

Material Safety Data Sheet

Sulfuric Acid (30 - 51%)

1. Product and company identification

Product name	: Sulfuric Acid (30 - 51%)
Material uses	: Industrial applications; battery electrolyte.
Headquarters	: Marsulex Inc. 111 Gordon Baker Road Suite 300 North York, ON M2H 3R1 (416) 496-9655 www.marsulex.com
MSDS authored by	: KMK Regulatory Services inc.
<u>In case of emergency</u>	: Canada: CANUTEC +1-613-996-6666 US: CHEMTREC +1-800-424-9300
Product type	: Liquid.

2. Hazards identification

Emergency overview

Color	: Clear.
Physical state	: Liquid.
Odor	: Odorless.
Signal word	: DANGER!
Hazard statements	: MAY BE FATAL IF INHALED. CAUSES SEVERE RESPIRATORY TRACT BURNS. CAUSES EYE AND SKIN BURNS. HARMFUL IF SWALLOWED. MAY CAUSE TARGET ORGAN DAMAGE, BASED ON ANIMAL DATA.
Precautions	: Avoid exposure - obtain special instructions before use. Do not breathe vapor or mist. Do not ingest. Do not get in eyes or on skin or clothing. Use only with adequate ventilation. Keep container tightly closed and sealed until ready for use. Wash thoroughly after handling.
OSHA/HCS status	: This material is considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200).
Routes of entry	: Dermal contact. Eye contact. Inhalation. Ingestion.
<u>Potential acute health effects</u>	
Inhalation	: Inhalation of the mist may produce severe irritation of respiratory tract, characterized by coughing, choking, or shortness of breath. Over-exposure by inhalation may cause respiratory irritation. May be fatal if inhaled.
Ingestion	: Very hazardous by the following route of exposure: of ingestion. May be fatal if swallowed. May cause burns to mouth, throat and stomach.
Skin	: Very hazardous by the following route of exposure: of skin contact (corrosive, irritant). Skin contact may produce burns. Severe over-exposure can result in death. Skin inflammation is characterized by itching, scaling, reddening or, occasionally, blistering.
Eyes	: Very hazardous by the following route of exposure: of eye contact (irritant, corrosive). Inflammation of the eye is characterized by redness, watering, and itching. Immediate pain, severe burns and corneal damage, which may result in permanent blindness.
<u>Potential chronic health effects</u>	
Chronic effects	: May cause target organ damage, based on animal data.
Carcinogenicity	: Can cause cancer. Risk of cancer depends on duration and level of exposure to the sulfuric acid mist.
Mutagenicity	: No known significant effects or critical hazards.
Teratogenicity	: No known significant effects or critical hazards.
Developmental effects	: No known significant effects or critical hazards.

2. Hazards identification

- Fertility effects** : No known significant effects or critical hazards.
- Target organs** : Contains material which may cause damage to the following organs: lungs, mucous membranes, upper respiratory tract, skin, eyes, teeth.

Over-exposure signs/symptoms

- Inhalation** : Adverse symptoms may include the following:
respiratory tract irritation
coughing
Breathing of vapors may aggravate acute or chronic asthma and chronic pulmonary disease such as emphysema and bronchitis.
- Ingestion** : Adverse symptoms may include the following:
stomach pains
- Skin** : Adverse symptoms may include the following:
pain or irritation
redness
blistering may occur
Skin irritation may be aggravated in individuals with existing skin lesions.
- Eyes** : Adverse symptoms may include the following:
pain
watering
redness
- Medical conditions aggravated by over-exposure** : Repeated or prolonged contact with mist may produce chronic eye irritation and severe skin irritation. Repeated or prolonged exposure to mist may produce respiratory tract irritation leading to frequent attacks of bronchial infection. Repeated exposure to a highly toxic material may produce general deterioration of health by an accumulation in one or many human organs.

See toxicological information (section 11)

3. Composition/information on ingredients

United States

Name	CAS number	%
Sulfuric acid	7664-93-9	30 - 51

Canada

Name	CAS number	%
Sulfuric acid	7664-93-9	30 - 51

There are no additional ingredients present which, within the current knowledge of the supplier and in the concentrations applicable, are classified as hazardous to health or the environment and hence require reporting in this section.

4. First aid measures

- Eye contact** : Immediately flush eyes with running water for a minimum of 20 minutes. Hold eyelids open during flushing. If irritation persists, repeat flushing. Obtain medical attention IMMEDIATELY. Do not transport victim until the recommended flushing period is completed unless flushing can be continued during transport.
- Skin contact** : Immediately flush skin with running water for a minimum of 20 minutes. Start flushing while removing contaminated clothing. If irritation persists, repeat flushing. Obtain medical attention IMMEDIATELY. Do not transport victim unless the recommended flushing period is completed or flushing can be continued during transport. While the patient is being transported to a medical facility, apply compresses of iced water. If medical treatment must be delayed, immerse the affected area in iced water. Do not apply ointments unless directed by a physician. If immersion is not practical, compresses of iced water can be applied. Avoid freezing tissues. Discard heavily contaminated clothing and shoes in a manner that limits further exposure. Otherwise, wash clothing separately before reuse.

4. First aid measures

- Inhalation** : Move victim to fresh air. Give artificial respiration **ONLY** if breathing has stopped. Do not use mouth-to-mouth method if victim ingested or inhaled the substance: give artificial respiration with the aid of a pocket mask equipped with a one-way valve or other proper respiratory medical device. Give Cardiopulmonary Resuscitation (CPR) if there is no pulse **AND** no breathing. Obtain medical attention **IMMEDIATELY**.
- Ingestion** : **DO NOT INDUCE VOMITING**. If victim is alert and not convulsing, rinse mouth and give ½ to 1 glass of water to dilute material. If spontaneous vomiting occurs, have victim lean forward with head down to avoid breathing in of vomitus, rinse mouth and administer more water. **IMMEDIATELY** contact local poison control center. Vomiting may need to be induced but should be directed by a physician or a poison control center. **IMMEDIATELY** transport victim to an emergency facility.
- Protection of first-aiders** : No action shall be taken involving any personal risk or without suitable training. If it is suspected that fumes are still present, the rescuer should wear an appropriate mask or self-contained breathing apparatus. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation. Wash contaminated clothing thoroughly with water before removing it, or wear gloves.
- Notes to physician** : This product contains materials that may cause severe pneumonitis if aspirated. If ingestion has occurred less than 2 hours earlier, carry out careful gastric lavage; use endotracheal cuff if available, to prevent aspiration. Observe patient for respiratory difficulty from aspiration pneumonitis. Give artificial resuscitation and appropriate chemotherapy if respiration is depressed. Following exposure the patient should be kept under medical review for at least 48 hours as delayed pneumonitis may occur.

5. Fire-fighting measures

- Flammability of the product** : Non-flammable.
- Extinguishing media**
- Suitable** : Use an extinguishing agent suitable for the surrounding fire.
- Not suitable** : None known.
- Hazardous thermal decomposition products** : Decomposition products may include the following materials:
sulfur oxides
nitrogen oxides
- Special protective equipment for fire-fighters** : Not applicable.
- Special remarks on fire hazards** : Not flammable but highly reactive. Strong dehydrating agent, which may cause ignition of finely divided combustible materials on contact. Sulfuric acid is not compatible with steel.
- Special remarks on explosion hazards** : Reacts violently with water with the evolution of heat. It can react explosively with organic materials (See Section 10). Reacts with many metals to liberate hydrogen gas that can form explosive mixtures with air. Hydrogen, a highly flammable gas, can accumulate to explosive concentrations inside drums, or any types of steel containers or tanks upon storage. Oxides of sulfur may be produced in fire.

6. Accidental release measures

- Personal precautions** : Do not touch or walk through spilled material. Do not breathe vapor or mist. Provide adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Put on appropriate personal protective equipment (see section 8).
- Environmental precautions** : Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers. Inform the relevant authorities if the product has caused environmental pollution (sewers, waterways, soil or air).
- Small spill** : Cover with **DRY** earth, sand or other non-combustible material. Use clean non-sparking tools to collect material and place it into loosely covered plastic containers for later disposal.

6. Accidental release measures

- Large spill** : Restrict access to area until completion of clean up. Ensure trained personnel conduct clean up. Remove all ignition sources (no smoking, flares, sparks or flames). All equipment should be grounded. Ventilate area. Use appropriate Personal Protection Equipment. Prevent liquid from entering sewers or waterways. Stop or reduce leak if safe to do so. Dike with inert material (sand, earth, etc.). Collect into plastic containers for disposal. Consider in situ neutralization and disposal. Ensure adequate decontamination of tools and equipment following clean up. Comply with Federal, Provincial/State and local regulations on reporting releases.

7. Handling and storage

- Handling** : Do not ingest. Do not breathe mist. Keep container closed. Use only with adequate ventilation. Wash thoroughly after handling. Use EXTREME care when diluting with water. **Always add acid to water.** CAUTION: Hydrogen, a highly flammable gas, can accumulate to explosive concentrations inside drums, or inside most types of metal containers or tanks upon storage. **Carbon steel storage tanks must be vented.**
- Storage** : If stored in nonreactive container keep container tightly closed. Metal and, specifically, carbon steel, storage tanks must be vented due to hydrogen release as noted above. Do not store below the following temperature: 0°C (32°F).

8. Exposure controls/personal protection

United States

Ingredient	Exposure limits
Sulfuric acid	ACGIH TLV (United States, 1/2009). TWA: 0.2 mg/m ³ 8 hour(s). NIOSH REL (United States, 6/2008). TWA: 1 mg/m ³ 10 hour(s). OSHA PEL (United States, 11/2006). TWA: 1 mg/m ³ 8 hour(s).

Canada

Occupational exposure limits		TWA (8 hours)			STEL (15 mins)			Ceiling			Notations
Ingredient	List name	ppm	mg/m ³	Other	ppm	mg/m ³	Other	ppm	mg/m ³	Other	
Sulfuric acid	US ACGIH 1/2009	-	0.2	-	-	-	-	-	-	-	[a] [b]
	AB 6/2008	-	1	-	-	3	-	-	-	-	
	BC 6/2008	-	0.2	-	-	-	-	-	-	-	
	ON 6/2008	-	0.2	-	-	-	-	-	-	-	
	QC 6/2008	-	1	-	-	3	-	-	-	-	

Form: [a]thoracic [b]thoracic fraction

Consult local authorities for acceptable exposure limits.

- Recommended monitoring procedures** : Personal, workplace atmosphere or biological monitoring may be required to determine the effectiveness of the ventilation or other control measures and/or the necessity to use respiratory protective equipment.
- Engineering measures** : Use only with adequate ventilation. Use process enclosures, local exhaust ventilation or other engineering controls to keep worker exposure to airborne contaminants below any recommended or statutory limits. The engineering controls also need to keep gas, vapor or dust concentrations below any lower explosive limits.
- Hygiene measures** : Ensure that eyewash stations and safety showers are close to the workstation location. Wash hands, forearms and face thoroughly after handling chemical products, before eating, smoking and using the lavatory and at the end of the working period. Appropriate techniques should be used to remove potentially contaminated clothing.
- Respiratory** : A NIOSH/MSHA approved air-purifying respirator equipped with acid gas/fume, dust, mist cartridges for concentrations up to 10 mg/m³. An air-supplied respirator if concentrations are higher or unknown.
- Hands** : Use gloves appropriate for work or task being performed. **RECOMMENDED:** Impervious (i.e., neoprene, PVC) gloves.

8. Exposure controls/personal protection

- Eyes** : Safety eyewear should be used when there is a likelihood of exposure. Recommended: Chemical splash goggles or face shield.
- Skin** : Personal protective equipment for the body should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product. Recommended: Rubber apron and/on long sleeves, boots or other acid resistant protective clothing.
- Environmental exposure controls** : Emissions from ventilation or work process equipment should be checked to ensure they comply with the requirements of environmental protection legislation. In some cases, fume scrubbers, filters or engineering modifications to the process equipment will be necessary to reduce emissions to acceptable levels.

9. Physical and chemical properties

- Physical state** : Liquid.
- Color** : Clear.
- Odor** : Odorless.
- Molecular formula** : H₂SO₄
- pH** : 0.3
- Boiling/condensation point** : 109°C (229°F) @ 32.05%; 118°C (244°F) @ 42.63%; 127°C (260°F) @ 50.87%
- Melting/freezing point** : -37.4°C (-35.3°F) @30.79%; -55.2°C (-67.3°F) @ 39.92%; 36.4°C (33.5°F) @ 49.47%
- Specific gravity** : 1.2288 @ 30.79%; 1.3063 @ 39.92%; 1.3942 @ 49.47%
- Vapor pressure** : 0.52 @ 30%; 2.10 @ 40%; 4.60 @ 50%
- Vapor density** : 3.4 [Air = 1]
- Solubility** : Soluble in the following materials: cold water and hot water.
Partially soluble in the following materials: Methanol and acetone.

10. Stability and reactivity

- Chemical stability** : The product is stable.
- Conditions to avoid** : Avoid exposure - obtain special instructions before use.
- Materials to avoid** : Reactive or incompatible with the following materials: reducing materials, organic materials, alkalis and moisture.
- Hazardous decomposition products** : Toxic gases and vapors (e.g. sulfur dioxide, sulfuric acid vapors/mists and sulfur trioxide) may be released when sulfuric acid decomposes.
- Possibility of hazardous reactions** : Under normal conditions of storage and use, hazardous reactions will not occur.
- Hazardous polymerization** : Under normal conditions of storage and use, hazardous polymerization will not occur.

11. Toxicological information

Acute toxicity

Product/ingredient name	Result	Species	Dose	Exposure
Sulfuric acid	LD50 Oral	Rat	2140 mg/kg	-

Chronic toxicity

Classification

Product/ingredient name	ACGIH	IARC	EPA	NIOSH	NTP	OSHA
Sulfuric acid mist	A2	1	-	-	Proven.	-

IDLH : 15 mg/m³

12. Ecological information

Environmental effects : Not established

Aquatic ecotoxicity

Product/ingredient name	Result	Species	Exposure
Sulfuric acid	Acute LC50 42500 ug/L Marine water Acute LC50 42000 ug/L Fresh water	Crustaceans - Pandalus montagui - Adult Fish - Gambusia affinis - Adult	48 hours 96 hours

Special remarks on the products of biodegradation :





13. Disposal considerations

Waste disposal : The generation of waste should be avoided or minimized wherever possible. This material and its container must be disposed of in a safe way. Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers. Empty containers or liners may retain some product residues. Dispose of surplus and non-recyclable products via a licensed waste disposal contractor. Disposal of this product, solutions and any by-products should at all times comply with the requirements of environmental protection and waste disposal legislation and any regional local authority requirements.

Disposal should be in accordance with applicable regional, national and local laws and regulations.

Refer to Section 7: HANDLING AND STORAGE and Section 8: EXPOSURE CONTROLS/PERSONAL PROTECTION for additional handling information and protection of employees.

14. Transport information

Regulatory information	UN number	Proper shipping name	Classes	PG*	Label	Additional information
DOT Classification	UN2796	SULFURIC ACID	8	II		<p>Reportable quantity 1000 lbs. (454 kg)</p> <p>Limited quantity Yes.</p> <p>Packaging instruction Passenger aircraft Quantity limitation: Forbidden.</p> <p>Cargo aircraft Quantity limitation: 30 to 30 L</p> <p>Special provisions A3, A7, B2, B83, B84, IB2, N34, T8, TP2, TP12</p>
TDG Classification	UN2796	SULFURIC ACID	8	II		-
IMDG Class	UN2796	SULFURIC ACID	8	II		-
IATA-DGR Class	UN2796	SULFURIC ACID	8	II		<p>Passenger and Cargo AircraftQuantity limitation: 1 L</p> <p>Cargo Aircraft OnlyQuantity limitation: 30 L</p> <p>Limited Quantities - Passenger AircraftQuantity limitation: 0.5 L</p>

14 . Transport information

PG* : Packing group

AERG : 157

Exemption to the above classification may apply.

15 . Regulatory information

United States

HCS Classification

: Highly toxic material
Corrosive material
Target organ effects

U.S. Federal regulations

: **United States inventory (TSCA 8b):** All components are listed or exempted.

SARA 302/304/311/312 extremely hazardous substances: Sulfuric acid

SARA 302/304 emergency planning and notification: Sulfuric acid

SARA 302/304/311/312 hazardous chemicals: Sulfuric acid

SARA 311/312 MSDS distribution - chemical inventory - hazard identification:

Sulfuric acid: reactive, Immediate (acute) health hazard, Delayed (chronic) health hazard

Clean Water Act (CWA) 307: No products were found.

Clean Water Act (CWA) 311: Sulfuric acid

Clean Air Act (CAA) 112 accidental release prevention: No products were found.

Clean Air Act (CAA) 112 regulated flammable substances: No products were found.

Clean Air Act (CAA) 112 regulated toxic substances: No products were found.

Clean Air Act Section 112(b) Hazardous Air Pollutants (HAPs)

: Not listed

Clean Air Act Section 602 Class I Substances

: Not listed

Clean Air Act Section 602 Class II Substances

: Not listed

DEA List I Chemicals (Precursor Chemicals)

: Not listed

DEA List II Chemicals (Essential Chemicals)

: Listed

SARA 313

Form R - Reporting requirements

	<u>Product name</u>	<u>CAS number</u>	<u>Concentration</u>
: Sulfuric acid	Sulfuric acid	7664-93-9	30 - 51

Supplier notification

: Sulfuric acid	Sulfuric acid	7664-93-9	30 - 51
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SARA 313 notifications must not be detached from the MSDS and any copying and redistribution of the MSDS shall include copying and redistribution of the notice attached to copies of the MSDS subsequently redistributed.

State regulations

: **Connecticut Carcinogen Reporting:** None of the components are listed.

Connecticut Hazardous Material Survey: None of the components are listed.

Florida substances: None of the components are listed.

Illinois Chemical Safety Act: None of the components are listed.

Illinois Toxic Substances Disclosure to Employee Act: None of the components are listed.

Louisiana Reporting: None of the components are listed.

Louisiana Spill: None of the components are listed.

Massachusetts Spill: None of the components are listed.

Massachusetts Substances: The following components are listed: Sulfuric acid

Michigan Critical Material: None of the components are listed.

Minnesota Hazardous Substances: None of the components are listed.

New Jersey Hazardous Substances: The following components are listed: Sulfuric acid

New Jersey Spill: None of the components are listed.

15 . Regulatory information

New Jersey Toxic Catastrophe Prevention Act: None of the components are listed.

New York Acutely Hazardous Substances: The following components are listed:
Sulfuric acid

New York Toxic Chemical Release Reporting: None of the components are listed.

Pennsylvania RTK Hazardous Substances: The following components are listed:
Sulfuric acid

Rhode Island Hazardous Substances: None of the components are listed.

California Prop. 65

No products were found.

Canada

WHMIS (Canada)

: Class D-1A: Material causing immediate and serious toxic effects (Very toxic).
Class E: Corrosive material

Canadian lists

: **CEPA Toxic substances:** None of the components are listed.
Canadian ARET: None of the components are listed.
Canadian NPRI: The following components are listed: Sulfuric acid
Alberta Designated Substances: None of the components are listed.
Ontario Designated Substances: None of the components are listed.
Quebec Designated Substances: None of the components are listed.

Canada inventory

: This material is listed or exempted.

This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the MSDS contains all the information required by the Controlled Products Regulations.

International regulations

International lists

: **Australia inventory (AICS):** All components are listed or exempted.
China inventory (IECSC): All components are listed or exempted.
Japan inventory: All components are listed or exempted.
Korea inventory: All components are listed or exempted.
New Zealand Inventory of Chemicals (NZIoC): All components are listed or exempted.
Philippines inventory (PICCS): All components are listed or exempted.

Chemical Weapons Convention List Schedule I Chemicals

: Not listed

Chemical Weapons Convention List Schedule II Chemicals

: Not listed

Chemical Weapons Convention List Schedule III Chemicals

: Not listed

16 . Other information

United States

Label requirements

: MAY BE FATAL IF INHALED. CAUSES SEVERE RESPIRATORY TRACT BURNS. CAUSES EYE AND SKIN BURNS. HARMFUL IF SWALLOWED. MAY CAUSE TARGET ORGAN DAMAGE, BASED ON ANIMAL DATA.

Hazardous Material Information System (U.S.A.)

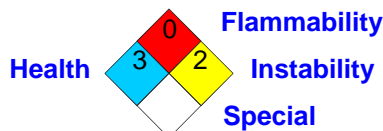
Health	*	3
Flammability		0
Physical hazards		2

16 . Other information

Caution: HMIS® ratings are based on a 0-4 rating scale, with 0 representing minimal hazards or risks, and 4 representing significant hazards or risks. Although HMIS® ratings are not required on MSDSs under 29 CFR 1910.1200, the preparer may choose to provide them. HMIS® ratings are to be used with a fully implemented HMIS® program. HMIS® is a registered mark of the National Paint & Coatings Association (NPCA). HMIS® materials may be purchased exclusively from J. J. Keller (800) 327-6868.

The customer is responsible for determining the PPE code for this material.

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



Canada

WHMIS (Canada) :



Date of issue : 10/15/2009

Date of previous issue : 11/15/2008

Version : 5

Notice to reader

To the best of our knowledge, the information contained herein is accurate. However, neither the above-named supplier, nor any of its subsidiaries, assumes any liability whatsoever for the accuracy or completeness of the information contained herein.

Final determination of suitability of any material is the sole responsibility of the user. All materials may present unknown hazards and should be used with caution. Although certain hazards are described herein, we cannot guarantee that these are the only hazards that exist.

