

Sulfuric Acid (70 – 78%)

SECTION 1 – CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

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Manufacturer's name and address: Olin Corporation – Chlor Alkali Products Division CLEVELAND, TN OFFICE 490 Stuart Road NE Cleveland, TN 37312-4918 U.S. • (423) 336-4850	Supplier's name and address: Olin Canada, ULC d/b/a Olin Chlor Alkali Products MONTREAL, QC OFFICE 2020 University, Suite 2190 Montreal, Quebec H3A 2A5 Canada • (514) 397-6100
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Product Name:	Sulfuric Acid (70-78%)	Preparation date (M/D/Y):	10/04/08
CAS#:	7664-93-9	Revision date (M/D/Y):	02/08/11
MSDS Code:	H2SO4-e		
Synonyms:	Sulphuric acid; Hydrogen Sulfate; Diluted Sulfuric acid		
Product Use:	Fertilizers, Alum		

Emergency Contacts (24 hr.)

FOR INFORMATION REGARDING ON SITE CHEMICAL EMERGENCIES INVOLVING A SPILL OR LEAK, CALL

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Canada: 1-800-567-7455
U.S.: 1-800-424-9300 – CHEMTREC

SECTION 2 – COMPOSITION / INFORMATION ON INGREDIENTS

Hazardous Ingredient(s)	% (w/w)	Exposure limits		CAS NO.
Sulfuric Acid	70 – 78	1 mg/m ³ (OSHA-PEL-TWA)	0.2 mg/m ³ (ACGIH-TLV-TWA)	7664-93-9

SECTION 3 – HAZARD IDENTIFICATION

Emergency Overview: Danger! **Extremely corrosive.** Causes severe burns and eye damage. Mist: Strong inorganic acid mists containing sulfuric acid are carcinogenic. Causes respiratory irritation. **Extremely toxic.** Harmful or fatal if inhaled. Harmful or fatal if swallowed. Reacts violently with water. Concentrated Sulfuric Acid will react with many organic materials and may cause fire due to the heat of the reaction. Not flammable, but reacts with most metals to form explosive/flammable hydrogen gas. Read the entire MSDS for a more thorough evaluation of the hazards.

Potential Health Effects:

Δ **Routes of exposure:** Inhalation, skin contact, eye contact and ingestion.

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Inhalation: Causes respiratory irritation and at high concentrations may cause severe injury, burns, or death. Effects of exposure may be delayed.

Skin Contact: Causes burns which may result in permanent scarring. Concentrated solutions may cause second or third degree burns with severe necrosis. Prolonged and repeated exposure to dilute solutions may cause irritation, redness, pain and drying and cracking of the skin.

Eye Contact: Immediate pain, severe burns and corneal damage, which may result in permanent blindness. The severity of the injury depends on the concentration of the sulfuric acid solution and the duration of exposure.

Ingestion: Causes severe irritation or burns of the mouth, throat, and esophagus. Symptoms may include difficulty swallowing, intense thirst, nausea, vomiting, diarrhea, and in severe cases, collapse and death. Small amounts of acid that may enter the lungs during ingestion or vomiting (aspiration) can cause serious lung injury and death.

Existing Medical Conditions Possibly Aggravated by Exposure: Skin irritation may be aggravated in individuals with existing skin lesions. Breathing of vapors or sprays (mists) may aggravate acute or chronic asthma and chronic pulmonary disease such as emphysema and bronchitis.

Chronic Effects: Repeated exposure may produce erosion and discoloration of teeth.

Carcinogenicity: The International Agency for Research on Cancer (IARC) has concluded that occupational exposure to strong inorganic acid mists containing sulfuric acid is carcinogenic to man, causing cancer of the larynx (the voice box) and to a lesser extent, the lung. Although no direct link has been established between exposure to sulfuric acid, itself, and cancer in man, exposure to any mist or aerosol during the use of this product should be avoided.

The National Toxicology Program (NTP) has listed strong inorganic acid mists containing sulfuric acid as “known human carcinogens.” Studies indicate occupational exposures to strong inorganic acid mists containing sulfuric acid are specifically associated with laryngeal and lung cancer in humans. Industrial processes in which occupational exposure to sulfuric acid mist has been examined include manufacture of isopropyl alcohol, lead batteries, phosphate fertilizers, soap and detergents, synthetic ethanol, and pickling and other acid treatments of metals

The American Conference of Governmental Industrial Hygienists (ACGIH) has designated strong inorganic acid mists containing sulfuric acid as A2 (suspected human carcinogen).

- Δ **Other important hazards:** Refer to TOXICOLOGICAL INFORMATION (Section 11) for additional information.

SECTION 4 – FIRST AID MEASURES

General: Corrosive effects on the skin, eyes and lungs may be delayed, and damage may occur without the sensation or onset of pain. Strict adherence to first aid measures following any exposure is essential. SPEED IS ESSENTIAL. OBTAIN IMMEDIATE MEDICAL ATTENTION.

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: provide 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) only if there is no pulse AND no breathing. Obtain medical attention IMMEDIATELY.

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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. If immersion is not practical, compresses of iced water can be applied. Avoid freezing tissues.

Discard heavily contaminated clothing and shoes in a manner which limits further exposure. Otherwise, wash clothing separately before reuse.

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.

Ingestion: DO NOT INDUCE VOMITING. If victim is alert and not convulsing, rinse mouth and give 1 glass of water (240 ml to 300 ml / 8 to 10 oz) to dilute material. If spontaneous vomiting occurs, have victim lean forward with head down to avoid aspiration into lungs, rinse mouth and administer more water. IMMEDIATELY contact local poison control center. IMMEDIATELY transport victim to an emergency facility.

Note to Physicians: 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.

SECTION 5 – FIRE FIGHTING MEASURES

Δ	Flash Point and method	Not applicable. Not combustible
	Flammable Limits (Lower)	Not applicable
	Flammable Limits (Upper)	Not applicable
	Auto Ignition Temperature	Not applicable
	Decomposition Temperature	340°C (644°F)
	Combustion and Thermal Decomposition Products	Oxides of Sulfur
	Rate of Burning	Not applicable
	Explosive Power	Not applicable
	Sensitivity to Mechanical Impact	Not applicable
	Sensitivity to Static Discharge:	Not sensitive. Stable material.

Fire and Explosion Hazards: Not flammable but highly reactive. Does not burn. Strong dehydrating agent, which may cause ignition of finely divided combustible materials on contact. Reacts violently with water and organic materials with evolution of heat. Reacts with many metals to liberate hydrogen gas which 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.

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Extinguishing Media: For large fires use an all-purpose type foam. The foam supplier should be consulted for recommendations regarding foam types and delivery rates for specific applications. Use carbon dioxide or dry chemical media for small fires. If only water is available, use it in the form of a fog.

Fire Fighting Protective Equipment: Use positive pressure self-contained breathing apparatus (SCBA) and protective fire fighting clothing (includes fire fighting helmet, coat, pants, boots and gloves). If protective equipment is not available or not used, fight fire from a protected location or safe distance.

NOTE: Also see "Section 10 - Stability and Reactivity

SECTION 6 – ACCIDENTAL RELEASE MEASURES

Spills, Leaks, or Releases:

- 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.
- Wear adequate personal protective equipment. Do not touch spilled material.
- Stop leak if possible without personal risk.
- Small spills: 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. Washing down spills with water is not recommended.
- Large spills: Prevent entry into sewers and confined areas. Dike with inert material (sand, earth, etc.). Collect into plastic containers for disposal. Consider on-site neutralization and disposal. Ensure adequate decontamination of tools and equipment following clean up. Comply with Federal, Provincial/State and local regulations on reporting releases

Deactivating Chemicals: Lime, limestone, sodium carbonate (soda ash), sodium bicarbonate, dilute sodium hydroxide, dilute aqua ammonia. Take care to avoid foaming or spattering.

Waste Disposal Methods: Dispose of waste material at an approved waste treatment/disposal facility, in accordance with applicable regulations. Do not dispose of waste with normal garbage or to sewer systems.

- Note**
- Clean-up material may be a RCRA Hazardous Waste on disposal.
 - Spills are subject to CERCLA reporting requirements: RQ = 1000 lbs (454 kg)

SECTION 7 – HANDLING AND STORAGE

Precautions: Wear appropriate Personal Protection Equipment. Do not breathe sprays or mists. Do not ingest. Do not get in eyes, on skin or on clothing. Keep ignition sources away from sulfuric acid storage, handling and transportation equipment. Locate safety shower and eyewash station close to chemical handling area. 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 any types of steel containers or tanks upon storage. People working with this chemical should be properly trained regarding its hazards and its safe use.

Handling Procedures and Equipment: Carbon steel or certain stainless steels, as well as certain fiberglass-reinforced plastics are suitable for handling sulfuric acid. Supplier should be contacted for specific recommendations when handling sulfuric acid and concentrations less than 71% sulfuric acid. Use corrosion-resistant transfer equipment.

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Storage Temperature: Store above freezing point (Section 9). Elevated temperatures can lead to a build-up of pressure due to sulfur dioxide generation. Elevated temperatures will increase the corrosion rate of most metals. Ideal storage temperature is 10-27°C. Do not expose sealed containers to temperatures above 40°C.

Storage Requirements: Do not store material unvented for long periods of time (more than 1 month). Store packaged acid in a dry, well-ventilated location, preferably in the supplier's container. Protect the label and keep it visible. Keep away from combustibles, oxidizers, bases, or metallic powders. Storage tanks should be protected from water ingress, be well ventilated, and maintained structurally in a safe and reliable condition.

Other Precautions: Sulfuric acid will attack some forms of plastics and coatings. Teflon® is the only common plastic that resists all acid concentrations. If kept in upper floors of building, floors should be acid proof with drains to a recovery tank.

SECTION 8 – EXPOSURE CONTROLS / PERSONAL PROTECTION

PREVENTIVE MEASURES

Recommendations listed in this section indicate the type of equipment which will provide protection against over exposure to this product. Conditions of use, adequacy of engineering or other control measures, and actual exposures will dictate the need for specific protective devices at your workplace.

Engineering Controls: Local exhaust ventilation should be applied wherever there is an incidence of point source emissions or dispersion of regulated contaminants in the work area. Ventilation control of the contaminant as close to its point of generation is both the most economical and safest method to minimize personnel exposure to airborne contaminants. The most effective measures are the total enclosure of processes and the mechanization of handling procedures to prevent all personal contact with sulfuric acid. Electrical installations should be protected against the corrosive action of acid vapors. Smoking should be prohibited in areas in which sulfuric acid is stored or handled.

PERSONAL PROTECTIVE EQUIPMENT

Eye Protection: Wear splash resistant chemical goggles. A full-face shield should be used as well for certain operations. Maintain eye wash fountain and quick-drench facilities in work area.

Skin Protection: Impervious, acid resistant gloves, boots, full body suit and/or other acid resistant protective clothing.

Respiratory Protection: NIOSH recommendations for sulfuric acid concentrations in air up to 15 mg/m³: Full-facepiece chemical cartridge respirator with acid gas cartridge(s) and a high-efficiency particulate filter; or supplied air respirator operated in a continuous-flow mode; or powered air-purifying respirator with acid gas cartridge(s) and a high-efficiency particulate filter; or gas mask with acid gas canister and high-efficiency particulate filter; or full-facepiece SCBA; or full-facepiece supplied air respirator.

Emergency or planned entry into unknown concentrations or IDLH conditions: Positive pressure, full-facepiece SCBA; or positive pressure full-facepiece supplied air respirator with an auxiliary positive pressure SCBA.

Escape: Gas mask with acid gas canister and high-efficiency particulate filter; or escape-type SCBA.

SCBA – Self-contained breathing apparatus.

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EXPOSURE GUIDELINES

PRODUCT: Sulfuric Acid

	ACGIH Time Weighted Average (TLV-TWA)	0.2 mg/m ³
	ACGIH Short Term Exposure Limit (STEL)	Not available
Δ	OSHA Time Weighted Average (PEL-TWA)	1 mg/m ³
	NIOSH Immediately Dangerous to life and Health Level	15 mg/m ³ (IDLH)

SECTION 9 – PHYSICAL AND CHEMICAL PROPERTIES

	Alternate Name(s)	Sulphuric Acid-Spent, Sulfuric Acid-Chlorine Drying Spent
	Chemical Name	Sulfuric Acid
	Chemical Family	Inorganic acid
	Molecular Formula	H ₂ SO ₄
	Molecular Weight	98.08
Δ	Physical State and Appearance	Dense brown colored and oily liquid
	Odor	Pungent odor
	pH	0.3 (1N solution at 25°C/78°F)
	Vapor Pressure (mm Hg at 20°C)	77.67%: 1.2 mmHg
	Vapor Density (Air = 1)	3.4
	Boiling Point	150°C (70% sulfuric acid), 180°C (75% sulfuric acid).
	Freezing Point	-40°C (70% sulfuric acid), -29°C (75% sulfuric acid)
	Solubility (Water)	100%
	Solubility (Other)	Most organic solvents
	Specific Gravity	77.67%: 1.7059 (15°C)
	Evaporation Rate	Extremely low
	% Volatile by Volume	0%
	% Volatile Organic Compounds	0%
	Viscosity (at 25°C)	21 mPa.s
	Coefficient of Oil/Water distribution	Not available

SECTION 10 – STABILITY AND REACTIVITY

Hazardous Decomposition Products: Toxic gases and vapors (e.g. sulfur dioxide, sulfur trioxide, sulfuric acid vapors, chlorine and hydrogen gas) may be released.

Chemical Stability: Stable, but reacts violently with water and organic materials with evolution of heat. The concentrated acid oxidizes, dehydrates, or sulfonates most organic compounds.

Conditions to Avoid: Avoid heat, flames, sparks and other sources of ignition. Elevated temperatures will rapidly increase pressure from sulfur dioxide generation and may also have a negative effect on the materials of construction used in equipment. Do not freeze, as thawing should only be attempted with assistance from the supplier. When diluting, acid should be added to diluent. Do not add diluent to acid.

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Incompatibility with other Substances: Reacts violently with water and reducing agents. When diluting, always **add acid to water**. Do NOT add water to the acid.

Organic materials (such as alcohol, acrylonitrile, chlorates, carbides, epichlorohydrin, fulminates, isoprene, nitrates and picrates) may cause fire and explosions. Contact with metals may produce flammable hydrogen gas.

Corrosivity to Metals: Depending upon concentration, can be very corrosive to most metals including cast iron, steel, stainless steel, brass, aluminum, titanium, nickel and some alloys. The corrosivity of sulfuric acid solutions depends on factors such as concentration, temperature and acid impurities. Generally, the resistance of alloys to sulfuric acid corrosion increases with increasing chromium, molybdenum, copper and silicon content.

Hazardous Polymerization: Will not occur

SECTION 11 – TOXICOLOGICAL INFORMATION

Δ For additional toxicological information, refer to Section 3.

TOXICOLOGICAL DATA

PRODUCT: None established for product

Δ **INGREDIENTS:**

<u>Sulfuric Acid:</u>	LD ₅₀ (oral, rat) =	2140 mg/kg
	LC ₅₀ (inhalation, rat) =	255 mg/m ³ for 4 hrs
	Skin effects (rabbit):	Severe irritation
	Eye effects (rabbit):	Severe irritation

Δ **Sensitization to material:** Not expected to cause respiratory or skin sensitization reactions.

Δ **Carcinogenicity:** See Section 3.

Mutagenicity: Insufficient information.

Reproductive Effects: Insufficient information.

Teratogenicity and Fetotoxicity: Not teratogenic in mice and rabbits.

Synergistic Materials: None known

SECTION 12 – ECOLOGICAL INFORMATION

Ecotoxicological Information: Harmful to aquatic life in very low concentrations. May be dangerous if it enters water intake.

Fish Toxicity: 2.8 µg/L 96 hrs; LC₅₀ Rainbow trout.

Environmental Effects: Can be dangerous if allowed to enter drinking water intakes. Do not contaminate domestic or irrigation water supplies, lakes, streams, ponds, or rivers.

Persistence and Degradation: The substance is highly reactive and will not persist in the environment.

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SECTION 13 – DISPOSAL CONSIDERATIONS

Dispose of waste material at an approved (hazardous) waste treatment/disposal facility in accordance with applicable local, provincial, and federal regulations. Do not dispose of waste with normal garbage, or to sewer systems.

Clean-up material may be a RCRA Hazardous Waste on disposal.

The information applies to the material as manufactured. Processing, neutralizing, use or contamination may make the information inappropriate, inaccurate or incomplete.

SECTION 14 – TRANSPORT INFORMATION

	TDG CLR *	DOT
Shipping Name	Sulfuric Acid	Sulfuric Acid
Hazard Class / Division	8	8
Identification No.	UN1830	UN1830
Packing Group	II	II
ERAP / RQ	3000 L	RQ = 1000 lbs (454 kg)

- Δ **IATA/ICAO Shipping Description:** UN1830, Sulfuric acid, Class 8, PG II is accepted for air transport.
- Δ **For Chemical Emergencies in Transportation Requiring Activation of Olin 24 Hour Emergency Response Plan Call:**

U.S.	1-800-424-9300 – Chemtrec
Canada	1-800-567-7455

SECTION 15 – REGULATORY INFORMATION

Δ **CANADIAN INFORMATION:**

This product has been classified in accordance with the hazard criteria of the CPR (Controlled Products Regulations) and this MSDS (Material Safety Data Sheet) contains all the information required by the CPR.

CEPA / Canadian Domestic Substances List (DSL): On the Canadian Domestic Substances List (CEPA DSL).

Workplace Hazardous Materials Information System (WHMIS)

WHMIS Classification:

- Class D1A - Poisonous material with immediate and serious toxic effects – Very Toxic
- Class D2A - Poisonous material with other toxic effects – Very toxic
- Class E - Corrosive

National Pollutant Release Inventory (NPRI): Included

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Δ **USA INFORMATION:**

OSHA Classification: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200)

SARA Regulations sections 313 and 40 CFR 372: Y

SARA Hazard Categories, SARA SECTIONS 311/312 (40 CFR 370.21):

ACUTE: Y

CHRONIC: Y

FIRE: N

REACTIVE: Y

SUDDEN RELEASE: N

OSHA PROCESS SAFETY (29 CFR 1910.119): N

TSCA Inventory Status: Y

Emergency Planning and Notification (40 CFR 355): This product contains chemical(s) which is/are on the Extremely Hazardous Chemicals list: Hydrogen Sulfate (7664-93-9), TPQ = 1000

Ozone Protection and 40 CFR 42: This product does not contain nor is it manufactured with ozone depleting substances.

Δ **EUROPEAN ECONOMIC COMMUNITY (EEC) INFORMATION:**

EEC CLASSIFICATION: C, Corrosive, R 35 Causes severe burns

EINECS: 231-639-5

CALIFORNIA PROP 65 COMPONENTS:

This product is not listed, but it may contain elements known to the State of California to cause cancer or reproductive toxicity as listed under Proposition 65 State Drinking Water and Toxic Enforcement Act. For additional information, contact Olin Technical Services (800-299-6546)

SECTION 16 – OTHER INFORMATION

- Δ The information contained herein is offered only as a guide to the handling of this specific material and has been prepared in good faith by technically knowledgeable personnel. It is not intended to be all-inclusive and the manner and conditions of use and handling may involve other and additional considerations. No warranty of any kind is given or implied and Olin will not be liable for any damages, losses, injuries or consequential damages that may result from the use of or reliance on any information contained herein. This Material Safety Data Sheet is valid for three years.

Revision Indicators:

- Δ In the left margin indicates a revision or addition of information since the previous issue.

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**National Fire Protection Association (NFPA) Rating
Hazardous Materials Identification System (HMIS) Rating**

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	NFPA	HMIS
HEALTH	3	3
FIRE	0	0
REACTIVITY / INSTABILITY	2	2
SPECIAL HAZARDS	W	N/Ap

4 = Extreme/Severe
3 = High/Serious
2 = Moderate
1 = Slight
0 = Minimum
W = Water Reactive
OX = Oxidizer
* = Chronic health hazard

Δ **REFERENCE**

1. RTECS-Registry of Toxic Effects of Chemical Substances, through "CCINFO", Canadian Centre for Occupational Health and Safety, Hamilton, Ontario, Canada, Update 2008.
2. "CHEMINFO", Canadian Centre for Occupational Health and Safety, Hamilton, Ontario, Canada, (2008).
3. Chemlist, STN Database, Chemical Abstract Service, 2005.
4. DOSE, Royal Society of Chemistry, 2001
5. HSDB-Hazardous Substances Data Bank, Canadian Centre for Occupational Health and Safety, Hamilton, Ontario, Canada, (2008).
6. NIOSH POCKET GUIDE TO CHEMICAL HAZARDS, U.S. Department of Health and Human Services, National Institute for Occupational Safety and Health, June 1997
7. "9th Report on Carcinogens – 2000 Summary", National Toxicology Program
8. Sax, N.I., "Dangerous Properties of Industrial Materials", 7th Edition, 1989
9. "2008 Threshold Limit Values and Biological Exposure Indices", American Conference of Government Industrial Hygienists, 2008.
10. Merck, 11th Edition, 1989

Δ **LEGEND**

ACGIH - American Conference of Governmental Industrial Hygienists
AFFF - Aqueous Film Forming Foam
AIHA - American Industrial Hygiene Association
CAS # - Chemical Abstracts Service Registry Number
CERCLA - Comprehensive Environmental Response, Compensation, and Liability Act
CFR - Code of Federal Regulations
DOT - Department of Transportation
EINECS - European Inventory of Existing Chemical Substances
EPA - Environmental Protection Agency
ERAP - Emergency Response Assistance Plan
IATA - International Air Transportation Association
ICAO - International Civil Aviation Organization
FRP - Fiberglass Reinforced Plastic
HMIS - Hazardous Materials Identification System

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IARC - International Agency for Research on Cancer
IDLH - Immediately Dangerous to Life and Health
LC50 - The concentration of material in air expected to kill 50% of a group of test animals
LD₅₀ - Lethal Dose expected to kill 50% of a group of test animals
MSHA - Mine Safety and Health Administration
N/Ap - Not Applicable
N/Av - Not Available
NFPA - National Fire Protection Association
NIOSH - National Institute for Occupational Safety and Health
NTP - National Toxicology Program
OSHA - Occupational Safety & Health Administration
PEL - Permissible Exposure Limit
PVC - Polyvinyl chloride
RCRA - Resource Conservation and Recovery Act
SARA - Superfund Amendments and Reauthorization Act of the U.S. EPA
STEL - Short Term Exposure Limit
TDG - Transportation of Dangerous Goods Act/Regulations
TLV - Threshold Limit Value
TSCA - Toxic Substances Control Act
TWA - Time Weighted Average
WEEL - Workplace Environmental Exposure Level
WHMIS - Workplace Hazardous Materials Identification System

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