Chemical Threats
Advanced Chemistry Course

SAND2010-3697P

Introduction to
Chemistry Laboratory Safety
Part 1

Sandia is a multiprogram laboratory operated by Sandia Corporation, a Lockheed Martin Company, for the United States Department of Energy's National Nuclear Security Administration under contract DE-AC04-94AL85000.

BIOSECURITY ENGAGEMENT PROGRAM

International BIOLOGICAL THREAT REDUCTION

Unit Objectives

- Regulatory Drivers
- Physical and Health hazards
- Recognition of hazards
- Controls to minimize hazards

Regulatory Drivers

Occupational Safety and Health Administration

- **29 CFR 1200 Hazard Communication**
- **29 CFR 1450 Occupational Exposure to Hazardous Chemicals in Laboratories**

HazCom, 29 CFR 1200

- **Must be informed about the chemical hazards in the workplace and how you can get the information you need to protect yourself.**

- **Recognize signs used to communicate the hazards in the lab.**
- **Recognize health and physical hazards of chemicals and the terms associated with them.**
- **Identify the requirements of chemical labeling.**
- **Identify methods used to detect hazardous chemicals.**
- **Recognize signs and symptoms associated with exposure to hazardous chemicals.**

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Lab Standard, 29 CFR 1450

- **Defines what 'laboratory operations' are and the requirements employers must implement to protect workers.**

- **Minimize all Chemical Exposures**
- **Avoid Underestimation of Risk**
- **Provide Adequate Ventilation**
- **Institute a Chemical Hygiene Program**
- **Observe the Permissible Exposure Limits and Threshold Limit Values**

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Physical Hazards

- **Physical hazards are defined as a chemical for which there is scientifically valid evidence that it is a:**

Flammable material or Combustible liquid

Physical Hazards

- **Physical hazards:**

Compressed Gas

Physical Hazards

- **Physical hazards:**

Explosive

Physical Hazards

- **Physical hazards:**

Organic Peroxide

Oxidizer

Physical Hazards

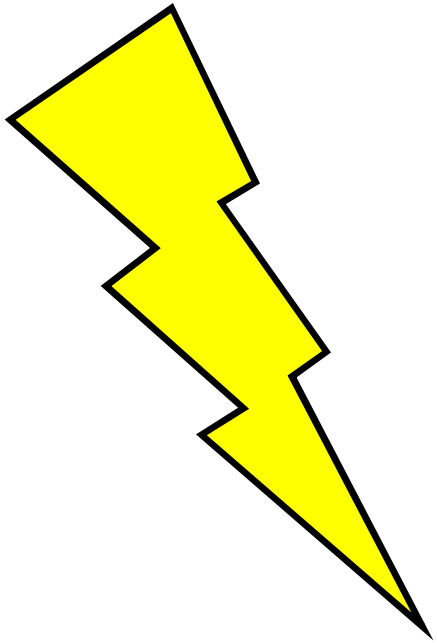
- **Physical hazards are defined as a chemical for which there is scientifically valid evidence that it is:**
  - Pyrophoric - will spontaneously ignite on contact with air
  - Unstable - will vigorously polymerize, decompose, condense, or will become self-reactive under conditions of shocks, pressure or temperature .
  - Water-reactive - reacts with water to release a gas that is either flammable or presents a health hazard.

Hazardous Chemical

Hazardous chemical means a chemical for which there is statistically significant evidence based on at least one study conducted in accordance with established scientific principles that acute or chronic health effects may occur in exposed employees.

The term **"health hazard"** includes chemicals which are carcinogens, toxic or highly toxic agents, reproductive toxins, irritants, corrosives, sensitizers, hepatotoxins, nephrotoxins, neurotoxins, agents which act on the hematopoietic systems, and agents which damage the lungs, skin, eyes, or mucous membranes.

Acute vs. Chronic



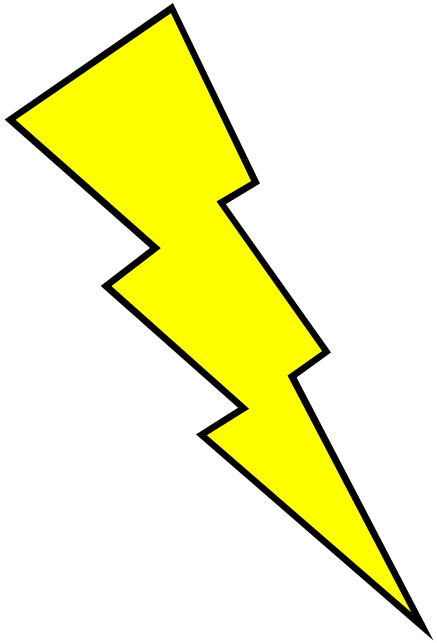
Acute Exposure

Large dose, short time frame

Chronic Exposure

Small doses spread out over time

Acute vs. Chronic



Acute Exposure

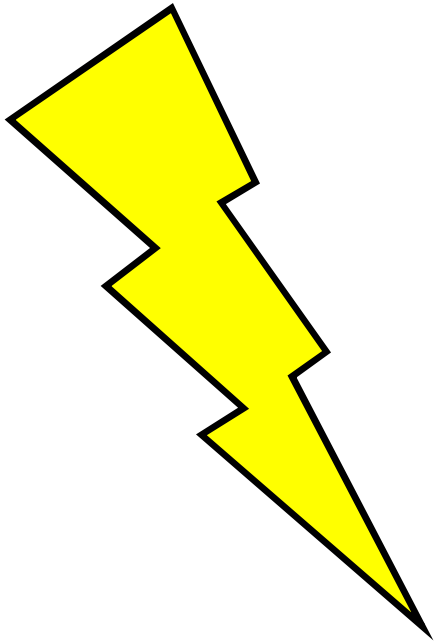
Large dose, short time frame

Example: **Ethanol**

Chronic Exposure

Small doses spread out over time

Acute vs. Chronic



Acute Exposure

Large dose, short time frame

Example: **Ethanol**

Chronic Exposure

Small doses spread out over time

Example: **Ethanol**

Acute vs. Chronic

<u>Acute Health Effects examples</u>:
Burns, dizziness, shortness of breath, fainting, death

<u>Chronic Health Effects examples</u>:
Sensitization, illness, cancer, death

Health Hazards

- Health hazards may cause measurable changes in the body.
- These changes are generally indicated by the occurrence of signs and symptoms in the exposed employees.
- Employees exposed to such hazards must be apprised of both the change in body function and the signs and symptoms that may occur to signal that change.

Health Hazards Defined

- **Corrosives**
  - A chemical that causes visible destruction of, or irreversible alterations in, living tissue by chemical action at the site of contact.
  - Examples: Sulfuric acid, Hydrochloric acid, Sodium Hydroxide

Health Hazards Defined

- **Irritants**
  - A chemical, which is not corrosive, but which causes a reversible inflammatory effect on living tissue by chemical action at the site of contact.
- **Sensitizers**
  - A chemical that causes a substantial proportion of exposed people or animals to develop an allergic reaction in normal tissue after repeated exposure to the chemical.

Health Hazards Defined

- **Toxic; A chemical is defined as toxic if it falls within any of the following categories:**
  - (a) A chemical that has a median lethal dose (LD(50)) of more than 50 milligrams per kilogram but not more than 500 milligrams per kilogram of body weight when administered orally to albino rats weighing between 200 and 300 grams each.
  - (b) A chemical that has a median lethal dose (LD(50)) of more than 200 milligrams per kilogram but not more than 1,000 milligrams per kilogram of body weight when administered by continuous contact for 24 hours (or less if death occurs within 24 hours) with the bare skin of albino rabbits weighing between two and three kilograms each.
  - (c) A chemical that has a median lethal concentration (LC(50)) in air of more than 200 parts per million but not more than 2,000 parts per million by volume of gas or vapor, or more than two milligrams per liter but not more than 20 milligrams per liter of mist, fume, or dust, when administered by continuous inhalation for one hour (or less if death occurs within one hour) to albino rats weighing between 200 and 300 grams each.

Health Hazards Defined

- **Highly Toxic; A chemical is defined as highly toxic if it falls within any of the following categories:**
  - (a) A chemical that has a median lethal dose (LD(50)) of less than 50 milligrams per kilogram body weight when administered orally to albino rats weighing between 200 and 300 grams each.
  - (b) A chemical that has a median lethal dose (LD(50)) of less than 200 milligrams per kilogram of body weight when administered by continuous contact for 24 hours (or less if death occurs within 24 hours) with the bare skin of albino rabbits weighing between two and three kilograms each.
  - (c) A chemical that has a median lethal concentration (LC(50)) in air of less than 200 parts per million by volume of gas or vapor, or less than two milligrams per liter of mist, fume, or dust, when administered by continuous inhalation for one hour (or less if death occurs within one hour) to albino rats weighing between 200 and 300 grams each.

Health Hazards Defined

- **Carcinogen: A chemical is considered to be a carcinogen if:**
  - A chemical, It has been evaluated by the International Agency for Research on Cancer (IARC), and found to be a carcinogen or potential carcinogen; or
  - It is listed as a carcinogen or potential carcinogen in the Annual Report on Carcinogens published by the National Toxicology Program (NTP) (latest edition); or,
  - It is regulated by OSHA as a carcinogen.

Health Hazards Defined

- **Target Organ Effects: A chemical shown to effect a specific organ or system in the body.**
  - Hepatotoxins: Chemicals which produce liver damage
    - Signs & Symptoms: Jaundice; liver enlargement
    - Chemicals: Carbon tetrachloride; nitrosamines
  - Nephrotoxins: Chemicals which produce kidney damage
    - Signs & Symptoms: Edema; proteinuria
    - Chemicals: Halogenated hydrocarbons; uranium
  - Neurotoxins: Chemicals which produce their primary toxic effects on the nervous system
    - Signs & Symptoms: Narcosis, behavioral changes; decrease in motor functions
    - Chemicals: Mercury, carbon disulfide

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Health Hazards Defined

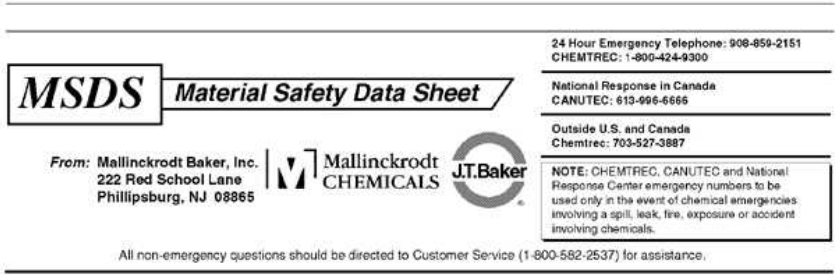
- **Target Organ Effects: A chemical shown to effect a specific organ or system in the body.**
  - Agents which act on the blood or hemato-poietic system: Decrease hemoglobin function; deprive the body tissues of oxygen:
    - Signs & Symptoms: Cyanosis; loss of consciousness
    - Chemicals: Carbon monoxide; cyanides
  - Agents which damage the lung: Chemicals which irritate or damage pulmonary tissue:
    - Signs & Symptoms: Cough; tightness in chest; shortness of breath
    - Chemicals: Silica; Asbestos
  - Cutaneous hazards: Chemicals which affect the dermal layer of the body:
    - Signs & Symptoms: Defatting of the skin; rashes; irritation
    - Chemicals: Ketones; chlorinated compounds
  - Eye hazards: Chemicals which affect the eyes or visual capacity:
    - Signs & Symptoms: Conjunctivitis; corneal damage:
    - Chemicals: Organic solvents; acids

Health Hazards Defined

- **Target Organ Effects: A chemical shown to effect a specific organ or system in the body.**
  - Reproductive Toxins: Chemicals which affect the reproductive capabilities, including:
    - Mutagens: cause chromosomal damage
    - Tetatogens: cause effects in the developing fetus
      - **Chemicals: Lead**

Material Safety Data Sheets (MSDS)

- **Your guide to protecting yourself in the laboratory.**



MSDS Material Safety Data Sheet

From: Mallinckrodt Baker, Inc.
222 Red School Lane
Phillipsburg, NJ 08865

Mallinckrodt CHEMICALS J.T.Baker

24 Hour Emergency Telephone: 908-859-2151
CHEMTREC: 1-800-424-9300

National Response in Canada
CANUTEC: 613-996-6666

Outside U.S. and Canada
Chemtrec: 703-527-3887

NOTE: CHEMTREC, CANUTEC and National Response Center emergency numbers to be used only in the event of chemical emergencies involving a spill, leak, fire, exposure or accident involving chemicals.

All non-emergency questions should be directed to Customer Service (1-800-582-2537) for assistance.

SULFURIC ACID, 52 - 100 %

1. Product Identification

Synonyms: Oil of vitriol; Babcock acid; sulphuric acid
CAS No.: 7664-93-9
Molecular Weight: 98.08
Chemical Formula: H2SO4 in H2O
Product Codes:
J.T. Baker: 5030, 5137, 5374, 5802, 5815, 5858, 5859, 5868, 5889, 5897, 5961, 5971, 5997, 6163, 6902, 9671, 9673, 9674, 9675, 9676, 9679, 9680, 9681, 9682, 9684, 9687, 9690, 9691, 9693, 9694, 9697
Mallinckrodt: 21201, 2468, 2876, 2878, 2879, 2900, 2904, 3780, 4222, 5524, 5557, H644, H850, H976, H996, V651, XL003

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Material Safety Data Sheets (MSDS)

2. Composition/Information on Ingredients

Ingredient	CAS No	Percent	Hazardous
Sulfuric Acid	7664-93-9	52 - 100%	Yes
Water	7732-18-5	0 - 48%	No

Material Safety Data Sheets (MSDS)

3. Hazards Identification

Emergency Overview

POISON! DANGER! CORROSIVE. LIQUID AND MIST CAUSE SEVERE BURNS TO ALL BODY TISSUE. MAY BE FATAL IF SWALLOWED OR CONTACTED WITH SKIN. HARMFUL IF INHALED. AFFECTS TEETH. WATER REACTIVE. CANCER HAZARD. STRONG INORGANIC ACID MISTS CONTAINING SULFURIC ACID CAN CAUSE CANCER. Risk of cancer depends on duration and level of exposure.

SAF-T-DATA(tm) Ratings (Provided here for your convenience)

Health Rating: 4 - Extreme (Poison)
Flammability Rating: 0 - None
Reactivity Rating: 2 - Moderate
Contact Rating: 4 - Extreme (Corrosive)
Lab Protective Equip: GOGGLES & SHIELD; LAB COAT & APRON; VENT HOOD; PROPER GLOVES
Storage Color Code: White (Corrosive)

Potential Health Effects

Inhalation:
Inhalation produces damaging effects on the mucous membranes and upper respiratory tract. Symptoms may include irritation of the nose and throat, and labored breathing. May cause lung edema, a medical emergency.

Ingestion:
Corrosive. Swallowing can cause severe burns of the mouth, throat, and stomach, leading to death. Can cause sore throat, vomiting, diarrhea. Circulatory collapse with clammy skin, weak and rapid pulse, shallow respirations, and scanty urine may follow ingestion or skin contact. Circulatory shock is often the immediate cause of death.

Skin Contact:
Corrosive. Symptoms of redness, pain, and severe burn can occur. Circulatory collapse with clammy skin, weak and rapid pulse, shallow respirations, and scanty urine may follow skin contact or ingestion. Circulatory shock is often the immediate cause of death.

Eye Contact:
Corrosive. Contact can cause blurred vision, redness, pain and severe tissue burns. Can cause blindness.

Chronic Exposure:
Long-term exposure to mist or vapors may cause damage to teeth. Chronic exposure to mists containing sulfuric acid is a cancer hazard.

Aggravation of Pre-existing Conditions:
Persons with pre-existing skin disorders or eye problems or impaired respiratory function may be more susceptible to the effects of the substance.

Material Safety Data Sheets (MSDS)

4. First Aid Measures

Inhalation:
Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Call a physician immediately.
Ingestion:
DO NOT INDUCE VOMITING. Give large quantities of water. Never give anything by mouth to an unconscious person. Call a physician immediately.
Skin Contact:
In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. Excess acid on skin can be neutralized with a 2% solution of bicarbonate of soda. Call a physician immediately.
Eye Contact:
Immediately flush eyes with gentle but large stream of water for at least 15 minutes, lifting lower and upper eyelids occasionally. Call a physician immediately.

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5. Fire Fighting Measures

Fire:
Concentrated material is a strong dehydrating agent. Reacts with organic materials and may cause ignition of finely divided materials on contact.
Explosion:
Contact with most metals causes formation of flammable and explosive hydrogen gas.
Fire Extinguishing Media:
Dry chemical, foam or carbon dioxide. Do not use water on material. However, water spray may be used to keep fire exposed containers cool.
Special Information:
In the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full facepiece operated in the pressure demand or other positive pressure mode. Structural firefighter's protective clothing is ineffective for fires involving this material. Stay away from sealed containers.

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6. Accidental Release Measures

Ventilate area of leak or spill. Wear appropriate personal protective equipment as specified in Section 8. Isolate hazard area. Keep unnecessary and unprotected personnel from entering. Contain and recover liquid when possible. Neutralize with alkaline material (soda ash, lime), then absorb with an inert material (e. g., vermiculite, dry sand, earth), and place in a chemical waste container. Do not use combustible materials, such as saw dust. Do not flush to sewer! US Regulations (CERCLA) require reporting spills and releases to soil, water and air in excess of reportable quantities. The toll free number for the US Coast Guard National Response Center is (800) 424-8802.

J. T. Baker NEUTRASORB® acid neutralizers are recommended for spills of this product.

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Material Safety Data Sheets (MSDS)

7. Handling and Storage

Store in a cool, dry, ventilated storage area with acid resistant floors and good drainage. Protect from physical damage. Keep out of direct sunlight and away from heat, water, and incompatible materials. Do not wash out container and use it for other purposes. When diluting, always add the acid to water; never add water to the acid. When opening metal containers, use non-sparking tools because of the possibility of hydrogen gas being present. 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.

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8. Exposure Controls/Personal Protection

Airborne Exposure Limits:
For Sulfuric Acid:
- OSHA Permissible Exposure Limit (PEL) -
1 mg/m3 (TWA)
- ACGIH Threshold Limit Value (TLV) -
0.2 mg/m3(T) (TWA) for sulfuric acid - A2 Suspected Human Carcinogen for sulfuric acid contained in strong inorganic mists.

Ventilation System:
A system of local and/or general exhaust is recommended to keep employee exposures below the Airborne Exposure Limits. Local exhaust ventilation is generally preferred because it can control the emissions of the contaminant at its source, preventing dispersion of it into the general work area. Please refer to the ACGIH document, *Industrial Ventilation, A Manual of Recommended Practices*, most recent edition, for details.

Personal Respirators (NIOSH Approved):
If the exposure limit is exceeded and engineering controls are not feasible, a full facepiece respirator with an acid gas cartridge and particulate filter (NIOSH type N100 filter) may be worn up to 50 times the exposure limit, or the maximum use concentration specified by the appropriate regulatory agency or respirator supplier, whichever is lowest. If oil particles (e.g. lubricants, cutting fluids, glycerine, etc.) are present, use a NIOSH type R or P particulate filter. For emergencies or instances where the exposure levels are not known, use a full-facepiece positive-pressure, air-supplied respirator. WARNING: Air purifying respirators do not protect workers in oxygen-deficient atmospheres. Where respirators are required, you must have a written program covering the basic requirements in the OSHA respirator standard. These include training, fit testing, medical approval, cleaning, maintenance, cartridge change schedules, etc. See 29CFR1910.134 for details.

Skin Protection:
Wear impervious protective clothing, including boots, gloves, lab coat, apron or coveralls, as appropriate, to prevent skin contact.

Eye Protection:
Use chemical safety goggles and/or a full face shield where splashing is possible. Maintain eye wash fountain and quick-drench facilities in work area.

Material Safety Data Sheets (MSDS)

9. Physical and Chemical Properties

Appearance:
Clear oily liquid.
Odor:
Odorless.
Solubility:
Miscible with water, liberates much heat.
Specific Gravity:
1.84 (98%), 1.40 (50%), 1.07 (10%)
pH:
1 N solution (ca. 5% w/w) = 0.3; 0.1 N solution (ca. 0.5% w/w) = 1.2; 0.01 N solution (ca. 0.05% w/w) = 2.1.
% Volatiles by volume @ 21C (70F):
No information found.
Boiling Point:
ca. 290C (ca. 554F) (decomposes at 340C)
Melting Point:
3C (100%), -32C (93%), -38C (78%), -64C (65%).
Vapor Density (Air=1):
3.4
Vapor Pressure (mm Hg):
1 @ 145.8C (295F)
Evaporation Rate (BuAc=1):
No information found.

Material Safety Data Sheets (MSDS)

10. Stability and Reactivity

Stability:
Stable under ordinary conditions of use and storage. Concentrated solutions react violently with water, spattering and liberating heat.
Hazardous Decomposition Products:
Toxic fumes of oxides of sulfur when heated to decomposition. Will react with water or steam to produce toxic and corrosive fumes. Reacts with carbonates to generate carbon dioxide gas, and with cyanides and sulfides to form poisonous hydrogen cyanide and hydrogen sulfide respectively.
Hazardous Polymerization:
Will not occur.
Incompatibilities:
Water, potassium chlorate, potassium perchlorate, potassium permanganate, sodium, lithium, bases, organic material, halogens, metal acetylides, oxides and hydrides, metals (yields hydrogen gas), strong oxidizing and reducing agents and many other reactive substances.
Conditions to Avoid:
Heat, moisture, incompatibles.

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11. Toxicological Information

Toxicological Data:
Oral rat LD50: 2140 mg/kg; inhalation rat LC50: 510 mg/m3/2H; standard Draize, eye rabbit, 250 ug (severe); investigated as a tumorigen, mutagen, reproductive effector.
Carcinogenicity:
Cancer Status: The International Agency for Research on Cancer (IARC) has classified "strong inorganic acid mists containing sulfuric acid" as a known human carcinogen, (IARC category 1). This classification applies only to mists containing sulfuric acid and not to sulfuric acid or sulfuric acid solutions.

--------\Cancer Lists\----------

Ingredient	---NTP Carcinogen--- Known	Anticipated	IARC Category
Sulfuric Acid (7664-93-9)	No	No	None
Water (7732-18-5)	No	No	None

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12. Ecological Information

Environmental Fate:
When released into the soil, this material may leach into groundwater. When released into the air, this material may be removed from the atmosphere to a moderate extent by wet deposition. When released into the air, this material may be removed from the atmosphere to a moderate extent by dry deposition.
Environmental Toxicity:
LC50 Flounder 100 to 330 mg/l/48 hr aerated water/Conditions of bioassay not specified; LC50 Shrimp 80 to 90 mg/l/48 hr aerated water /Conditions of bioassay not specified; LC50 Prawn 42.5 ppm/48 hr salt water /Conditions of bioassay not specified.
This material may be toxic to aquatic life.

Material Safety Data Sheets (MSDS)

13. Disposal Considerations

Whatever cannot be saved for recovery or recycling should be handled as hazardous waste and sent to a RCRA approved incinerator or disposed in a RCRA approved waste facility. Processing, use or contamination of this product may change the waste management options. State and local disposal regulations may differ from federal disposal regulations. Dispose of container and unused contents in accordance with federal, state and local requirements.

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14. Transport Information

Domestic (Land, D.O.T.)

Proper Shipping Name: SULFURIC ACID (WITH MORE THAN 51% ACID)
Hazard Class: 8
UN/NA: UN1830
Packing Group: II
Information reported for product/size: 440LB

International (Water, I.M.O.)

Proper Shipping Name: SULFURIC ACID (WITH MORE THAN 51% ACID)
Hazard Class: 8
UN/NA: UN1830
Packing Group: II
Information reported for product/size: 440LB

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Material Safety Data Sheets (MSDS)

15. Regulatory Information

--------\Chemical Inventory Status - Part 1\---------------------------------

Ingredient	TSCA	EC	Japan	Australia
Sulfuric Acid (7664-93-9)	Yes	Yes	Yes	Yes
Water (7732-18-5)	Yes	Yes	Yes	Yes

--------\Chemical Inventory Status - Part 2\---------------------------------

		--Canada--		
Ingredient	Korea	DSL	NDSL	Phil.
Sulfuric Acid (7664-93-9)	Yes	Yes	No	Yes
Water (7732-18-5)	Yes	Yes	No	Yes

--------\Federal, State & International Regulations - Part 1\----------------

	-SARA 302-		------SARA 313------	
Ingredient	RQ	TPQ	List	Chemical Catg.
Sulfuric Acid (7664-93-9)	1000	1000	Yes	No
Water (7732-18-5)	No	No	No	No

--------\Federal, State & International Regulations - Part 2\----------------

		-RCRA-	-TSCA-
Ingredient	CERCLA	261.33	8(d)
Sulfuric Acid (7664-93-9)	1000	No	No
Water (7732-18-5)	No	No	No

Chemical Weapons Convention: No TSCA 12(b): No CDTA: Yes
SARA 311/312: Acute: Yes Chronic: Yes Fire: No Pressure: No
Reactivity: Yes (Pure / Liquid)

Australian Hazchem Code: 2P
Poison Schedule: None allocated.
WHMIS:
This MSDS has been prepared according to the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all of the information required by the CPR.

Material Safety Data Sheets (MSDS)

16. Other Information

NFPA Ratings: Health: **3** Flammability: **0** Reactivity: **2** Other: **Water reactive**
Label Hazard Warning:
POISON! DANGER! CORROSIVE. LIQUID AND MIST CAUSE SEVERE BURNS TO ALL BODY TISSUE. MAY BE FATAL IF SWALLOWED OR CONTACTED WITH SKIN. HARMFUL IF INHALED. AFFECTS TEETH. WATER REACTIVE. CANCER HAZARD. STRONG INORGANIC ACID MISTS CONTAINING SULFURIC ACID CAN CAUSE CANCER. Risk of cancer depends on duration and level of exposure.
Label Precautions:
Do not get in eyes, on skin, or on clothing.
Do not breathe mist.
Keep container closed.
Use only with adequate ventilation.
Wash thoroughly after handling.
Do not contact with water.
Label First Aid:
In all cases call a physician immediately. In case of contact, immediately flush eyes or skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before re-use. Excess acid on skin can be neutralized with a 2% bicarbonate of soda solution. If swallowed, DO NOT INDUCE VOMITING. Give large quantities of water. Never give anything by mouth to an unconscious person. If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen.
Product Use:
Laboratory Reagent.
Revision Information:
No Changes.
Disclaimer:
****
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Prepared by: Environmental Health & Safety
Phone Number: (314) 654-1600 (U.S.A.)

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Laboratory Signage

BLUE HEALTH HAZARD

4	Deadly
3	Extreme danger
2	Hazardous
1	Slightly hazardous
0	Normal Material

RED FIRE HAZARD (F)

Flash Points:

4	Below 73
3	Below 100
2	Below 200
1	Above 200
0	Will Not Burn

WHITE SPECIFIC HAZARD

OX	Oxidizer
W	Use NO WATER

YELLOW REACTIVITY

4	May Detonate
3	Shock or Heat May Detonate
2	Violent Chemical Change
1	Unstable if Heated
0	Stable

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Chemical Hazards

Routes of Entry

- **The ways exposure to a hazardous chemical occurs:**
  - **Inhalation**
  - **Ingestion**
  - **Contact**
  - **Injection**

Routes of Entry/Ways to Minimize

Inhalation	**Work in Fume Hood, avoid vapors.** **No smoking in the lab.**
Ingestion	**No eating or drinking in the lab, no storage of food or drink in lab.**
Contact	**Wear proper personal protective equipment: labcoat, eye protection, gloves.**
Injection	**Be careful handling syringes and glassware.**

Summary

It is your right to be informed about the hazards you may encounter in the laboratory.

Physical Hazards

Chemical Hazards

MSDS

Signage