750 mg/kg bw

#### Acute Toxicity, Other Routes

LD<sub>LO</sub> Rabbit:..... 10 mg/kg bw

#### Skin Irritation / Corrosion

Rabbit:..... Corrosive at 20% but not 10%

#### Eye Irritation / Corrosion

Rabbit:..... Irritating

#### Genetic Toxicity in vitro

Gene Mutation *E. Coli*:..... Negative

#### Genetic Toxicity in vivo

Gene Mutation *Drosophila melanogaster*:..... No evidence for mutagenicity

### Ecotoxicity

#### Acute Toxicity to Fish

LC<sub>50</sub> *Cyprinus carpio*:..... 1.34 – 1.70 mg un-ionized NH<sub>3</sub>/L (48 hr semi-static)

#### Acute Toxicity to Aquatic Invertebrates

LC<sub>50</sub> *Daphnia magna*:..... 32 mg NH<sub>4</sub>OH/L (48 hr static)

#### Chronic Toxicity to Fish

LC<sub>50</sub> *Ictalurus punctatus*:..... 37.5 ppm (8 days)

Source: TFI Product Testing Program April 2003

## 12. ECOLOGICAL INFORMATION

- Ammonia is harmful to aquatic life in very low concentrations and may be hazardous if it enters water intakes.
- Local health and wildlife authorities, as well as operators of water intakes in the vicinity, should be notified of water releases.
- Waterfowl toxicity may occur at elevated concentrations.
- Ammonia does not concentrate in the food chain.
- The conversion of ammonia to nitrites/nitrates by bacteria in aquatic systems can reduce the concentration of dissolved oxygen (referred to as nitrogenous oxygen demand).

Effect on water treatment process: Chlorination will produce chloramines, which are more readily detected by taste and odor.

Note: See Ecotoxicity information in section 11.

### 13. DISPOSAL CONSIDERATIONS

Reclaim as fertilizer if possible. Otherwise, waste must be disposed of in accordance with federal, state, and local environmental control regulations.

### 14. TRANSPORTATION INFORMATION

U.S. DOT and Canadian TDG Act

Shipping Name: ..... Ammonia solutions, (*more than 10% but not more than 35 % ammonia*)

Hazard Class/Division: ..... 8

Label Code: ..... 8 Corrosive Liquid

Product Identification Number (PIN): ..... UN2672

Packing Group: ..... III

OSHA Label Required: ..... Yes

RQ (Reportable Quantity): ..... 1000 pounds (as NH<sub>4</sub>OH)

TDG Reporting Quantity: ..... 5 kg or 5 liters

### 15. REGULATORY INFORMATION

**Controlled Products Regulations Classification:**

D-1B: Toxic (Acute Lethality); E: Corrosive

**OSHA:** This product is considered a hazardous material under criteria of the Federal OSHA Hazard Communication Standard 29 CFR 1910.1200 (Toxic; Corrosive).

**CAA Chemical Accident Prevention:**

Ammonia solution with a concentration less than 20% is not subject to the provisions of 40 CFR Part 68.

**CERCLA Hazardous Substances List:**

a. RQ (Reportable Quantity): 1000 pounds (as NH<sub>4</sub>OH)

b. Regulation: "Designation, Reportable Quantities, Notification" - 40 CFR Part 302

**SARA TITLE III:**

Ammonia (including ammonia solution) is subject to the reporting requirements of Section 313 "Specific Toxic Chemical Listings" 40 CFR Part 372. Terra is required by 40 CFR Part 372.45 to notify certain customers as to which of its mixture or trade name products contain those chemicals. The purpose of that notification is to ensure that facilities that may be subject to the reporting requirements of Section 313 and that use products of unknown formulation will have knowledge that they are receiving products that contain chemicals subject to those reporting requirements.

## 16. OTHER INFORMATION

May 5, 2003:	This MSDS was written to comply with ANSI Standard Z400.1-1993.
July 1, 2003:	Added toxicity information from the TFI Product Testing Program April 2003.
October 4, 2006:	Added NFPA hazard classification information and updated isolation / protective action distances per ERG 2004.
February 16, 2007:	Created separate MSDS for 19% Aqua Ammonia.

The information and recommendations herein are taken from data contained in independent, industry-recognized references including but not limited to NIOSH, OSHA, ANSI, NFPA, DOT ERG, the TFI Product Testing Program, Global Engineering Documents, MEDITEXT, HAZARDTEXT, SARATEXT, CHRIS, OHM/TADS, and IRIS. Terra Industries Inc. makes no guarantee, warranty or other representation concerning this substance, since conditions of its use are beyond the control of the company. Terra Industries Inc. disclaims any liability for loss or damage incurred in connection with the use of this substance.