

UNITED STATES DEPARTMENT OF COMMERCE National Oceanic and Atmospheric Administration NOAA Marine and Aviation Operations Marine Operations Center 439 W. York Street Norfolk, VA 23510-1114

MEMORANDUM FOR: Lieutenant Commander Jeffrey Shoup, NOAA Commanding Officer, NOAA Ship *Nancy Foster* 

FROM:

Captain Scott M. Sirois, NOAA Commanding Officer, NOAA Marine Operations Center-Atlantic

SUBJECT:

Project Instruction for NF-16-05 Hypoxia Monitoring Survey in the Gulf of Mexico

Attached is the final Project Instruction for NF-16-05 Hypoxia Monitoring Survey in the Gulf of Mexico, which is scheduled aboard NOAA Ship *Nancy Foster* during the period of July 19, – August 1, 2016. Of the 14 DAS scheduled for this project, 14 days are funded by a Line Office Allocation. This project is estimated to exhibit a Medium Operational Tempo. Acknowledge receipt of these instructions via e-mail to <u>OpsMgr.MOA@noaa.gov</u> at Marine Operations Center-Atlantic.





Louisiana Universities Marine Consortium 8124 Hwy. 56, Chauvin, LA 70344 (985) 851-2800, -2874 fax 17 May 2016

#### **Project Instructions**

**Date Submitted:** 

#### June 21, 2016

**Platform:** 

NOAA Ship Nancy Foster

NF-16-05

**Project Number:** 

Hypoxia Monitoring Survey in the Gulf of Mexico

**Project Dates:** 

**Project Title:** 

July 19, 2016 to August 1, 2016

Dated:

ANY

Dated

Prepared by:

Dated: June 21, 2016

Nancy N. Rabalais **Chief Scientist** Louisiana Universities Marine Consortium MAGNIEN.ROBERT.E.DR.1365824688

Approved by:

Rob Magnien Director NCCOS/Center for Sponsored Coastal Ocean Research

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Nancy Rabalais

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Approved by:

Mary Erickson Director

Approved by:

National Centers for Coastal Ocean Science (NCCOS)

Captain Scott M. Sirois, NOAA Commanding Officer Marine Operations Center - Atlantic

# I. Overview

A. Brief Summary and Project Period

The National Centers for Coastal Ocean Science will be supporting the 32<sup>nd</sup> annual research cruise to monitor the Gulf of Mexico hypoxic zone to be conducted on board the NOAA Ship *Nancy Foster* (July 19 - August 1, 2016). This cruise is led by Dr. Nancy Rabalais of the Louisiana Universities Marine Consortium.

The purpose of the cruise is to measure the size of the dead zone, which is used by the Interagency Mississippi/Gulf of Mexico Hypoxia Task Force to evaluate their progress toward achieving the 2001 Action Plan (reaffirmed in 2008 Action Plan) goal to reduce the size of the hypoxic zone to 5,000 km<sup>2</sup> by 2035. The action plan recommends nutrient loading reduction targets of 45% in the Mississippi River Watershed (impacting over 40% of the U.S. land area). This survey is the only downstream measurement with which to determine the effectiveness of these management actions.

- B. Days at Sea (DAS)
  Of the <u>14</u> DAS scheduled for this project, <u>0</u> DAS are funded by an OMAO allocation, <u>14</u>
  DAS are funded by a Line Office Allocation. This project is estimated to exhibit a Medium Operational Tempo.
- C. Operating Area (see attached excel file for coordinates)

A standard set of hydrographic stations for the shelfwide cruise begin within Southwest Pass of the Mississippi River and extend east to west from 5 m to 120 m to as far as Galveston, TX, or High Island, TX at times. Not all stations listed in the Monitoring Station Excel file are occupied. The normal depth to which hypoxia is found is 40 to 50 m. The boundary of hypoxia on the nearshore and the offshore are dictated by the value of dissolved oxygen found. Typical shelfwide transect bounds are usually A' to S or T. We work from east to west until we no longer detect hypoxia.



# D. Summary of Objectives

The cruise, historically conducted onboard the R/V Pelican from 1985-2015, will be aboard the NOAA Ship Nancy Foster beginning in 2016 as the project is being transitioned to operations. The cruise's science activities will be conducted within an area approximately 13,650 km<sup>2</sup> west of the Mississippi River Delta within and just outside of the hypoxic zone in water depths of 5 to 120 meters. Activities are conducted along a grid until hypoxia is no longer detected beginning at the inshore station in Transect line A'. Thus, the exact number of stations and transects will vary. The order and length of each transect will depend on prevailing weather conditions, size of the hypoxic zone and other logistic considerations. All sampling will be done from the Nancy Foster for stations greater than 10 m in depth. For stations that are less than 10 m in depth, a small boat will be deployed from the Nancy Foster during daylight hours (2-3 individuals) with two 5-L Niskin Bottles (including 30 feet in cable and messenger), 2 coolers (48-52 quart) and a handheld YSI 6820 (optical probe for dissolved oxygen; 13.5 in. length, 2.86 in. diameter, 3.4 lbs.), which can be lowered to the seabed and capture surface thin layers, will be deployed. Water from the Niskin bottles will be decanted into plastic jars or BOD bottles. The general plan is for the NOAA Ship Nancy Foster to end science activities when hypoxia is no longer present in the western most region of the area for a shorter transit to Galveston, TX.

Our objective is to measure the spatial extent of the hypoxic zone in the northern Gulf of Mexico. To achieve this objective we will:

- 1. Develop hydrographic profiles using the ship's Seabird 911 plus CTD unit and a Biospherical Profiling Natural Fluorescence radiometer;
- 2. Collect water samples using Niskin bottles.
- 3. Acquire data using underway systems [GPS, meteorological, and sea surface hydrographic (temperature, conductivity, % transmission, fluorescence), and hull-mounted ADCP, i.e., Acoustic Doppler current profiler (Teledyne RDI Ocean Surveyor 150 kHz for up to 450 m)].
- 4. Conduct routine sample and data processing aboard (top-side) the NOAA Ship *Nancy Foster*.
  - E. Participating Institutions

Louisiana Universities Marine Consortium (LUMCON)

Louisiana State University (LSU)

Texas A&M University Corpus Christi (TAMUCC)

Florida State University (FSU)

NOAA National Centers for Coastal Ocean Science/Center for Sponsored Coastal Ocean Research (NCCOS/CSCOR)

F. Personnel/Science Party: name, title, gender, affiliation, and nationality

Name (Last,	Title	Date	Date	Gender	Affiliation	Nationalit
First)		Aboard	Disembark			У
Chelsky, Ariela	Postdoctoral	7-23-16	8-1-16	F	LUMCON	USA
	Associate					
Gillies, Lauren	Ph.D. Student	7-23-16	8-1-16	F	FSU	USA
Hu, Xinping	Assistant	7-23-16	8-1-16	М	TAMUCC	China,
	Professor					green card
Meckley,	Research	7-23-16	8-1-16	М	NOAA/NOS/	USA
Trevor	Assistant,				NCCOS/CSC	
	Knauss Fellow				OR	
Morrison,	Co-Chief	7-23-16	8-1-16	F	LUMCON	USA
Wendy	Scientist					
Pietraroia,	Research	7-23-16	8-1-16	F	LUMCON	USA
Logen	Assistant					
Puglise,	NOAA	7-23-16	8-1-16	F	NOAA/NOS/	USA
Kimberly	Science				NCCOS/CSC	
	Liaison				OR	
Rabalais,	Chief Scientist	7-23-16	8-1-16	F	LUMCON	USA
Nancy						
Setta,	Research	7-23-16	8-1-16	F	LUMCON	USA
Samantha	Assistant					
Shivarudrappa,	Postdoctoral	7-23-16	8-1-16	Μ	LUMCON	India
Shivakumar	Associate					F1 visa
Smith, Leslie	Data Manager	7-23-16	8-1-16	F	Your Ocean	USA
					Consulting	
Turner, R.	Professor	7-23-16	8-1-16	М	LSU	USA
Eugene						
Wang, Hongjie	Ph.D. Student	7-23-16	8-1-16	F	TAMUCC	China,
						F-1 visa

#### G. Administrative

1. Points of Contacts:

Chief Scientist – Nancy Rabalais LUMCON, 8124 Hwy. 56, Chauvin, LA 70344, 985-870-4203 nrabalais@lumcon.edu

Alternate Chief Scientist - Wendy Morrison LUMCON, 8124 Hwy. 56, Chauvin, LA 70344, 985-851-8522, wmorrison@lumcon.edu

NOAA Science Liaison Project – Kimberly Puglise NOAA/NCCOS/CSCOR, 1305 East-West Highway, N/CSI2, Silver Spring, MD 20910, 240-533-0190, kimberly.puglise@noaa.gov Operations Officer – LT Linh Nguyen NOAA Ship *Nancy Foster*, 1050 Register St., North Charleston, SC 29405 843-991-6326 (ship cell) or 541-867-8915 (ship VoIP), ops.nancy.foster@noaa.gov

2. Diplomatic Clearances

None Required.

3. Licenses and Permits

None Required.

#### II. Operations

The Chief Scientist is responsible for ensuring the scientific staff are trained in planned operations and are knowledgeable of project objectives and priorities. The Commanding Officer is responsible for ensuring all operations conform to the ship's accepted practices and procedures.

A. Project Itinerary:

July 19-23	NOAA Ship Nancy Foster transits from Savannah, GA to Pascagoula, MS
July 24	Embark from Pascagoula, MS
July 24-August 1	At Sea
August 1-2	Science Personnel disembark in Galveston, TX

On July 24, the NOAA Ship *Nancy Foster* will proceed from Pascagoula, MS to the Southwest Pass of the Mississippi River, and up into the river to as close to 0 salinity as possible. Collection of water in the river will be a bucket tossed over the side for surface water. Flow through CTD will be below the surface. This will take multiple tries, but efficiency is the goal of the science crew to collect the correct water samples. Transit to first station at A'1. Proceed along transect from A'1 to A'5, transit to A7 to A1, and continue going west from transect to transect until all the low oxygen is mapped.

- B. Staging and Destaging: Staging at Pascagoula, MS; destaging at Galveston, TX.
- C. Operations to be Conducted:
  - i. At each station, five separate activities occur:
    - a. A single cast of the CTD rosette with 12 5-L Niskin bottles, outfitted with SeaBird O<sub>2</sub>, transmission, PAR, conductivity, temperature, pressure, altimeter, in vivo fluorescence, backscatter. Soak with bottles below the

surface until pump is on for 2 minutes. Lower as slowly as possible. Come as close to the bottom as possible, preferably within 1 m of the seafloor. We will trip bottles at the deepest depth and at selected depths through the water column (actual depths will vary), and some at the surface with at least 1 m of water covering the tops of the Niskin bottles.

- i. Various samples will be taken from the 12 5-L Niskin bottles on the rosette and processed in the ship's lab. Chl a, suspended sediments, nutrients, bacteria, pCO2, and pH.
- b. On a separate cast, a single 5-L Niskin with messenger is added to the wire with a chain and lead weight (25 lbs.) to make sure it gets to the seafloor. At 0.5 m above the seafloor, the messenger is sent to close the Niskin bottle. The Niskin bottle is brought back to the surface and on board. Some stations may require a second cast to obtain enough water for filtering.
- c. The YSI 6820 (optical probe for dissolved oxygen) is put on the same cable with the lead weight and taken to the bottom and discrete depths are measured at 1-m intervals to cover the bottom layer and then the surface layer. These data are very important because of the density gradients at the bottom and at the surface.
- d. A surface bucket is deployed to collect surface water.
- e. From 0700 to 1900, a secchi disk will be hand deployed over the side to determine water clarity.
- ii. Station decisions are made considering the dissolved oxygen concentration at the existing station. The goal is to fully map the extent of the low oxygen. If we transit from a station close to 2.0 mg/L in oxygen, we will probably go farther in the inshore and offshore direction.

iii. If a harmful algal bloom is spotted, we will want to get a bucket of surface water.

- iv. We will want to box core at selected stations, if possible. We will do sediment and water incubation in three stations along transects A, C, and H (for a total of 9 stations).
- v. Water samples and sediment samples will be incubated in flasks in the wet lab with the outflow from the pCO2 system. Dr. Hu has done this on the *Nancy Foster* before.
  - a. All incubations will be done in dark flowing seawater. We will only need minimal space for the incubations, if the outflow from the pCO2 can be used, a large beaker (1 L) can actually be used.
- vi. Small boat operations. If the depth is too shallow for the *Nancy Foster*, we will need to deploy the small boat to take water samples and do an YSI 6820 cast. We will need a GPS to measure station location. If shallow stations occur at night, we may have to back track on the transects to re-occupy them in the daylight using the small boat.
- D. Dive Plan

Dives are not planned for this project.

E. Applicable Restrictions

Conditions which preclude normal operations:

- i. Sea state not safe for deployment of CTD unit or box corer.
- ii. Sea state not suitable for outboard transits to nearshore stations.

- iii. Lightning on the back deck. We do work in pouring rain.
- iv. CTD or winch failures.
- v. See Appendix Document entitled: Protective Measures and Best Management Practices to be incorporated into the cruise to ensure compliance with the National Environmental Policy Act

# III. Equipment

- A. Equipment and Capabilities provided by the ship (itemized)
  - i. Refrigerator for storage of samples
  - ii. Freezer for storage of samples
  - iii. Clean power
  - iv. SBE-9/11 plus CTD unit with 12 5-L Niskin bottles. We will bring clean tubing for spigots.
  - v. Cable with 25 lb. lead weight on the bottom to which a 5-L Niskin can be deployed to the seabed. Diameter to fit bronze messenger.
  - vi. Separate 5-L Niskin with bronze messenger.
  - vii. Teledyne RDI Ocean Surveyor 150 kHz ADCP
  - viii. 24-hour marine technician(s) for CTD operations
  - ix. Port or starboard winch for deployment of YSI 6820 and 5-L Niskin, size must meet inside diameter of bronze messenger.
  - x. Adequate band width for internet work, especially for uploading daily photos, logs, and maps of extent of hypoxia, and for conductance of work of scientists who are working on proposals, etc.
- B. Equipment and Capabilities provided by the scientists (itemized)
  - i. pCO2 system
  - ii. tank of CO<sub>2</sub> gas
  - iii. Turner AU-10 fluorometer
  - iv. Winkler dissolved oxygen Mettler titrator 2
  - v. miscellaneous supplies
  - vi. peristaltic water pump
  - vii. small oven 1.5 x 1.5 x 1.5 ft
  - viii. Dynac II centrifuge
  - ix. Dynac III centrifuge
  - x. Vortex Genie 2 mixer
  - xi. Vacuum pump(s)
  - xii. YSI 6820, weight (25 lb), chain and cable
  - xiii. Ponar grab, Wildco is 9"W x 9"L and weighs 45 lb. Made with 316 stainless steel and an 18-8 stainless steel screen. Sample volume is 8200mL.

# IV. Hazardous Materials

A. Policy and Compliance

The Chief Scientist is responsible for complying with FEC 07 Hazardous Materials and Hazardous Waste Management Requirements for Visiting Scientific Parties (or the OMAO procedure that supersedes it). By Federal regulations and NOAA Marine and Aviation Operations policy, the ship may not sail without a complete inventory of all hazardous materials by name and quantity, MSDS, appropriate spill cleanup materials (neutralizing agents, buffers, or absorbents) in amounts adequate to address spills of a size equal to the amount of chemical brought aboard, and chemical safety and spill response procedures. Documentation regarding those requirements will be provided by the Chief of Operations, Marine Operations Center, upon request.

Per OMAO procedure, the scientific party will include with their project instructions and provide to the CO of the respective ship 30 days before departure:

- List of chemicals by name with anticipated quantity
- List of spill response materials, including neutralizing agents, buffers, and absorbents
- Chemical safety and spill response procedures, such as excerpts of the program's Chemical Hygiene Plan or SOPs relevant for shipboard laboratories
- For bulk quantities of chemicals in excess of 50 gallons total or in containers larger than 10 gallons each, notify ship's Operations Officer regarding quantity, packaging and chemical to verify safe stowage is available as soon as chemical quantities are known.

Upon embarkation and prior to loading hazardous materials aboard the vessel, the scientific party will provide to the CO or their designee:

- An inventory list showing actual amount of hazardous material brought aboard
- An MSDS for each material
- Confirmation that neutralizing agents and spill equipment were brought aboard sufficient to contain and cleanup all of the hazardous material brought aboard by the program
- Confirmation that chemical safety and spill response procedures were brought aboard

Upon departure from the ship, scientific parties will provide the CO or their designee an inventory showing that all chemicals were removed from the vessel. The CO's designee will maintain a log to track scientific party hazardous materials. MSDS will be made available to the ship's complement, in compliance with Hazard Communication Laws.

Scientific parties are expected to manage and respond to spills of scientific hazardous materials. Overboard discharge of hazardous materials is not permitted aboard NOAA ships.

#### B. Inventory

Common Name	Qty	Notes	Trained	Spill
of Material			Individual	control
Formaldehyde	1 x 500ml	Alkalinity	Nancy	F
solution (2%)			Rabalais	
Formaldehyde	1 x 50ml	Alkalinity, Stored	Nancy	F
solution (37%)		in ship chem. lkr	Rabalais	

Common Name	Qty	Notes	Trained	Spill
of Material			Individual	control
Hydrochloric	20x500ml	Alkalinity, Stored	Nancy	А
Acid, 0.1N		in ship chem. lkr	Rabalais	
Glutaraldehyde	30 x 1 ml in 125	In lab refrigerator	Wendy	Fixative,
1%	ml plastic bottles		Morrison	contact skin
Sodium	4 l, not HZ	In box in cabinet	Nancy	Not HZ
thiosulfate			Rabalais	
Sulfuric acid, 16N	50 ml	In box in cabinet,	Nancy	Acid
		small amount on	Rabalais	
		lab bench		
WD-40	25 ml, small	Lab cabinet	Nancy	Flammable
	spray can		Rabalais	
DMSO/90%	2 500-ml bottles	Chemical locker	Nancy	Flammable,
acetone mixture			Rabalais	skin contact
Dimethyl	60% of mixture	Lab cabinet	Nancy	Skin contact
sulfoxide			Rabalais	
Acetone 90%	40% of mixture	Chemical locker	Nancy	Flammable
			Rabalais	
Potassium iodide	250 ml, 1 squirt	Lab cabinet	Nancy	Corrosive
0.01N	bottle		Rabalais	
Manganese sulfate	250 ml, 1 squirt	Lab cabinet	Nancy	Not HZ
-	bottle		Rabalais	
Thiosulfate titrant	2 50-ml bottles	Lab cabinet	Nancy	Not HZ
			Rabalais	
Saturated	20 ml	Located in Sci Van	Xinping Hu	Т
Mercuric Chloride				
(9%)				

#### C. Chemical safety and spill response procedures

#### A: ACID

- Wear appropriate protective equipment and clothing during clean-up. Keep upwind. Keep out of low areas.
- Ventilate closed spaces before entering them.
- Stop the flow of material, if this is without risk. Dike the spilled material, where this is possible.
- **Small Spills**: Wipe up with absorbent material (e.g. cloth, fleece). Clean surface thoroughly to remove residual contamination.
- Never return spills in original containers for re-use.
- Neutralize spill area with water.
- J. T. Baker NEUTRASORB® acid neutralizers are recommended for spills of this product.

#### F: Formalin/Formaldehyde

- Ventilate area of leak or spill. Remove all sources of ignition.
- Wear appropriate personal protective equipment.

- Isolate hazard area. Keep unnecessary and unprotected personnel from entering. Contain and recover liquid when possible.
- Use non-sparking tools and equipment. Collect liquid in an appropriate container or 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.

# **C: Contact Chemicals**

- Wear appropriate personal protective equipment.
- Disposal of gloves, kimwipes, used dmso/acetone tubes into ziplock storage bags for removal from ship for eventual chemical disposition at Louisiana State University.
- Dilute any spills with water and wipe up with paper towels. Store in ziplock storage bags for removal from ship for eventual chemical disposition at Louisiana State University.

# **T:** Toxic Chemicals

- Wear appropriate personal protective equipment.
- Secure area for holding samples.
- Store in a tightly closed container. Store in a cool, dry, well-ventilated.
- Disposal of gloves, kimwipes, used tubes into ziplock storage bags for removal from ship for eventual chemical disposition at Texas A&M University Corpus Christi.
- First Aid:

**Eyes:** Immediately flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower eyelids. Get medical aid immediately. **Skin:** Get medical aid immediately. Immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse.

**Ingestion:** If victim is conscious and alert, give 24 cupfuls of milk or water. Get medical aid immediately. Wash mouth out with water.

**Inhalation:** Get medical aid immediately. Remove from exposure and move to fresh air immediately. If not breathing, give artificial respiration. If breathing is difficult, give oxygen.

# **Flammable Chemicals**

- Wear appropriate personal protective equipment.
- Storage in chemical locker
- Minimal amounts in lab area in re-pipette for dispersal 5 ml at a time.

Product Name	Amount	Chemicals it is useful against	Amount it can clean up
Universal Spill	5 gallons	Fast response for emergency oil,	5 gallons
Kit		water-based and chemical liquid	
		spills	

# D. Radioactive Materials

No Radioactive Isotopes are planned for this project.

# V. Additional Projects

A. Supplementary ("Piggyback") Projects

No Supplementary Projects are planned.

C. NOAA Fleet Ancillary Projects

No NOAA Fleet Ancillary Projects are planned.

# VI. Disposition of Data and Reports

Disposition of data gathered aboard NOAA ships will conform to NAO 216-101 *Ocean Data Acquisitions* and NAO 212-15 *Management of Environmental Data and Information*. To guide the implementation of these NAOs, NOAA's Environmental Data Management Committee (EDMC) provides the *NOAA Data Documentation Procedural Directive* (data documentation) and *NOAA Data Management Planning Procedural Directive* (preparation of Data Management Plans). OMAO is developing procedures and allocating resources to manage OMAO data and Programs are encouraged to do the same for their Project data.

- A. Data Classifications: Under Development
  - a. OMAO Data
  - b. Program Data

Data requirements for NOAA NOS are for quality controlled/quality assured data with metadata be submitted to National Environmental Information Center, previously NOAA NODC (National Oceanic Data Center).

Chief Scientist will ask for all CTD data, jpg of CTD profiles, flow through data, ADCP data, and navigation data at the end of the cruise. Contact information for post-cruise issues with the data is requested.

B. Responsibilities: Under Development

# VII. Meetings, Vessel Familiarization, and Project Evaluations

A. <u>Pre-Project Meeting</u>: The Chief Scientist and Commanding Officer will conduct a meeting of pertinent members of the scientific party and ship's crew to discuss required equipment, planned operations, concerns, and establish mitigation strategies for all concerns. This meeting shall be conducted before the beginning of the project with sufficient time to allow for preparation of the ship and project personnel. The ship's Operations Officer usually is delegated to assist the Chief Scientist in arranging this meeting.

- B. <u>Vessel Familiarization Meeting</u>: The Commanding Officer is responsible for ensuring scientific personnel are familiarized with applicable sections of the standing orders and vessel protocols, e.g., meals, watches, etiquette, drills, etc. A vessel familiarization meeting shall be conducted in the first 24 hours of the project's start and is normally presented by the ship's Operations Officer.
- C. <u>Post-Project Meeting</u>: The Commanding Officer is responsible for conducted a meeting no earlier than 24 hrs before or 7 days after the completion of a project to discuss the overall success and short comings of the project. Concerns regarding safety, efficiency, and suggestions for future improvements shall be discussed and mitigations for future projects will be documented for future use. This meeting shall be attended by the ship's officers, applicable crew, the Chief Scientist, and members of the scientific party and is normally arranged by the Operations Officer and Chief Scientist.

### D. Project Evaluation Report

Within seven days of the completion of the project, a Customer Satisfaction Survey is to be completed by the Chief Scientist. The form is available at <u>http://www.omao.noaa.gov/fleeteval.html</u> and provides a "Submit" button at the end of the form. Submitted form data is deposited into a spreadsheet used by OMAO management to analyze the information. Though the complete form is not shared with the ships, specific concerns and praises are followed up on while not divulging the identity of the evaluator.

#### VIII. Miscellaneous

#### A. Meals and Berthing

The ship will provide meals for the scientists listed above. Meals will be served 3 times daily beginning one hour before scheduled departure, extending throughout the project, and ending two hours after the termination of the project. Since the watch schedule is split between day and night, the night watch may often miss daytime meals and will require adequate food and beverages (for example a variety of sandwich items, cheeses, fruit, milk, juices) during what are not typically meal hours. Special dietary requirements for scientific participants will be made available to the ship's command at least seven days prior to the project.

Berthing requirements, including number and gender of the scientific party, will be provided to the ship by the Chief Scientist. The Chief Scientist and Commanding Officer will work together on a detailed berthing plan to accommodate the gender mix of the scientific party taking into consideration the current make-up of the ship's complement. The Chief Scientist is responsible for ensuring the scientific berthing spaces are left in the condition in which they were received; for stripping bedding and linen return; and for the return of any room keys which were issued. The Chief Scientist is also responsible for the cleanliness of the laboratory spaces and the storage areas utilized by the scientific party, both during the project and at its conclusion prior to departing the ship.

All NOAA scientists will have proper travel orders when assigned to any NOAA ship. The Chief Scientist will ensure that all non NOAA or non-Federal scientists aboard also have proper orders.

It is the responsibility of the Chief Scientist to ensure that the entire scientific party has a mechanism in place to provide lodging and food and to be reimbursed for these costs in the event that the ship becomes uninhabitable and/or the galley is closed during any part of the scheduled project.

All persons boarding NOAA vessels give implied consent to comply with all safety and security policies and regulations which are administered by the Commanding Officer. All spaces and equipment on the vessel are subject to inspection or search at any time. All personnel must comply with OMAO's Drug and Alcohol Policy dated May 17, 2000 which forbids the possession and/or use of illegal drugs and alcohol aboard NOAA Vessels.

#### B. Medical Forms and Emergency Contacts

The NOAA Health Services Questionnaire (NHSQ, NF 57-10-01 (3-14)) must be completed in advance by each participating scientist. The NHSQ can be obtained from the Chief Scientist or the NOAA website <u>http://www.corporateservices.noaa.gov/noaaforms/eforms/nf57-10-01.pdf</u>.

All NHSQs submitted after March 1, 2014 must be accompanied by <u>NOAA Form (NF) 57-10-02</u> - Tuberculosis Screening Document in compliance with <u>OMAO Policy 1008</u> (Tuberculosis Protection Program).

The completed forms should be sent to the Regional Director of Health Services at the applicable Marine Operations Center. The NHSQ and Tuberculosis Screening Document should reach the Health Services Office no later than 4 weeks prior to the start of the project to allow time for the participant to obtain and submit additional information should health services require it, before clearance to sail can be granted. Please contact MOC Health Services with any questions regarding eligibility or completion of either form. Ensure to fully complete each form and indicate the ship or ships the participant will be sailing on. The participant will receive an email notice when medically cleared to sail if a legible email address is provided on the NHSQ.

The participant can mail, fax, or email the forms to the contact information below. Participants should take precautions to protect their Personally Identifiable Information (PII) and medical information and ensure all correspondence adheres to DOC guidance (http://ocio.os.doc.gov/ITPolicyandPrograms/IT\_Privacy/PROD01\_008240).

The only secure email process approved by NOAA is <u>Accellion Secure File Transfer</u> which requires the sender to setup an account. <u>Accellion's Web Users Guide</u> is a valuable aid in using this service, however to reduce cost the DOC contract doesn't provide for automatically issuing full functioning accounts. To receive access to a "Send Tab", after your Accellion account has been established send an email from the associated email account to accellionAlerts@doc.gov requesting access to the "Send Tab" function. They will notify you via email usually within 1 business day of your approval. The 'Send Tab" function will be accessible for 30 days.

Contact information:

Regional Director of Health Services Marine Operations Center – Atlantic 439 W. York Street Norfolk, VA 23510 Telephone 757-441-6320 Fax 757-441-3760 Email <u>MOA.Health.Services@noaa.gov</u>

Prior to departure, the Chief Scientist must provide an electronic listing of emergency contacts to the Executive Officer for all members of the scientific party, with the following information: contact name, address, relationship to member, and telephone number.

### C. Shipboard Safety

Hard hats are required when working with suspended loads. Work vests are required when working near open railings and during small boat launch and recovery operations. Hard hats and work vests will be provided by the ship when required.

Wearing open-toed footwear or shoes that do not completely enclose the foot (such as sandals or clogs) outside of private berthing areas is not permitted. At the discretion of the ship CO, safety shoes (i.e. steel or composite toe protection) may be required to participate in any work dealing with suspended loads, including CTD deployment and recovery. The ship does not provide safety-toed shoes/boots. The ship's Operations Officer should be consulted by the Chief Scientist to ensure members of the scientific party report aboard with the proper attire.

#### D. Communications

A progress report on operations prepared by the Chief Scientist may be relayed to the program office. Sometimes it is necessary for the Chief Scientist to communicate with another vessel, aircraft, or shore facility. Through various means of communications, the ship can usually accommodate the Chief Scientist. Special radio voice communications requirements should be listed in the project instructions. The ship's primary means of communication with the Marine Operations Center is via email and the Very Small Aperture Terminal (VSAT) link. Standard VSAT bandwidth at 128kbs is shared by all vessels staff and the science team at no charge. Increased bandwidth in 30 day increments is available on the VSAT systems at increased cost to the scientific party. If increased bandwidth is being considered, program accounting is required and it must be arranged through the ship's Commanding Officer at least 30 days in advance.

#### E. IT Security

Any computer that will be hooked into the ship's network must comply with the *OMAO Fleet IT Security Policy* 1.1 (November 4, 2005) prior to establishing a direct connection to the NOAA WAN. Requirements include, but are not limited to:

(1) Installation of the latest virus definition (.DAT) file on all systems and performance of a virus scan on each system.

- (2) Installation of the latest critical operating system security patches.
- (3) No external public Internet Service Provider (ISP) connections.

Completion of the above requirements prior to boarding the ship is required.

Non-NOAA personnel using the ship's computers or connecting their own computers to the ship's network must complete NOAA's IT Security Awareness Course within 3 days of embarking.

# F. Foreign National Guests Access to OMAO Facilities and Platforms

All foreign national access to the vessel shall be in accordance with NAO 207-12 and RADM De Bow's March 16, 2006 memo (<u>http://deemedexports.noaa.gov</u>). National Marine Fisheries Service personnel will use the Foreign National Registration System (FNRS) to submit requests for access to NOAA facilities and ships. The Departmental Sponsor/NOAA (DSN) is responsible for obtaining clearances and export licenses and for providing escorts required by the NAO. DSNs should consult with their designated Line Office Deemed Export point of contact to assist with the process.

Foreign National access must be sought not only for access to the ship involved in the project but also for any Federal Facility access (NOAA Marine Operations Centers, NOAA port offices, USCG Bases) that foreign nationals might have to traverse to gain access to and from the ship. The following are basic requirements.

Full compliance with NAO 207-12 is required.

Responsibilities of the Chief Scientist:

- 1. Provide the Commanding Officer with the email generated by the Servicing Security Office granting approval for the foreign national guest's visit. (For NMFS-sponsored guests, this email will be transmitted by FNRS.) This email will identify the guest's DSN and will serve as evidence that the requirements of NAO 207-12 have been complied with.
- 2. Escorts The Chief Scientist is responsible to provide escorts to comply with NAO 207-12 Section 5.10, or as required by the vessel's DOC/OSY Regional Security Officer.
- 3. Ensure all non-foreign national members of the scientific party receive the briefing on Espionage Indicators (NAO 207-12 Appendix A) at least annually or as required by the Servicing Security Office.
- 4. Export Control Ensure that approved controls are in place for any technologies that are subject to Export Administration Regulations (EAR).

The Commanding Officer and the Chief Scientist will work together to implement any access controls necessary to ensure no unlicensed export occurs of any controlled technology onboard regardless of ownership.

Responsibilities of the Commanding Officer:

- 1. Ensure only those foreign nationals with DOC/OSY clearance are granted access.
- 2. Deny access to OMAO platforms and facilities by foreign nationals from countries controlled for anti-terrorism (AT) reasons and individuals from Cuba or Iran without written approval from the Director of the Office of Marine and Aviation Operations and compliance with export and sanction regulations.
- 3. Ensure foreign national access is permitted only if unlicensed deemed export is not likely to occur.

- 4. Ensure receipt from the Chief Scientist or the DSN of the FNRS or Servicing Security Office email granting approval for the foreign national guest's visit.
- 5. Ensure Foreign Port Officials, e.g., Pilots, immigration officials, receive escorted access in accordance with maritime custom to facilitate the vessel's visit to foreign ports.
- 6. Export Control 8 weeks in advance of the project, provide the Chief Scientist with a current inventory of OMAO controlled technology onboard the vessel and a copy of the vessel Technology Access Control Plan (TACP). Also notify the Chief Scientist of any OMAO-sponsored foreign nationals that will be onboard while program equipment is aboard so that the Chief Scientist can take steps to prevent unlicensed export of Program controlled technology. The Commanding Officer and the Chief Scientist will work together to implement any access controls necessary to ensure no unlicensed export occurs of any controlled technology onboard regardless of ownership.
- 7. Ensure all OMAO personnel onboard receive the briefing on Espionage Indicators (NAO 207-12 Appendix A) at least annually or as required by the Servicing Security Office.

Responsibilities of the Foreign National Sponsor:

- 1. Export Control The foreign national's sponsor is responsible for obtaining any required export licenses and complying with any conditions of those licenses prior to the foreign national being provided access to the controlled technology onboard regardless of the technology's ownership.
- 2. The DSN of the foreign national shall assign an on-board Program individual, who will be responsible for the foreign national while on board. The identified individual must be a U.S. citizen and a NOAA or DOC employee. According to DOC/OSY, this requirement cannot be altered.
- 3. Ensure completion and submission of Appendix C (Certification of Conditions and Responsibilities for a Foreign National

# VIII. Appendices

- 1. Location of hypoxic bottom-water for the last several years.
- 2. Station/Waypoint List (coordinates in Latitude, Longitude: degree-minutes)
- 3. Protective measures and Best Management Practices to be incorporated into Cruise to ensure National Environmental Protection Act (NEPA) Compliance
- 4. MSDS forms





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# Bottom-Water Hypoxia (< 2mg/L) July, 2007 20,500 km<sup>2</sup>, 7900 mi<sup>2</sup>



Data source: N. N. Rabalais, Louisiana Universities Marine Consortium, and R. E. Turner, Louisiana State University Funding from: National Oceanic and Atmospheric Administration, Center for Sponsored Coastal Ocean Research



Data source: Nancy N. Rabalais, LUMCON, and R. Eugene Turner, LSU Funding sources: NOAA Center for Sponsored Coastal Ocean Research, U.S. EPA Gulf of Mexico Program, NOAA NOS via Northern Gulf Institute Data SUPPORT Federal/State Mississippi River Nutrient and Hypoxia Task Force

Trans	Sta	Depth(m)	Depth(ft)	Latitude	Longitude	Lat.dec	Long.dec	Descriptor
Х	1			28:54.70'N	89:25.60'W	28.9117	-90.4267	Off Southwest Pass; just inside
Х	2	52.0	173	28:50.46'N	89:29.02'W	28.8410	-90.4837	Off Southwest Pass
Х	3	90.0	300	28:45.58'N	89:32.00'W	28.7597	-90.5333	Off Southwest Pass
Y	1	23.0	77	28:58.00'N	89:28.50'W	28.9667	-89.4750	To West of Southwest Pass
Y	2	32.0	106	28:54.00'N	89:30.00'W	28,9000	-89,5000	To West of Southwest Pass
Ý	3	76.0	253	28:49.17'N	89:33.95'W	28.8195	-89.5658	To West of Southwest Pass
	•						00.0000	
Δ'	1	74	24	29.08 00'N	89·28 50'W	29 1333	-89 4750	Off Tiger Pass: also called 7
	2	10.6	3/	20:05 50'N	80·30 00'W	20.1000	-89 5000	Off Tiger Pass; also called Z
	2	12.6	/1	20:02:00'N	80·32 00'W	20.0317	-80 5333	Off Tiger Pass; also called Z
	5 1	33.5	100	28.50 00'N	89:34 00'W	29.0000	-89 5667	Off Tiger Pass; also called Z
	<del>4</del> 5	53.5	109	20.39.00 N	89.34.00 W	20.9000	90 5750	Off Tiger Pass, also called Z
	5	54.0 65.0	216	20.37.00 N	89.34.30 W	20.9000	-09.5750	Off Tiger Pass, also called Z
A	0	05.0	210	20.32.40 N	69.37.00 W	20.0733	-09.0107	Oli Tiger Pass, also called Z
L .	1	6.2	24	20.17 40.11	90.4E 001144	20.2000	90 7500	
	1	0.3	21	29:17.40 N	09:45.00 W	29.2900	-09.7500	Off Devetorie Devi
A	2	11.0	36	29:14.35 N	89:45.00 W	29.2392	-89.7500	Off Barataria Bay
A	3	15.7	51	29:10.70 <sup>°</sup> N	89:45.00 <sup>°</sup> W	29.1783	-89.7500	Off Barataria Bay; near WD32E
A	4	20.2	66	29:08.00 <sup>°</sup> N	89:45.00 <sup>°</sup> W	29.1333	-89.7500	Off Barataria Bay
A	5	29.6	96	29:04.20'N	89:45.00'W	29.0700	-89.7500	Off Barataria Bay
A	6	39.2	127	29:00.50'N	89:45.00'W	29.0083	-89.7500	Off Barataria Bay
A	7	47.8	155	28:56.50'N	89:45.00'W	28.9417	-89.7500	Off Barataria Bay
A	8	63.0	210	28:50.00'N	89:45.00'W	28.8333	-89.7500	Off Barataria Bay
A	9	81.0	270	28:45.00'N	89:45.00'W	28.7500	-89.7500	Off Barataria Bay
A	10	102.0	335	28:39.00'N	89:45.00'W	28.6500	-89.7599	Off Barataria Bay
CAM	INADA	CSI-9	15.0m	29:08'N	89:58'W			Off Caminada Pass
В	1	8.1	26	29:04.60'N	90:12.47'W	29.0767	-90.2078	Off Bell Pass, Port Fourchon
В	2	10.0	33	29:04.30'N	90:11.41'W	29.0717	-90.1902	Off Bell Pass, Port Fourchon
	Chevro	n BM 30						
B	3	12.2	40	29:02.80'N	90:09.80'W	29.0467	-90.1633	Off Bell Pass, Port Fourchon
	Chevro	n BM 3KN						
В	4	17.0	55	29:01.65'N	90:07.25'W	29.0275	-90.1208	Off Bell Pass, Port Fourchon
	Chevro	n GI 37Z						
В	5	16.2	53	29:01.25'N	90:06.35'W	29.0208	-90.1058	Off Bell Pass, Port Fourchon
	Chevro	n GI 37						
В	6	21.4	70	28:59.60'N	90:04.60'W	28.9933	-90.0767	Off Bell Pass, Port Fourchon
В	7	25.8	86	28:57.60'N	90:02.60'W	28.9600	-90.0433	Off Bell Pass, Port Fourchon
	Conoco	GI 48D						
В	8	29.7	97	28:55.45'N	90:01.90'W	28.9247	-90.0317	Off Belle Pass, Port Fourchon
В	9	37.9	123	28:50.00'N	90:00.00'W	28.8333	-90.0000	Off Belle Pass, Port Fourchon
В	10	49.1	162	28:46.00'N	89:56.00'W	28.7667	-89.9333	Off Belle Pass, Port Fourchon
В	10A	58.2	192	28:43.40'N	89:55.00'W	28.7233	-89.9166	Off Belle Pass, Port Fourchon
В	11	91.0	300	28:40.23'N	89:51.50'W	28.6705	-89.8583	Off Belle Pass, Port Fourchon
C.	1	6.5	21	29:03.40'N	90:31.90'W	29.0567	-90.5317	Off Cat Island Pass, Cocodrie
- -	2	7.6	25	29:01.20'N	90:29.67'W	29.0200	-90,4645	Off Cat Island Pass, Cocodrie
C C	3	10.6	35	28.59 44'N	90:31 25'W	28,9907	-90 5208	Off Cat Island Pass, Cocodrie
⊢ Ŭ	-			20.00. 111	55.51.20 11	_0.0007	00.0200	tie up
r l	34	11 1	36	28.56 454	90.32 005	28 9409	-90 5334	Off Cat Island Pass Cocodrie
Ĕ	57	11.1	50	20.00.404	50.52.005	20.0403	-30.3334	
- ^	1	12.1	13	28.57 00'N	00.31 46.14	28 0500	-00 5242	Off Cat Island Pass Coordina
	+	16.2	43	20.37.00 N	00.20 251M	20.9000	-30.0243	Off Cat Island Pass, Cocodria
	J	10.3	55	20.04.00 N	JO.29.00 VV	20.914/	-90.4092	Un Cal Island Fass, Cuculle

Trans	Sta	Depth(m)	Depth(ft)	Latitude	Longitude	Lat.dec	Long.dec	Descriptor
	KM ST	34 A & B						
С	5-ALT	15.5	51	28:54.55'N	90:29.40'W	28.9092	-90.4900	Off Cat Island Pass, Cocodrie
С	5-ALT	15.5	51	28:55.16'N	90:29.41'W	28.9193	-90.4902	Off Cat Island Pass, Cocodrie
С	6B	19.4	63	28:52.18'N	90:28.04'W	28.8697	-90.4673	Off Cat Island Pass, Cocodrie
	Hell II (t	oo) Station (	new moorin	g on N side);	UNOCAL ST	53 #3		
	Benthos	s 500 m to ea	ast of platfor	28:52.22'N	90:27.72'W	28.8703	-90.4620	Off Cat Island Pass, Cocodrie
С	6	20.2	62	28:51.44'N	90:27.68'W	28.8573	-90.4613	Off Cat Island Pass, Cocodrie
	Unocal	ST 53A & Au	JX.					
С	SP2			28:50.87'N	90:28.39'W	28.8478	-90.4715	Off Cat Island Pass, Cocodrie
	St 53#6							
С	6C	19.2	62	28:52.12'N	90:29.42'W	28.8686	-90.4903	Chevron/Texaco
	Hamme	rhead, Hell I	II (more so),	instruments of	on nw leg of c	uarters, Al	DCP 100 ft o	ff nw leg of quarters
С	6A	19.2	62	28:50.41'N	90:26.03'W	28.8402	-90.4338	Off Cat Island Pass, Cocodrie
	Hell Sta	tion, Unocal	ST53B (old	mooring; nov	v gone)			
	Benthos	S		28:50.23'N	90:26.26'W	28.8372	-90.4377	Off Cat Island Pass, Cocodrie
С	7	20.3	66	28:49.93'N	90:23.53'W	28.8322	-90.3922	Off Cat Island Pass, Cocodrie
	Exxon S	ST54A now g	one; ST540	in vicinity; S	St66D too far	offshore		
С	7anch			28:49.69'N	90:23.93'W	28.8282	-90.3988	Off Cat Island Pass, Cocodrie
	Anchor	stn position	0.25 mi. off	C7 to avoid h	ang			
С	7A	19.0	61	28:46.03'N	90:21.27'W	28.7672	-90.3545	Off Cat Island Pass, Cocodrie
C	SP1	20.0	66	28:51.06'N	90°22.31'W	28.8510	-90.3718	Off Cat Island Pass, Cocodrie
	ST55F							
C	8	23.5	76	28:47.30'N	90:16.60'W	28.7883	-90.2767	Off Cat Island Pass, Cocodrie
C	9 old	30.1	98	28:45.50'N	90:14.00'W	28.7583	-90.2333	Off Cat Island Pass, Cocodrie
	Odeco	ST86-3 now	gone					
C	9 new	30.6	100	28:45.95'N	90:13.16'W	28.7658	-90.2193	Off Cat Island Pass, Cocodrie
	Odeco	ST 86-0605 I	No. 20; 0.85	nmi farther to	o east			
С	9 nu nu	28.5	93	28:46.82'N	90:13.82'W	28.7803	-90.2303	Off Cat Island Pass, Cocodrie
С	9Q	28.2	93	28:47.743'N	90:13.847'w	28.7957	-90.2308	Off Cat Island Pass, Cocodrie
C	9B	33.2	108	28:44.50'N	90:12.00'W	28.7414	-90.2000	Off Cat Island Pass, Cocodrie
С	10B	35.8	117	28:43.20'N	90:10.00'W	28.7200	-90.1667	Off Cat Island Pass, Cocodrie
C	8A	24.6	82	28:44.00'N	90:19.50'N	28.7333	-90.3250	Off Cat Island Pass, Cocodrie
C	8AA	28.4	93	28:42.00'N	90:18.00'W	28.7000	-90.3000	Off Cat Island Pass, Cocodrie
C	11B	41.0	180	28:41.50'N	90:08.25'W	28.6917	-90.1375	Off Cat Island Pass, Cocodrie
C	9A	29.4	98	28:40.50'N	90:16.50'W	28.6750	-90.2750	Off Cat Island Pass, Cocodrie
C	9AA	38.8	129	28:38.00'N	90:15.00'W	28.6333	-90.2500	Off Cat Island Pass, Cocodrie
C	10	43.8	146	28:36.60'N	90:14.00'W	28.6100	-90.2333	Off Cat Island Pass, Cocodrie
C	10.1	44.5	136	28:36.13'N	90:14.53'W	28.6027	-90.2422	Off Cat Island Pass, Cocodrie
C	11	49.5	165	28:35.20'N	90:12.20'W	28.5867	-90.2033	Off Cat Island Pass, Cocodrie
D	0	10.0		00.40.04101	00.04.0004	00.0405	00 5077	Of Mine Island Deep
	0	19.2	62	28:48.81 N	90:31.66 W	28.8135	-90.5277	Off Wine Island Pass
יש	1	10.2	59	28:46.50 N	90:31.70 W	28.7750	-90.5283	Off Wine Island Pass
ם ש	2	17.7	57	28:43.00 N	90:31.72 W	20.7107	-90.5287	Off Wine Island Pass
ט ט	3	19.0	64	28:38.30 N	90:32.00 W	28.0417	-90.5333	Off Wine Island Pass
ים ש	JA 1	21.0	69	20.37.20 N	90.33.00 W	20.0200	-90.5500	Off Wine Island Pass
ים	4 501d	30.5		20.34.13 N	90.32.80 W	20.0092	-90.5407	Off Wine Island Pass
יח	5010	31.0	10	20.32.73 N	90.33.73 11	20.0400	-90.0020	Off Wine Island Pass
ע יח	6	<u> </u>	150	28.27 10'N	90.32.30 10	20.000	-00.5417	Off Wine Island Pase
ים יח	7	-+J.9 50 0	108	28.17 40'N	90.32 50'\//	28.4007	-90.5505	Off Wine Island Pass
	1	53.3	190	20.17.40 N	30.32.30 11	20.0074	-30.3470	
	<u> </u>							
п	0	6.5	21	29:00 90'N	90:50 00'W	29,0150	-90 8333	Off Isle Dernieres Shin Shoal
D	1	8.6	28	28:59.00'N	90:50.00'W	28,9833	-90.8333	Off Isle Dernieres Ship Shoal
	1N	10.5	34	28:56.50'N	90:50.00'W	28,9417	-90.8333	Off Isle Dernieres Ship Shoal
D	1A	5.5	18	28:53.50'N	90:50.00'W	28.8917	-90,8333	Off Isle Dernieres Ship Shoal
D	1B	10.0	33	28:52.09'N	90:50.00'W	28.8682	-90.8333	Off Isle Dernieres Ship Shoal

Trans	Sta	Depth(m)	Depth(ft)	Latitude	Longitude	Lat.dec	Long.dec	Descriptor
D	2	15.6	51	28:50.50'N	90:50.00'W	28.8417	-90.8333	Off Isle Dernieres Ship Shoal
D	2A	16.5	54	28:46.50'N	90:50.00'W	28.7750	-90.8333	Off Isle Dernieres Ship Shoal
D	3	17.6	57	28:43.00'N	90:50.00'W	28.7167	-90.8333	Off Isle Dernieres Ship Shoal
D	3A	16.0	52	28:39.50'N	90:50.00'W	28.6583	-90.8333	Off Isle Dernieres Ship Shoal
D	4	19.1	62	28:36.50'N	90:50.00'W	28.6083	-90.8333	Off Isle Dernieres Ship Shoal
D	4A	22.0	75	28:34.70'N	90:50.00'W	28.5783	-90.8333	Off Isle Dernieres Ship Shoal
 D	4 <b>B</b>	28.0	94	28:32 00'N	90:50 00'W	28 5333	-90 8333	Off Isle Dernieres Shin Shoal
D	5	32.9	107	28:30 00'N	90:50 00'W	28,5000	-90 8333	Off Isle Dernieres Ship Shoal
D	6	42.0	138	28:23 50'N	90:50 00'W	28.3917	-90 8333	Off Isle Dernieres Shin Shoal
D	7	65.0	213	28:15 98'N	90:50 00'W	28 2663	-90 8333	Off Isle Dernieres Shin Shoal
ם	8	75.0	216	28.13.00'N	90:50.00 W	20.2000	-00.8333	Off Isle Dernieres Ship Shoal
	0	75.0	240	20.10.001	50.50.00 W	20.2107	-30.0000	
-	1	65	21	20.50 00'N	01.15 00'\//	20 0667	01 2500	Off Point ou For Icl. Fourloogue Pov
	1	6.0	21	20.30.00 N	91.15.00 W	20.9007	-91.2500	Off Point au Fer Isl., Fourleague Bay
	1A 0	0.0	22	28:55.10 N	91:15.00 W	20.9103	-91.2500	Off Point au Fer Isl., Fourleague Bay
	2	0.4	27	28:51.50 N	91:15.00 W	28.8583	-91.2500	Off Point au Fer Isl., Fourleague Bay
E	2A	15.3	50	28:44.50 N	91:15.00 W	28.7417	-91.2500	Off Point au Fer Isl., Fourleague Bay
E	3	22.0	72	28:39.50 N	91:15.00 <sup>°</sup> W	28.6583	-91.2500	Off Point au Fer Isl., Fourleague Bay
E	4	30.0	98	28:35.00'N	91:15.00'W	28.5833	-91.2500	Off Point au Fer Isl., Fourleague Bay
E	5	41.0	133	28:29.00'N	91:15.00'W	28.4833	-91.2500	Off Point au Fer Isl., Fourleague Bay
E	5A	45.7	150	28:24.50'N	91:15.00'W	28.4083	-91.2500	Off Point au Fer Isl., Fourleague Bay
E	6	55.8	186	28:22.50'N	91:15.00'W	28.3750	-91.2500	Off Point au Fer Isl., Fourleague Bay
E	7	54.5	240	28:15.40'N	91:15.00'W	28.2567	-91.2500	Off Point au Fer Isl., Fourleague Bay
E	7A	87.2	288	28:10.70'N	91:15.00'W	28.1783	-91.2500	Off Point au Fer Isl., Fourleague Bay
E	7B	108.9	360	28:05.70'N	91:15.00'W	28.0950	-91.2500	Off Point au Fer Isl., Fourleague Bay
E	8	118.0	390	28:00.00'N	91:15.00'W	28.0000	-91.2500	Off Point au Fer Isl., Fourleague Bay
F	0	6.5	21	29:16.40	91:37.00'W	29.2733	-91.616667	Off Atchafalaya Bay
F	1	7.9	26	29:11.00'N	91:37.00'W	29.1833	-91.6167	Off Atchafalaya Bay
F	2	8.4	27	29:03.00'N	91:37.00'W	29.0500	-91.6167	Off Atchafalaya Bay
F	2A	15.1	49	28:56.89'N	91:34.73'W	28.9482	-91.578833	Off Atchafalaya Bay
F	3	19.6	64	28:53.00'N	91:37.00'W	28.8833	-91.6167	Off Atchafalaya Bay
F	4	24.2	79	28:47.00'N	91:37.00'W	28.7833	-91.6167	Off Atchafalaya Bay
F	5	29.0	94	28:41.50'N	91:37.00'W	28.6917	-91.6167	Off Atchafalaya Bay
F	6	38.8	126	28:35.00'N	91:37.00'W	28.5833	-91.6167	Off Atchafalaya Bay
F	7	51.2	186	28:27.00'N	91:37.00'W	28.4500	-91.6167	Off Atchafalaya Bay
F	8	71.0	216	28:10.80'N	91:37.00'W	28.1800	-91.6167	Off Atchafalaya Bay
G	1	8.5	28	29:15.50'N	92:00.00'W	29.2583	-92.0000	Off Vermilion Bay, Marsh Island
G	2	11.6	38	29:08.00'N	92:00.00'W	29.1333	-92.0000	Off Vermilion Bay, Marsh Island
G	3	20.6	67	28:59.00'N	92:00.00'W	28.9833	-92.0000	Off Vermilion Bay, Marsh Island
G	4	24.6	80	28:54.00'N	92:00.00'W	28.9000	-92.0000	Off Vermilion Bay, Marsh Island
G	5	29.7	99	28:47.50'N	92:00.00'W	28.7917	-92.0000	Off Vermilion Bay, Marsh Island
G	5A	33.2	109	28:44.40'N	92:00.00'W	28,7400	-92.0000	Off Vermilion Bay, Marsh Island
G	6	35.0	117	28:40.50'N	92:00.00'W	28.6750	-92.0000	Off Vermilion Bay, Marsh Island
G	6A	42.0	138	28:34.75'N	92:00.00'W	28,5792	-92,0000	Off Vermilion Bay, Marsh Island
G	7	48.0	144	28:32.12'N	92:00.00'W	28.5353	-92.0000	Off Vermilion Bay, Marsh Island
G	8	56.0	168	28:27.88'N	92:00.00'W	28.4646	-92,0000	Off Vermilion Bay, Marsh Island
- J	-	00.0						
н	0	6.0	18	29.29 50'N	92.23 00'\//	29 41 96	-02 2823	Off White Lake
<u>н</u>	1	93	30	29.24 50'N	92.23 00'\//	29 4083	-92 3833	Off White Lake
н	2	8.0	26	29.18 50'N	92.23.00 1	20.7000	-02 3833	Off White Lake
	<u>-</u> 2∆	73	20	20.10.00 N	92.23.00 W	20.0000	-02 3833	Off White Lake
	2	11.5	<u> </u>	20.00 E0'N	92.23.00 W	20.2000	-92.0000	
<u>п</u>	3	14.0	4/	29.09.00 N	92.23.00 W	29.1003	-92.3033	
I 11	4	22.0	/4	∠9.02.00 N	ສ∠.∠ <b>ວ.</b> ∪∪ ۷۷	∠ઝ.∪ఎఎఎ	-92.0000	

Trans	Sta	Depth(m)	Depth(ft)	Latitude	Longitude	Lat.dec	Long.dec	Descriptor
Н	4A	25.3	82	28:58.40'N	92:23.00'W	28.9733	-92.3833	Off White Lake
Н	5	28.3	93	28:54.50'N	92:23.00'W	28.9083	-92.3833	Off White Lake
Н	6	32.5	106	28:47.20'N	92:23.00'W	28.7750	-92.3833	Off White Lake
н	7	36.6	120	28:39.40'N	92:23.00'W	28.6567	-92.3833	Off White Lake
Н	8	51.0	168	28:31 00'N	92·23 00'W	28 5167	-92 3833	Off White Lake
	•	0110	100	20.01.0011	02.20.00 11	2010101	02.0000	
	0	5.5	10	20.24 50'N	02:45 00'\//	20 5750	02 7500	Off Grand Laka
1	4	5.5 10.9	10	29.34.30 N	92.45.00 W	29.5750	-92.7500	Off Grand Lake
	1	10.8	35	29:32.00 N	92:45.00 W	29.5330	-92.7500	
I	1A	13.0	43	29:27.80 <sup>°</sup> N	92:45.00 W	29.4633	-92.7500	Off Grand Lake
I	2	15.0	49	29:24.50'N	92:45.00'W	29.4083	-92.7500	Off Grand Lake
I	3	17.5	57	29:17.70'N	92:45.00'W	29.2950	-92.7500	Off Grand Lake
I	4	20.6	67	29:10.50'N	92:45.00'W	29.1750	-92.7500	Off Grand Lake
	5	24.6	80	29:03.00'N	92:45.00'W	29.0500	-92.7500	Off Grand Lake
I	6	27.1	88	28:53.50'N	92:45.00'W	28.8917	-92.7500	Off Grand Lake
	7	31.1	101	28:45.50'N	92:45.00'W	28.7583	-92.7500	Off Grand Lake
I	8	35.1	117	28:38.50'N	92:45.00'W	28.6417	-92.7500	Off Grand Lake
I	9	45.4	150	28:28.00'N	92:45.00'W	28.4667	-92.7500	Off Grand Lake
I	0	57	18	29.43 64'N	93·05 00'W	29 7273	-93 0833	Off Creole
<b>J</b>	1	10.0	33	20:38 00'N	93:05 00'W	20.7270	-93 0833	Off Creole
U	2	13.3	43	20:30 50'N	03:05.00'W	20.0000	-03.0000	Off Croolo
J 1	2	15.5	43 50	29.30.30 N	93.05.00 W	29.3003	-93.0033	Off Creele
J	3	17.4	50	29.23.30 N	93.05.00 W	29.3917	-93.0633	Off Creele
J	4	17.0	50	29.17.30 N	93.05.00 W	29.2917	-93.0633	
J	4A 5	18.0	55	29:12.30 N	93:05.00 W	29.2050	-93.0833	
J	5	20.2	66	29:07.00 <sup>°</sup> N	93:05.00 <sup>°</sup> W	29.1167	-93.0833	Off Creole
J	6	23.9	80	28:58.00'N	93:05.00'W	28.9667	-93.0833	Off Creole
J	6A	23.8	78	28:53.00'N	93:05.00'W	28.6500	-93.0833	Off Creole
J	7	28.2	92	28:48.00'N	93:05.00'W	28.8000	-93.0833	Off Creole
J	8	32.9	108	28:39.00'N	93:05.00'W	28.6500	-93.0833	Off Creole
J	9	43.6	144	28:27.70'N	93:05.00'W	28.4611	-93.0833	Off Creole
J	10			28:44.00'N	93:05.00W			
K	1	6.5	21	29:42.40'N	93:25.00'W	29.7067	-93.4167	Off Cameron
K	2	10.6	34	29:38.50'N	93:25.00'W	29.6417	-93.4167	Off Cameron
К	3	11.3	37	29:29.30'N	93:25.00'W	29.4883	-93.4167	Off Cameron
K	4	16.8	55	29:19.50'N	93:25.00'W	29.3250	-93,4167	Off Cameron
K	44	14 0	47	29.14 50'N	93·25 00'W	29 2417	-93 4167	Off Cameron (closer to M4A)
ĸ	5	18.5	60	29:10 00'N	93:25 00'W	29 1667	-93 4167	Off Cameron
ĸ	6	24.7	80	29:00 00'N	93·25 00'W	29,0000	-93 4167	Off Cameron
ĸ	7	25.7	84	28:40 00'N	03:25 00'W	29.0000	-03 4167	Off Cameron
ĸ	7 Q	20.7	04	28:42.00 N	93.25.00 W	28,7000	-03 /167	Off Cameron
	0	29.7	122	20.42.00 N	93.25.00 W	20.7000	-93.4107	Off Cameron
N K	9	41.9	132	20.30.20 N	93.25.00 W	20.0000	-93.4107	
n	10	50.8	100	28:24.20 N	93:25.00 W	28.4033	-93.4167	On Cameron
M	1	6.3	21	29:42.00'N	93:39.30'W	29.7000	-93.6550	Off Sabine to E
M	2	10.8	36	29:35.80'N	93:37.75'W	29.5967	-93.6292	Off Sabine to E
М	3	11.7	39	29:27.00'N	93:36.20'W	29.4500	-93.6033	Off Sabine to E
М	4	10.8	36	29:20.00'N	93:34.70'W	29.3333	-93.5783	Off Sabine to E
М	4A	13.5	44	29:15.01'N	93:33.59'W	29.2502	-93.5598	Off Sabine to E
Μ	5	18.0	60	29:09.50'N	93:32.50'W	29.1583	-93.5417	Off Sabine to E
М	6	24.0	78	29:00.17'N	93:31.19'W	29.0028	-93.5198	Off Sabine to E
М	7	24.1	78	28:49.23'N	93:31.55'W	28.8205	-93.5258	Off Sabine to E
Р	1	6.8	22	29:37 00'N	94:04 00'W	29.6167	-94,0667	Off Sabine to W
•		0.0		-0.07.0011			01.0007	

Trans	Sta	Depth(m)	Depth(ft)	Latitude	Longitude	Lat.dec	Long.dec	Descriptor
Р	2	10.8	36	29:31.00'N	94:01.00'W	29.5167	-94.0167	Off Sabine to W
Р	3	11.7	38	29:25.50'N	93:58.00'W	29.4250	-93.9667	Off Sabine to W
Р	4	14.1	46	29:18.00'N	93:54.00'W	29.3000	-93.9000	Off Sabine to W
Р	5	17.8	58	29:10.00'N	93:49.70'W	29.1667	-93.8283	Off Sabine to W
Р	6	20.3	66	29:00.11'N	93:42.60'W	29.0018	-93.71	Off Sabine to W
R	1	10.0	33	29:27.50'N	94:10.50'W	29.4583	-94.1750	W to E along 10-m contour
R	2	10.0	33	29:33.00'N	93:52.00'W	29.5500	-93.8667	W to E along 10-m contour
R	3	10.0	33	29:37.00'N	93:32.00'W	29.6167	-93.5333	W to E along 10-m contour
R	4	10.0	33	29:39.30'N	93:22.50'W	29.6550	-93.3750	W to E along 10-m contour
R	5	10.0	33	29:39.40'N	93:15.50'W	29.6567	-93.2583	W to E along 10-m contour
	-							
Q	1	?	?	29:31.32'N	94:13.87'W	29.5220	-94.2312	Near High Island
Q	2	?	?	29:27.64'N	94:06.46'W	29.4607	-94.1077	Near High Island
Q	3	12.8	42	29:22.23'N	94:06.40'W	29.3705	-94.1067	Near High Island
0 0	4	14.5	47	29:16.28'N	94:03.60'W	29.2713	-94 0600	Near High Island
с О	5	17.2	56	29:10.56'N	93:59 99'W	29.176	-94,0000	Near High Island
, 0	6	19.8	64	28:59.97'N	93:55.72'W	28 9995	-93 9287	Near High Island
	-		•••			_3.0000	30.0201	
S	1	9.5	30	29:31.80'N	94:16.20'W	29,5300	-94,2700	Off High Island
S	2	12.4	39	29.27 50'N	94.14 50'W	29 4583	-94 2417	Off High Island
S	3	14.3	45	29:21 00'N	94·10 50'W	29,3500	-94 1750	Off High Island
S	4	15.2	48	29:15 00'N	94·07 20'W	29 2500	-94 1200	Off High Island
s	5	17.2	54	29:09 50'N	94:04 50'W	29 1583	-94 0750	Off High Island
s	6	21.0	66	29:00.00'N	93·57 20'W	29,0000	-93 9533	Off High Island
S	7	21.0	72	28:49 00'N	93:51 50'W	28.8167	-93 8583	Off High Island
s	8	28.6	90	28:41 00'N	93:46 00'W	28 6833	-93 7667	Off High Island
s	9	41.0	126	28:30 20'N	93·40 00'W	28 5033	-93 6667	Off High Island
•	5	41.0	120	20.00.2011	30.40.00 W	20.0000	55.5557	
т	1	13.3	42	29.12.00'N	94·45 50'W	29 2000	-94 7833	Off Galveston
T	2	17.1	54	29.06 80'N	94·37 70'W	29 1133	-94 6283	Off Galveston
T	3	18.1	57	29:01 00'N	94:31 00'W	29 0167	-94 5167	Off Galveston
T	4	19.1	60	28:55.20'N	94:23.00'W	28,9200	-94.3833	Off Galveston
T	5	22.2	70	28:50 60'N	94·18 00'W	28 8433	-94 3000	Off Galveston
т	6	26.7	84	28:44 19'N	94·10 70'W	28 7365	-94 1783	Off Galveston
T	7	30.5	96	28.40 00'N	94.05 40'W	28 6667	-94 0900	Off Galveston
T	8	34.3	108	28:34 50'N	94.00 00'W	28 5750	-94 0000	Off Galveston
T	9	40.0	126	28·29 12'N	93:55 66'W	28 4853	-93 9277	Off Galveston
	•					_0000	00.0211	
ד'	3	20.0	63	28 56 25'N	94·32 90'W	28 9375	-94 5488	Off Galveston
T'	4	17.4	55	28:54 28'N	94·28 52'W	28 9047	-94 4753	Off Galveston
T'	5	23.3	74	28:51 70'N	94·26 10'W	28 8617	-94 4350	Off Galveston
•	•	20.0		20.01.7011	01.20.10 11	20.0017	01.1000	
U	1	13.0	42	29:02 70'N	94:58 30'W	29.0450	-94,9717	Off W Galveston Island
1	2	19.1	63	28:57 00'N	94:54 00'W	28,9500	-94 9000	Off W Galveston Island
1	3	20.0	66	28:50 00'N	94:49 11'W	28,8333	-94 8185	Off W Galveston Island
1	4	23.6	78	28:43 50 N	94.43 00'\//	28 7250	-94 7167	Off W Galveston Island
- U	5	30.0	99	28:37 80'N	94:38 30'W	28.6300	-94,6383	Off W Galveston Island
1	6	35.4	117	28:31 20'N	94:32 90·W	28,5200	-94 5483	Off W Galveston Island
1	7	41.8	138	28:24 70'N	94·27 50'W	28 4117	-94 4583	Off W Galveston Island
1	8	47.2	156	28:18 50 N	94:22 60'W	28,3083	-94 3767	Off W Galveston Island
			100	20.10.00,1	5 1.22.00 W	_0.0000	01.0707	
v	1	11.8	39	28:47 75'N	95:18 55'W	28,7955	-95,3092	Off Freeport
V	. 2	21.8	72	28:40 75'N	95·15 50'W	28 6797	-95 2583	Off Freeport
V V	<b>-</b>	21.0	14	20.70.70 N	00.10.00 W	20.0131	JJ.2000	

Trans	Sta	Depth(m)	Depth(ft)	Latitude	Longitude	Lat.dec	Long.dec	Descriptor
V	3	27.2	90	28:32.20'N	95:11.20'W	28.5367	-95.1867	Off Freeport
V	4	32.7	108	28:24.10'N	95:05.20'W	28.4017	-95.0867	Off Freeport
V	5	38.1	126	28:16.40'N	94:59.45'W	28.2733	-94.9908	Off Freeport
V	6			28:08.966'N	94:54.685'W	28.1494	-94.9114	Off Freeport
W	1			28:37.857'N	95:42.427'W	28.6310	-95.7071	off East Matagorda Bay
W	2			28:30.586'N	95:38.661'W	28.5098	-95.6444	off East Matagorda Bay
W	3			28:23.930'N	95:34.896'W	28.3988	-95.5812	off East Matagorda Bay
W	4			28:16.985'N	95:30.073'W	28.2831	-95.5012	off East Matagorda Bay
W	5			28:09.878'N	95:25.958'W	28.1646	-95.4326	off East Matagorda Bay
W	6			28:02.877'N	95:22.658'W	28.0479	-95.2776	off East Matagorda Bay
Х	1			28:28.993'N	96:05.049'W	28.4832	-96.0842	Off Matagorda Bay
Х	2			28:22.810'N	96:01.345'W	28.3802	-96.0224	Off Matagorda Bay
Х	3			28:16.256'N	95:58.054'W	28.2709	-96.9676	Off Matagorda Bay
Х	4			28:08.966'N	95:55.173'W	28.1494	-96.9196	Off Matagorda Bay
Х	5			28:01.667'N	95:51.058'W	28.0278	-95.8510	Off Matagorda Bay
Х	6			27:54.726'N	95:46.943'W	27.9121	-95.7824	Off Matagorda Bay
Y	1			28:16.984'N	96:25.623'W	28.2831	-96.4377	Off Palacios Bay
Y	2			28:10.789'N	96:21.097'W	28.1798	-96.3516	Off Palacios Bay
Y	3			28:04.547'N	96:17.257'W	28.0758	-96.2876	Off Palacios Bay
Y	4			27:59.953'N	96:13.727'W	27.9992	-96.2288	Off Palacios Bay
Y	5			27:52.011'N	96:09.962'W	27.8669	-96.1660	Off Palacios Bay
Y	6			27:46.571'N	96:06.196'W	27.7761	-96.1033	Off Palacios Bay



UNITED STATES DEPARTMENT OF COMMERCE National Oceanic and Atmospheric Administration NATIONAL OCEAN SERVICE National Centers for Coastal Ocean Science Silver Spring, Maryland 20910

# Protective Measures and Best Management Practices Incorporated into the Action

The following protective measures and BMPs will be incorporated into the cruise plan and are listed below. These include all applicable BMPs set forth by DUSO VADM Michael Devany's memo of August 22, 2014, concerning entanglement measures and habitat impact precautions.

- 1. Minimize vessel disturbance and ship strike potential
  - a. Reduced speeds (<13 knots) when transiting through ranges of ESA-listed cetaceans (unless otherwise required, e.g., NOAA Sanctuaries)
  - Reduced speeds (<13 knots) while transiting through designated critical habitat (unless slower speeds are required, e.g., < 10 knots in Right Whale critical habitat and management areas)
  - c. Trained observers aboard all vessels; 100% observer coverage
  - d. Species identification keys (for marine mammals, sea turtles, as applicable) will be available on all vessels
- 2. Minimize noise
  - a. Reduced speed (see above)
  - b. Multibeam surveys using  $\geq$  50 kHz frequencies, lowest possible power and ping-rate
  - c. Single beam surveys using ≥ 30 kHz frequencies, lowest possible power and ping-rate, and 12° beam angle.
  - d. Reduce use of active acoustics as much as possible. Active acoustic sources should be used only when required for navigation or data collection and should be used at the lowest source level and highest frequency available that is suitable for the purpose.
- 3. <u>Minimize vessel discharges</u> (including aquatic nuisance species)
  - a. Meet all EPA Vessel General Permits and Coast Guard requirements.
  - b. Avoid discharge of ballast water in designated critical habitat.
  - c. Use anti-fouling coatings.
  - d. Clean hull regularly to remove aquatic nuisance species.
  - e. Avoid cleaning of hull in critical habitat.
  - f. Avoid cleaners with nonylphenols.
  - g. Rinse anchor with high-powered hose after retrieval.
- 4. Minimize anchor impact to corals, seagrass or other EFH



- a. Use designated anchorage area when available
- b. Use mapping data to anchor in mud or sand, to avoid anchoring on corals
- c. Avoid anchoring in seagrass critical habitat
- d. Minimize anchor drag
- 5. Avoid collecting bottom samples in seagrass critical habitat
  - a. There will be no sample collections of any kind conducted during this cruise

# 6. Cetaceans

- a. Avoid approaching within 200 yards (182.9 m), 500 yards for Right Whales.
- b. Avoid critical habitat, when possible.
- 7. Sea Turtles and Manatees
  - a. Avoid approaching within 50 yards.
- 8. Entanglement Protective Measures
  - a. Use stiffer line materials for towing and keep taut during operations to reduce potential for entanglement
  - b. Reduce knots in the line as much as possible
  - c. Clearly mark lines in the event an animal does become entangled so that NMFS experts can identify the gear.
- 9. Habitat Protection
  - a. Avoid contact of gear, towed or lowered, with the sensitive bottom habitat (e.g. submerged aquatic vegetation (SAV) and hard bottom)





Personal Protection	H
Reactivity	0
Fire	3
Health	2

# Material Safety Data Sheet Acetone MSDS

# Section 1: Chemical Product and Company Identification

Product Name: Acetone

Catalog Codes: SLA3502, SLA1645, SLA3151, SLA3808

CAS#: 67-64-1

RTECS: AL3150000

TSCA: TSCA 8(b) inventory: Acetone

Cl#: Not applicable.

**Synonym:** 2-propanone; Dimethyl Ketone; Dimethylformaldehyde; Pyroacetic Acid

Chemical Name: Acetone

Chemical Formula: C3-H6-O

#### **Contact Information:**

Sciencelab.com, Inc. 14025 Smith Rd. Houston, Texas 77396

US Sales: 1-800-901-7247 International Sales: 1-281-441-4400

Order Online: ScienceLab.com

CHEMTREC (24HR Emergency Telephone), call: 1-800-424-9300

International CHEMTREC, call: 1-703-527-3887

For non-emergency assistance, call: 1-281-441-4400

# Section 2: Composition and Information on Ingredients

Composition:

Name	CAS #	% by Weight
Acetone	67-64-1	100

Toxicological Data on Ingredients: Acetone: ORAL (LD50): Acute: 5800 mg/kg [Rat]. 3000 mg/kg [Mouse]. 5340 mg/kg [Rabbit]. VAPOR (LC50): Acute: 50100 mg/m 8 hours [Rat]. 44000 mg/m 4 hours [Mouse].

# Section 3: Hazards Identification

#### **Potential Acute Health Effects:**

Hazardous in case of skin contact (irritant), of eye contact (irritant), of ingestion, of inhalation. Slightly hazardous in case of skin contact (permeator).

#### **Potential Chronic Health Effects:**

CARCINOGENIC EFFECTS: A4 (Not classifiable for human or animal.) by ACGIH. MUTAGENIC EFFECTS: Not available. TERATOGENIC EFFECTS: Not available. DEVELOPMENTAL TOXICITY: Classified Reproductive system/toxin/female, Reproductive system/toxin/male [SUSPECTED]. The substance is toxic to central nervous system (CNS). The substance may be toxic to kidneys, the reproductive system, liver, skin. Repeated or prolonged exposure to the substance can produce target regans damage.

# Section 4: First Aid Measures

# Eye Contact:

Check for and remove any contact lenses. Immediately flush eyes with running water for at least 15 minutes, keeping eyelids open. Cold water may be used. Get medical attention.

#### kin 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 medical attention.

#### Inhalation:

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

#### Serious Inhalation:

Evacuate the victim to a safe area as soon as possible. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, administer oxygen. If the victim is not breathing, perform mouth-to-mouth resuscitation. Seek medical attention.

#### Ingestion:

Do NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. Loosen tight clothing such as a collar, tie, belt or waistband. Get medical attention if symptoms appear.

Serious Ingestion: Not available.

# Section 5: Fire and Explosion Data

Tlammability of the Product: Flammable.

Auto-Ignition Temperature: 465°C (869°F)

Flash Points: CLOSED CUP: -20°C (-4°F). OPEN CUP: -9°C (15.8°F) (Cleveland).

Flammable Limits: LOWER: 2.6% UPPER: 12.8%

Products of Combustion: These products are carbon oxides (CO, CO2).

Fire Hazards in Presence of Various Substances: Highly flammable in presence of open flames and sparks, of heat.

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

Risks of explosion of the product in presence of mechanical impact: Not available. Slightly explosive in presence of open flames and sparks, of oxidizing materials, of acids.

#### **Fire Fighting Media and Instructions:**

Flammable liquid, soluble or dispersed in water. SMALL FIRE: Use DRY chemical powder. LARGE FIRE: Use alcohol foam, water spray or fog.

Special Remarks on Fire Hazards: Vapor may travel considerable distance to source of ignition and flash back.

#### **Special Remarks on Explosion Hazards:**

Forms explosive mixtures with hydrogen peroxide, acetic acid, nitric acid, nitric acid + sulfuric acid, chromic anydride, chromyl chloride, nitrosyl chloride, hexachloromelamine, nitrosyl perchlorate, nitryl perchlorate, permonosulfuric acid, thiodiglycol + hydrogen peroxide, potassium ter-butoxide, sulfur dichloride, 1-methyl-1,3-butadiene, bromoform, carbon, air, chloroform, thitriazylperchlorate.

# Section 6: Accidental Release Measures

#### Small Spill:

Dilute with water and mop up, or absorb with an inert dry material and place in an appropriate waste disposal container.

#### Large Spill:

Flammable liquid. Keep away from heat. Keep away from sources of ignition. Stop leak if without risk. Absorb with DRY earth, sand or other non-combustible material. Do not touch spilled material. Prevent entry into sewers, basements or confined areas; dike if needed. 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:

Keep locked up.. Keep away from heat. Keep away from sources of ignition. Ground all equipment containing material. Do not ingest. Do not breathe gas/fumes/ vapor/spray. Wear suitable protective clothing. 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. Keep away from incompatibles such as oxidizing agents, reducing agents, acids, alkalis.

#### Storage:

Store in a segregated and approved area (flammables area). Keep container in a cool, well-ventilated area. Keep container tightly closed and sealed until ready for use. Keep away from direct sunlight and heat and avoid all possible sources of ignition (spark or flame).

#### Section 8: Exposure Controls/Personal Protection

#### Engineering Controls:

Provide exhaust ventilation or other engineering controls to keep the airborne concentrations of vapors below their respective threshold limit value. Ensure that eyewash stations and safety showers are proximal to the work-station location.

#### **Personal Protection:**

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

#### ersonal Protection in Case of a Large Spill:

Splash goggles. Full suit. Vapor 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: 500 STEL: 750 (ppm) from ACGIH (TLV) [United States] TWA: 750 STEL: 1000 (ppm) from OSHA (PEL) [United States] TWA: 500 STEL: 1000 [Austalia] TWA: 1185 STEL: 2375 (mg/m3) [Australia] TWA: 750 STEL: 1500 (ppm) [United Kingdom (UK)] TWA: 1810 STEL: 3620 (mg/m3) [United Kingdom (UK)] TWA: 1800 STEL: 2400 from OSHA (PEL) [United States]Consult local authorities for acceptable exposure limits.

# **Section 9: Physical and Chemical Properties**

Physical state and appearance: Liquid.

Odor: Fruity. Mint-like. Fragrant. Ethereal

Taste: Pungent, Sweetish

Molecular Weight: 58.08 g/mole

Color: Colorless. Clear

pH (1% soln/water): Not available.

Boiling Point: 56.2°C (133.2°F)

1eiting Point: -95.35 (-139.6°F)

Critical Temperature: 235°C (455°F)

Specific Gravity: 0.79 (Water = 1)

Vapor Pressure: 24 kPa (@ 20°C)

Vapor Density: 2 (Air = 1)

folatility: Not available.

dor Threshold: 62 ppm

Water/Oil Dist. Coeff.: The product is more soluble in water; log(oil/water) = -0.2

Ionicity (in Water): Not available.

Dispersion Properties: See solubility in water.

Solubility: Easily soluble in cold water, hot water.

# Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Excess heat, ignition sources, exposure to moisture, air, or water, incompatible materials.

**Acompatibility with various substances:** Reactive with oxidizing agents, reducing agents, acids, alkalis.

Sorrosivity: Non-corrosive in presence of glass.

Special Remarks on Reactivity: Not available.

Special Remarks on Corrosivity: Not available.

Polymerization: Will not occur.

# Section 11: Toxicological Information

Routes of Entry: Absorbed through skin. Dermal contact. Eye contact. Inhalation.

#### **Toxicity to Animals:**

WARNING: THE LC50 VALUES HEREUNDER ARE ESTIMATED ON THE BASIS OF A 4-HOUR EXPOSURE. Acute oral toxicity (LD50): 3000 mg/kg [Mouse]. Acute toxicity of the vapor (LC50): 44000 mg/m3 4 hours [Mouse].

#### **Chronic Effects on Humans:**

ARCINOGENIC EFFECTS: A4 (Not classifiable for human or animal.) by ACGIH. DEVELOPMENTAL TOXICITY: Classified Reproductive system/toxin/female, Reproductive system/toxin/male [SUSPECTED]. Causes damage to the following organs: central nervous system (CNS). May cause damage to the following organs: kidneys, the reproductive system, liver, skin.

#### Other Toxic Effects on Humans:

Hazardous in case of skin contact (irritant), of ingestion, of inhalation. Slightly hazardous in case of skin contact (permeator).

Special Remarks on Toxicity to Animals: Not available.

#### Special Remarks on Chronic Effects on Humans:

May affect genetic material (mutagenicity) based on studies with yeast (S. cerevisiae), bacteria, and hamster fibroblast cells. May cause reproductive effects (fertility) based upon animal studies. May contain trace amounts of benzene and formaldehyde which may cancer and birth defects. Human: passes the placental barrier.

#### Special Remarks on other Toxic Effects on Humans:

Acute Potential Health Effects: Skin: May cause skin irritation. May be harmful if absorbed through the skin. Eyes: Causes eye irritation, characterized by a burning sensation, redness, tearing, inflammation, and possible corneal injury. Inhalation: phalation at high concentrations affects the sense organs, brain and causes respiratory tract irritation. It also may affect the entral Nervous System (behavior) characterized by dizzness, drowsiness, confusion, headache, muscle weakeness, and possibly motor incoordination, speech abnormalities, narcotic effects and coma. Inhalation may also affect the gastrointestinal

act (nausea, vomiting). Ingestion: May cause irritation of the digestive (gastrointestinal) tract (nausea, vomiting). It may also

affect the Central Nevous System (behavior), characterized by depression, fatigue, excitement, stupor, coma, headache, altered sleep time, ataxia, tremors as well at the blood, liver, and urinary system (kidney, bladder, ureter) and endocrine system. May also have musculoskeletal effects. Chronic Potential Health Effects: Skin: May cause dermatitis. Eyes: Eye irritation.

# Section 12: Ecological Information

#### **Ecotoxicity:**

Ecotoxicity in water (LC50): 5540 mg/l 96 hours [Trout]. 8300 mg/l 96 hours [Bluegill]. 7500 mg/l 96 hours [Fatthead Minnow]. 0.1 ppm any hours [Water flea].

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 product itself and its products of degradation are not toxic.

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

#### Waste Disposal:

Waste must be disposed of in accordance with federal, state and local environmental control regulations.

# Section 14: Transport Information

JOT Classification: CLASS 3: Flammable liquid.

Identification: : Acetone UNNA: 1090 PG: II

Special Provisions for Transport: Not available.

# Section 15: Other Regulatory Information

#### Federal and State Regulations:

California prop. 65: This product contains the following ingredients for which the State of California has found to cause reproductive harm (male) which would require a warning under the statute: Benzene California prop. 65: This product contains the following ingredients for which the State of California has found to cause birth defects which would require a warning under the statute: Benzene California prop. 65: This product contains the following ingredients for which the State of California has found to cause birth defects which would require a warning under the statute: Benzene California prop. 65: This product contains the following ingredients for which the State of California has found to cause cancer which would require a warning under the statute: Benzene, Formaldehyde Connecticut hazardous material survey.: Acetone Illinois toxic substances disclosure to employee act: Acetone Illinois chemical safety act: Acetone New York release reporting list: Acetone Rhode Island RTK hazardous substances: Acetone Pennsylvania RTK: Acetone Florida: Acetone Minnesota: Acetone Massachusetts RTK: Acetone Massachusetts spill list: Acetone New Jersey: Acetone New Jersey spill list: Acetone Louisiana spill reporting: Acetone California List of Hazardous Substances (8 CCR 339): Acetone TSCA 8(b) inventory: Acetone TSCA 4(a) final test rules: Acetone TSCA 8(a) IUR: Acetone

#### **Other Regulations:**

OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200). EINECS: This product is on the -European Inventory of Existing Commercial Chemical Substances.

#### **Other Classifications:**

#### VHMIS (Canada):

CLASS B-2: Flammable liquid with a flash point lower than 37.8°C (100°F). CLASS D-2B: Material causing other toxic effects (TOXIC).
# MATERIAL SAFETY DATA SHEET

#### **1. SUBSTANCE AND SOURCE IDENTIFICATION**

National Institute of Standards and Technology Standard Reference Materials Program 100 Bureau Drive, Stop 2300 Gaithersburg, Maryland 20899-2300 SRM Number: 1676 MSDS Number: 1676 SRM Name: Carbon dioxide in Air (Nominal Amount-of-Substance Fraction - 365 μmol/mol)

Date of Issue: 28 July 2010

MSDS Coordinator: Mario J. Cellarosi Telephone: 301-975-2200 FAX: 301-926-4751 E-mail: SRMMSDS@nist.gov Emergency Telephone ChemTrec: 1-800-424-9300 (North America) +1-703-527-3887 (International)

**Description:** SRM 1676 is a mixture of carbon dioxide and air provided as a compressed gas in a DOT 3AL specification aluminum (6061 alloy) cylinder with a water volume of 6 L and is equipped with a CGA-590 brass valve. The mixture is shipped at a nominal pressure of 12.4 MPa (1800 psig) which provides the user with 0.73  $\text{m}^3$  (25.8  $\text{ft}^3$ ) of useable mixture.

Substance: Carbon dioxide in Air Gas Cylinder.

Other Designations: Compressed Carbon dioxide/Air Gas Mixture.

#### 2. COMPOSITION AND INFORMATION ON HAZARDOUS INGREDIENTS

Component	CAS Registry	EC Number (EINECS)	Nominal Concentration
Carbon dioxide	124-38-9	204-696-9	365 µmol/mol
Air, compressed	132259-10-0	Not Assigned	balance
NOTE. The concentre	tion of oorbon diovido	in this ordinder does not r	analy are availed the OSUA

**NOTE:** The concentration of carbon dioxide in this cylinder does not reach or exceed the OSHA Permissible Exposure Limit (PEL) for carbon dioxide.

EC Classification: Not available.

EC Risk: Not available.

EC Safety: Not available.

Index, R/S Phrases (EC): Not determined.

#### **3. HAZARDS IDENTIFICATION**

NFPA	Ratings	(Sc

cale 0-4): Health = 1 Fire = 0

Reactivity = 0

Major Health Hazards: There are no known health hazards associated with this gas mixture.

Physical Hazards: Cylinder may rupture or explode if exposed to heat.

#### Potential Health Effects (Short Term Exposure)

Inhalation: No information on significant adverse effects.

Skin Contact: No information on significant adverse effects.

Eye Contact: No information on significant adverse effects.

Ingestion: Ingestion of a gas is unlikely.

#### Listed as a Carcinogen/Potential Carcinogen

In the National Toxicology Program (NTP) Report on Carcinogens	
In the International Agency for Research on Cancer (IARC) Monographs	
By the Occupational Safety and Health Administration (OSHA)	

# $\frac{\text{Yes}}{\underline{\qquad}} \frac{\text{No}}{\underline{\qquad}} \frac{X}{\underline{\qquad}} \frac{X}{\underline{\qquad}}$

### 4. FIRST AID MEASURES

Inhalation: Not applicable.

Skin Contact: Not applicable.

Eye Contact: Not applicable.

Ingestion: Not applicable.

#### 5. FIRE FIGHTING MEASURES

**Fire and Explosion Hazards:** Negligible fire hazard. Cylinder may rupture or explode if exposed to heat. Escaping gas mixture promotes combustion of surrounding materials.

Extinguishing Media: Regular dry chemical, carbon dioxide, water.

**Fire Fighting:** Move cylinder from fire area if it can be done without risk. Avoid inhalation of combustion by-products. Wear full protective clothing and NIOSH-approved self-contained breathing apparatus (SCBA).

Flash Point (°C): Not applicable. Method Used: Not applicable.

Autoignition Temperature (°C): Not applicable

Flammability Limits in Air

UPPER (Volume %) None LOWER (Volume %): None

#### 6. ACCIDENTAL RELEASE MEASURES

**Occupational Release:** Stop leak if possible without personal risk. Isolate hazard area and deny entry. Refer to Section 13 "Disposal Considerations".

#### 7. HANDLING AND STORAGE

**Storage:** Store and handle in accordance with all current regulations and standards. This cylinder is subject to storage regulations: U.S. OSHA 29 CFR 1910.101.

**Safe Handling Precautions:** Secure cylinder to prevent physical damage from falling. Keep valve protective cap on cylinder when not in use. See Section 8 "Exposure Controls and Personal Protection".

#### 8. EXPOSURE CONTROLS AND PERSONAL PROTECTION

#### Compressed Carbon dioxide/Air Gas Mixture:

Air: No data available.

#### Carbon dioxide:

OSHA (TWA): 5000 ppm ACGIH (TWA): 5000 ppm NIOSH (TWA): 5000 ppm NIOSH (IDLH): 40000 ppm

Ventilation: Provide local exhaust ventilation.

**Respirator:** No respirator is required under normal conditions of use.

**Eye Protection:** Wear safety goggles. **DO NOT** wear contact lenses in the laboratory. An eye wash station should be readily available near of handling and use areas.

**Personal Protection:** Wear safety shoes when moving cylinders. Protective clothing is not required. Protective gloves are not required but are recommended. Avoid inhalation of material.

#### 9. PHYSICAL AND CHEMICAL PROPERTIES

**Components:** Carbon dioxide/Air mixture.

Physical State: Gas

Appearance and Odor: Clear; odorless.

Vapor Density (air = 1): 1.00

Solubility in water:  $18.68 \text{ cm}^3/\text{L} @ 20 \text{ °C}$ .

**pH:** Not applicable.

Volatility: Not applicable.

#### **10. STABILITY AND REACTIVITY**

Stability: X Stable Unstable

Stable at normal temperatures and pressure.

Incompatible Materials: None listed.

**Conditions to Avoid:** Heat or flame; cylinder may rupture or explode if exposed to excessive heat or flame. Protect from physical damage.

Fire/Explosion Information: See Section 5 "Fire Fighting Measures".

Hazardous Decomposition: None known.

Hazardous Polymerization: Will Occur X Will Not Occur

#### **11. TOXICOLOGICAL INFORMATION**

Route of Entry: X Inhalation Skin

\_\_\_\_\_

Ingestion

#### Compressed Carbon dioxide in Air Gas Mixture:

Air: No established exposure limits.

#### Carbon dioxide:

Rat, inhalation (LC<sub>50</sub>): 470000 ppm/30 minutes

Health Effects (Acute Exposure): There are no known adverse health affects associated with exposure to this material.

Medical Conditions Generally Aggravated by Exposure: There are no known health conditions aggravated by exposure to this material.

#### **12. ECOLOGICAL INFORMATION**

Environmental Summary: Not applicable.

#### **13. DISPOSAL CONSIDERATIONS**

Waste Disposal: Dispose in accordance with all applicable federal, state, and local regulations.

#### **14. TRANSPORTATION INFORMATION**

U.S. DOT and IATA: Compressed gas, n.o.s. (Carbon dioxide in Air); UN1956; Hazard Class 2.2.

#### **15. Regulatory Information**

#### U.S. REGULATIONS

CERCLA Sections 102a/103 (40 CFR 302.4): Not regulated. SARA Title III Section 302 (40 CFR 355.30): Not regulated. SARA Title III Section 304 (40 CFR 355.40): Not regulated. SARA Title III Section 313 (40 CFR 372.65): Not regulated. OSHA Process Safety (29 CFR 1910.119): Not regulated.

SARA Title III Sections 311/312 Hazardous Categories (40 CFR 370.21)

ACUTE: No CHRONIC: No FIRE: No REACTIVE: No SUDDEN RELEASE: Yes

#### STATE REGULATIONS

California Proposition 65: Not regulated.

#### CANADIAN REGULATIONS

WHMIS Classification: Not determined.

#### **EUROPEAN REGULATIONS**

EC Classification: Not determined.

EC Risk and Safety Phrases: Not determined.

#### NATIONAL INVENTORY STATUS

U.S. Inventory (TSCA): Not listed on inventory.

TSCA 12(b), Export Notification: Not listed.

#### **16. OTHER INFORMATION**

Sources: ChemADVISOR, Inc., MSDS Compressed Air, Breathing Air, 23 June 2009. ChemADVISOR, Inc., MSDS 2 Comp. Mix. Carbon dioxide <5000 ppm Bal. Oxygen or Inert gas, 31 August 2009. Scott Specialty Gases, MSDS Carbon dioxide in Air, 27 October, 2006.

**Disclaimer:** Physical and chemical data contained in this MSDS are provided only for use in assessing the hazardous nature of the material. The MSDS was prepared carefully, using current references; however, NIST does not certify the data in the MSDS. The certified values for this material are given in the NIST Certificate of Analysis.

# Phyto Empab, Rm SIGMA-ALDRICH

sigma-aldrich.com

SAFETY DATA SHEET Version 3.13

Revision Date 01/28/2015 Print Date 10/09/2015

1. PF	ODUCT AND COMPANY IDE	NTIFICATION
1.1	Product identifiers Product name	· Dimethyl sulfoxide (DMSO)
	Product Number Brand	: 472301 : Sigma-Aldrich
	CAS-No.	: 67-68-5
1.2	Relevant identified uses of	the substance or mixture and uses advised against
	Identified uses	: Laboratory chemicals, Manufacture of substances
1.3	Details of the supplier of th	e safety data sheet
	Company	: Sigma-Aldrich 3050 Spruce Street SAINT LOUIS MO 63103 USA
	Telephone Fax	: +1 800-325-5832 : +1 800-325-5052
1.4	Emergency telephone num	ber
)	Emergency Phone #	: (314) 776-6555
2. HA	ZARDS IDENTIFICATION	
2.1	Classification of the substa	nce or mixture
	GHS Classification in accord Flammable liquids (Category	rdance with 29 CFR 1910 (OSHA HCS) 4), H227
	For the full text of the H-State	ements mentioned in this Section, see Section 16.
2.2	GHS Label elements, includ	ling precautionary statements
	Pictogram	none
	Signal word	Warning
	Hazard statement(s) H227	Combustible liquid.
	Precautionary statement(s) P210 P280	Keep away from heat/sparks/open flames/hot surfaces No smoking. Wear protective gloves/ protective clothing/ eye protection/ face
	P370 + P378	In case of fire: Use dry sand, dry chemical or alcohol-resistant foam for extinction.
	P403 + P235 P501	Store in a well-ventilated place. Keep cool. Dispose of contents/ container to an approved waste disposal plant.
2.3	Hazards not otherwise clas	sified (HNOC) or not covered by GHS - none

### 3. COMPOSITION/INFORMATION ON INGREDIENTS

#### 3.1 Substances Synonyms

DMSO

#### Methyl sulfoxide

÷	C <sub>2</sub> H <sub>6</sub> OS
:	78.13 g/mol
:	67-68-5
:	200-664-3
	01-2119431362-50-XXXX

#### Hazardous components

Component	Classification	Concentration
Dimethyl sulfoxide		
	Flam. Liq. 4; H227	<= 100 %

For the full text of the H-Statements mentioned in this Section, see Section 16.

#### 4. FIRST AID MEASURES

#### 4.1 Description of first aid measures

#### **General advice**

Consult a physician. Show this safety data sheet to the doctor in attendance. Move out of dangerous area.

#### If inhaled

If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

#### In case of skin contact

Wash off with soap and plenty of water. Consult a physician.

#### In case of eye contact

Flush eyes with water as a precaution.

#### **if swallowed**

Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

- 4.2 Most important symptoms and effects, both acute and delayed The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11
- 4.3 Indication of any immediate medical attention and special treatment needed No data available

#### **5. FIREFIGHTING MEASURES**

5.1 Extinguishing media

#### Suitable extinguishing media

Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

5.2 Special hazards arising from the substance or mixture Carbon oxides, Sulphur oxides

#### **5.3** Advice for firefighters Wear self-contained breathing apparatus for firefighting if necessary.

#### 5.4 Further information

Use water spray to cool unopened containers.

#### 6. ACCIDENTAL RELEASE MEASURES

6.1 Personal precautions, protective equipment and emergency procedures Avoid breathing vapours, mist or gas. Remove all sources of ignition. Beware of vapours accumulating to form explosive concentrations. Vapours can accumulate in low areas. For personal protection see section 8.

#### 6.2 Environmental precautions

Prevent further leakage or spillage if safe to do so. Do not let product enter drains.

#### Methods and materials for containment and cleaning up 6.3

Contain spillage, and then collect with an electrically protected vacuum cleaner or by wet-brushing and place in container for disposal according to local regulations (see section 13). Keep in suitable, closed containers for disposal.

6.4 **Reference to other sections** For disposal see section 13.

### 7. HANDLING AND STORAGE

#### 7.1 Precautions for safe handling

Avoid inhalation of vapour or mist. Keep away from sources of ignition - No smoking. Take measures to prevent the build up of electrostatic charge. For precautions see section 2.2.

#### Conditions for safe storage, including any incompatibilities 7.2 Keep container tightly closed in a dry and well-ventilated place.

Store under inert gas. hygroscopic

#### 7.3 Specific end use(s) Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

#### 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

#### 8.1 **Control parameters**

#### Components with workplace control parameters

Component	CAS-No.	Value	Control parameters	Basis
Dimethyl sulfoxide	67-68-5	TWA	250.000000 ppm	USA. Workplace Environmental Exposure Levels (WEEL)

#### 8.2 **Exposure controls**

#### Appropriate engineering controls

Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

#### Personal protective equipment

#### Eye/face protection

Safety glasses with side-shields conforming to EN166 Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

#### Skin protection

Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Splash contact Material: Nitrile rubber Minimum layer thickness: 0.2 mm Break through time: 38 min Material tested:Dermatril® P (KCL 743 / Aldrich Z677388, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374

If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

#### **Body Protection**

impervious clothing, The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

#### **Respiratory protection**

Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multipurpose combination (US) or type ABEK (EN 14387) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

#### Control of environmental exposure

Prevent further leakage or spillage if safe to do so. Do not let product enter drains.

#### 9. PHYSICAL AND CHEMICAL PROPERTIES

#### 9.1 Information on basic physical and chemical properties

a)	Appearance	Form: liquid, clear Colour: colourless
b)	Odour	No data available
c)	Odour Threshold	No data available
d)	рН	No data available
e)	Melting point/freezing point	Melting point/range: 16 - 19 °C (61 - 66 °F)
f)	Initial boiling point and boiling range	189 °C (372 °F)
g)	Flash point	87 °C (189 °F) - closed cup
h)	Evaporation rate	No data availabie
i)	Flammability (solid, gas)	No data available
j)	Upper/lower flammability or explosive limits	Upper explosion limit: 42 %(V) Lower explosion limit: 3.5 %(V)
k)	Vapour pressure	0.55 hPa (0.41 mmHg) at 20 °C (68 °F)
!)	Vapour density	2.70 - (Air = 1.0)
m)	Relative density	1.1 g/mL
n)	Water solubility	completely miscible
o)	Partition coefficient: n- octanol/water	log Pow: -2.03
p)	Auto-ignition temperature	No data available
q)	Decomposition temperature	No data available
r)	Viscosity	No data available
s)	Explosive properties	No data available
t)	Oxidizing properties	No data available
Oth	er safety information	
	Relative vapour density	2.70 - (Air = 1.0)

#### **10. STABILITY AND REACTIVITY**

10.1 Reactivity No data available

9.2

#### **10.2 Chemical stability** Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions No data available

Sigma-Aldrich - 472301

- 10.4 Conditions to avoid Heat, flames and sparks.
- 10.5 Incompatible materials Acid chlorides, Phosphorus halides, Strong acids, Strong oxidizing agents, Strong reducing agents

#### 10.6 Hazardous decomposition products Other decomposition products - No data available In the event of fire: see section 5

#### 11. TOXICOLOGICAL INFORMATION

#### 11.1 Information on toxicological effects

Acute toxicity LD50 Oral - Rat - 14,500 mg/kg

LC50 Inhalation - Rat - 4 h - 40250 ppm

LD50 Dermal - Rabbit - > 5,000 mg/kg

No data available

Skin corrosion/irritation No data available

Serious eye damage/eye irritation No data available

Respiratory or skin sensitisation No data available

Germ cell mutagenicity Mouse lymphocyte Cytogenetic analysis

Mouse lymphocyte Mutation in mammalian somatic cells.

Rat Cytogenetic analysis

Mouse DNA damage

#### Carcinogenicity

Carcinogenicity - Rat - Oral Tumorigenic:Equivocal tumorigenic agent by RTECS criteria. Skin and Appendages: Other: Tumors.

Carcinogenicity - Mouse - Oral

Tumorigenic: Equivocal tumorigenic agent by RTECS criteria. Leukaemia Skin and Appendages: Other: Tumors.

- IARC: No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.
- ACGIH: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by ACGIH.
- NTP: No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.
- OSHA: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

#### **Reproductive toxicity**

Reproductive toxicity - Rat - Intraperitoneal

Effects on Fertility: Abortion.

Reproductive toxicity - Rat - Intraperitoneal Effects on Fertility: Post-implantation mortality (e.g., dead and/or resorbed implants per total number of implants).

Reproductive toxicity - Rat - Subcutaneous Effects on Fertility: Post-implantation mortality (e.g., dead and/or resorbed implants per total number of implants). Effects on Fertility: Litter size (e.g.; # fetuses per litter; measured before birth).

#### Reproductive toxicity - Mouse - Oral

Effects on Fertility: Pre-implantation mortality (e.g., reduction in number of implants per female; total number of implants per corpora lutea). Effects on Embryo or Fetus: Fetotoxicity (except death, e.g., stunted fetus). Specific Developmental Abnormalities: Musculoskeletal system.

#### **Developmental Toxicity - Mouse - Intraperitoneal**

Effects on Embryo or Fetus: Fetotoxicity (except death, e.g., stunted fetus). Specific Developmental Abnormalities: Musculoskeletal system.

#### Specific target organ toxicity - single exposure No data available

Specific target organ toxicity - repeated exposure No data available

Aspiration hazard No data available

#### Additional Information RTECS: PV6210000

Effects due to ingestion may include:, Nausea, Fatigue, Headache To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

Eyes - Eye disease - Based on Human Evidence Eyes - Eye disease - Based on Human Evidence

#### **12. ECOLOGICAL INFORMATION**

#### 12.1 Toxicity

Toxicity to fish	LC50 - Pimephales promelas (fathead minnow) - 34,000 mg/l - 96 h
	LC50 - Oncorhynchus mykiss (rainbow trout) - 35,000 mg/l - 96 h
Toxicity to daphnia and other aquatic invertebrates	EC50 - Daphnia magna (Water flea) - 24,600 mg/l - 48 h (OECD Test Guideline 202)
Toxicity to algae	EC50 - Pseudokirchneriella subcapitata (green algae) - 17,000 mg/l - 72 h (OECD Test Guideline 201)

# 12.2 Persistence and degradability

Biodegradability Result: 31 % - According to the results of tests of biodegradability this product is not readily biodegradable. (OECD Test Guideline 301D)

12.3 Bioaccumulative potential No data available

#### 12.4 Mobility in soil No data available

#### 12.5 Results of PBT and vPvB assessment

PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

#### 12.6 Other adverse effects

# No data available

Stability in water - 0.12 - 1.2 h at 30 °C

#### **13. DISPOSAL CONSIDERATIONS**

#### 13.1 Waste treatment methods

#### Product

This combustible material may be burned in a chemical incinerator equipped with an afterburner and scrubber. Offer surplus and non-recyclable solutions to a licensed disposal company.

#### Contaminated packaging

Dispose of as unused product.

#### **14. TRANSPORT INFORMATION**

#### DOT (US)

NA-Number: 1993 Class: NONE Packing group: III Proper shipping name: Combustible liquid, n.o.s. (Dimethyl sulfoxide) (Dimethyl sulfoxide) Reportable Quantity (RQ):

Poison Inhalation Hazard: No

#### IMDG

Not dangerous goods

IATA Not dangerous goods

#### **15. REGULATORY INFORMATION**

#### SARA 302 Components

No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

#### SARA 313 Components

This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

#### SARA 311/312 Hazards

Fire Hazard, Chronic Health Hazard

#### Massachusetts Right To Know Components

No components are subject to the Massachusetts Right to Know Act.

#### Pennsylvania Right To Know Components

Dimethyl sulfoxide	CAS-No. 67-68-5	Revision Date 2007-03-01
New Jersey Right To Know Components		Devision Dete
Dimethyl sulfoxide	CAS-No. 67-68-5	2007-03-01

#### California Prop. 65 Components

This product does not contain any chemicals known to State of California to cause cancer, birth defects, or any other reproductive harm.

## **16. OTHER INFORMATION**

Full text of H-Statements referred to under sections 2 and 3.

Flam. Liq.	Flammable liquids
H227	Combustible liquid.
HMIS Rating Health hazard:	0

Chronic Health Hazard:	*
Flammability:	2
Physical Hazard	0
NFPA Rating	
Health hazard:	0
Fire Hazard:	2
Reactivity Hazard:	0

#### Further information

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#### Preparation Information

Sigma-Aldrich Corporation Product Safety – Americas Region 1-800-521-8956

Version: 3.13

Revision Date: 01/28/2015

Print Date: 10/09/2015

# Phyto Lab, Rm

# SIGMA-ALDRICH

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#### SAFETY DATA SHEET Version 4.10 Revision Date 04/10/2015 Print Date 10/08/2015

	- 1	117.1		Print Date 10/08/20
<b>1. PF</b>	RODUCT AND COMPANY	DENTIFICATION		
1.1	Product identifiers Product name	Eormaldehyde solu	tion	
	Product Number Brand	: 433284 : Aldrich		
1.2	Relevant identified uses	of the substance or mixture an	d uses advised against	
	Identified uses	: Laboratory chemicals, Man	ufacture of substances	
1.3	Details of the supplier of	f the safety data sheet		
	Company	: Sigma-Aldrich 3050 Spruce Street SAINT LOUIS MO 63103 USA		
	Telephone Fax	: +1 800-325-5832 : +1 800-325-5052		
1.4	Emergency telephone n	umber		
	Emergency Phone #	: (314) 776-6555		
2. HA	ZARDS IDENTIFICATION			
2.1	Classification of the sul	stance or mixture		
	GHS Classification in ac Flammable liquids (Categ Acute toxicity, Oral (Categ Acute toxicity, Inhalation ( Acute toxicity, Dermal (Ca Skin corrosion (Category Serious eye damage (Cat Skin sensitisation (Category Germ cell mutagenicity (C Carcinogenicity (Category Specific target organ toxic	cordance with 29 CFR 1910 (OS ory 4), H227 gory 3), H301 Category 3), H331 itegory 3), H311 1B), H314 egory 1), H318 ory 1), H317 ategory 2), H341 1A), H350 ity - single exposure (Category 1),	HA HCS) , H370	
	Acute aquatic toxicity (Ca	tegory 3), H402		
	CUS Labol alarmanta in	latements mentioned in this Secto		
<i>L.L</i>	Gris Label elements, ind		.s	
	Pictogram			
	Signal word	Danger		
	Hazard statement(s) H227 H301 + H311 + H331 H314	Combustible liquid. Toxic if swallowed, in conta Causes severe skin burns a May cause an alloraic skin b	ct with skin or if inhaled and eye damage.	

Causes serious eye damage.

Suspected of causing genetic defects.

Aldrich - 433284

H318

H341

H350 H370 H402	May cause cancer. Causes damage to organs. Harmful to aquatic life.
Precautionary statement(s) P201 P202	Obtain special instructions before use.
FZUZ	understood.
P210	Keep away from heat/sparks/open flames/hot surfaces No smoking.
P260	Do not breathe dustriumer gasr mistrivapoursr spray. Moch skin thoroughly after bandling
P204	Do not eat, drink or smoke when using this product
P271	Use only outdoors or in a well-ventilated area.
P272	Contaminated work clothing should not be allowed out of the workplace.
P273	Avoid release to the environment.
P280	Wear protective gloves/ protective clothing/ eye protection/ face
	protection.
P301 + P310 + P330	IF SWALLOWED: Immediately call a POISON CENTER or doctor/
	physician. Rinse mouth.
P301 + P330 + P331	IF SWALLOWED: Kinse mouth. Do NOT induce vomiling.
P303 + P361 + P353	Rinse skin with water/shower.
P304 + P340 + P310	IF INHALED: Remove person to fresh air and keep comfortable for
	breathing. Immediately call a POISON CENTER or doctor/ physician.
P305 + P351 + P338 + P310	IF IN EYES: Rinse cautiously with water for several minutes. Remove
	contact lenses, if present and easy to do. Continue rinsing. Immediately
	call a POISON CENTER of doctor/ physician.
P307 + P311	IF exposed: Call a POISON CENTER of doctor/ physician.
P333 + P313	If skin imitation of rash occurs, Get metical advice/ alternion.
P302	Take on containinated clothing and wash before reuse.
P3/0 + P3/8	extinguish.
P403 + P233	Store in a well-ventilated place. Keep container tightly closed.
P403 + P235	Store in a well-ventilated place. Keep cool.
P405	Store locked up.
P501	Dispose of contents/ container to an approved waste disposal plant.

# 2.3 Hazards not otherwise classified (HNOC) or not covered by GHS - none

# **3. COMPOSITION/INFORMATION ON INGREDIENTS**

#### 3.2 Mixtures

Synonyms : Formalin

# Molecular weight : 30.03 g/mol

#### **Hazardous components**

Component		Classification	Concentration	
Formaidehyde				
CAS-No. EC-No. Index-No.	50-00-0 200-001-8 605-001-00-5	Flam. Liq. 4; Acute Tox. 3; Skin Corr. 1B; Eye Dam. 1; Skin Sens. 1; Muta. 2; Carc. 1A; Aquatic Acute 3; H227, H301 + H311 + H331, H314, H317, H318, H341, H350, H402	>= 30 - < 50 %	
Methanol				
CAS-No.	67-56-1	Flam. Liq. 2; Acute Tox. 3;	>= 10 - < 20 %	
EC-No.	200-659-6	STOT SE 1; H225, H301 +		
Index-No.	603-001-00-X	H311 + H331, H370		
Registration number	01-2119433307-44-XXXX			

For the full text of the H-Statements mentioned in this Section, see Section 16.

#### 4. FIRST AID MEASURES

4.1 Description of first aid measures

#### **General advice**

Consult a physician. Show this safety data sheet to the doctor in attendance. Move out of dangerous area.

#### If inhaled

If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

#### In case of skin contact

Take off contaminated clothing and shoes immediately. Wash off with soap and plenty of water. Take victim immediately to hospital. Consult a physician.

#### In case of eye contact

Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician.Continue rinsing eyes during transport to hospital.

#### if swallowed

Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

- 4.2 Most important symptoms and effects, both acute and delayed The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11
- 4.3 Indication of any immediate medical attention and special treatment needed No data available

#### **5. FIREFIGHTING MEASURES**

5.1 Extinguishing media

Suitable extinguishing media Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

5.2 Special hazards arising from the substance or mixture Carbon oxides

#### 5.3 Advice for firefighters Wear self-contained breathing apparatus for firefighting if necessary.

5.4 Further information Use water spray to cool unopened containers.

#### 6. ACCIDENTAL RELEASE MEASURES

#### 6.1 Personal precautions, protective equipment and emergency procedures

Wear respiratory protection. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Remove all sources of ignition. Evacuate personnel to safe areas. Beware of vapours accumulating to form explosive concentrations. Vapours can accumulate in low areas.

For personal protection see section 8.

# 6.2 Environmental precautions

Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

- 6.3 Methods and materials for containment and cleaning up Contain spillage, and then collect with an electrically protected vacuum cleaner or by wet-brushing and place in container for disposal according to local regulations (see section 13). Keep in suitable, closed containers for disposal.
- 6.4 Reference to other sections For disposal see section 13.

## 7. HANDLING AND STORAGE

# 7.1 Precautions for safe handling

Avoid contact with skin and eyes. Avoid inhalation of vapour or mist.

Keep away from sources of ignition - No smoking. Take measures to prevent the build up of electrostatic charge. For precautions see section 2.2.

#### 7.2 Conditions for safe storage, including any incompatibilities

Keep container tightly closed in a dry and well-ventilated place. Containers which are opened must be carefully resealed and kept upright to prevent leakage.

Storage class (TRGS 510): Non-combustible, acute toxic Cat.3 / toxic hazardous materials or hazardous materials causing chronic effects

#### 7.3 Specific end use(s)

Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

### 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

#### 8.1 Control parameters

#### Components with workplace control parameters

Component	CAS-No.	Value	Control parameters	Basis			
Formaldehyde	50-00-0	С	0.300000 ppm	USA. ACGIH Threshold Limit Values (TLV)			
	Remarks	Upper Respi Eye irritation Suspected h	on				
		TWA	0.016000 ppm	USA. NIOSH Recommended Exposure Limits			
		Potential Oc See Append	cupational Carcino ix A	ogen			
		С	0.100000 ppm	USA. NIOSH Recommended Exposure Limits			
	Potential Occupational Carcinogen See Appendix A 15 minute ceiling value			ogen			
		Substance li 1910.1048	Substance listed; for more information see OSHA document 1910.1048				
		Substance li 1910.1048	sted; for more info	rmation see OSHA document			
		PEL 0.750000 ppm OSHA Specifical Chemicals/Carci		OSHA Specifically Regulated Chemicals/Carcinogens			
		1910.1048 This standar i.e. from form formaldehyd OSHA speci	1910.1048 This standard applies to all occupational exposures i.e. from formaldehyde gas, its solutions, and materi formaldehyde				
		STEL	2.000000 ppm	OSHA Specifically Regulated Chemicals/Carcinogens			
		1910.1048 This standar i.e. from form formaldehyd OSHA speci	.1048 standard applies to all occupational exposures to formaldehyd om formaldehyde gas, its solutions, and materials that release aldehyde A specifically regulated carcinogen				
		TWA	0.016000 ppm	USA. NIOSH Recommended Exposure Limits			
		Potential Oc Formalin is a weight; inhib Also see spe See Append	ial Occupational Carcinogen lin is an aqueous solution that is 37% formaldehyde by ; inhibited solutions usually contain 6-12% methyl alcohol. se specific listings for Formaldehyde and Methyl alcohol. oppendix A				

	l.	C	0.100000 ppm	USA. NIOSH Recommended Exposure Limits
		Potential O Formalin is weight; inhi Also see sp See Append 15 minute c	ccupational Carcin an aqueous solut bited solutions us ecific listings for F dix A teiling value	nogen ion that is 37% formaldehyde by ually contain 6-12% methyl alcohol. Formaldehyde and Methyl alcohol.
		С	0.3 ppm	USA. ACGIH Threshold Limit Values (TLV)
	-	Upper Resp Eye irritatio Adopted va are propose See Notice Suspected Sensitizer	biratory Tract irrita n lues or notations o ed in the NIC of Intended Chan human carcinoger	enclosed are those for which changes ges (NIC) n
Methanol	67-56-1	TWA	200.000000 ppm	USA. ACGIH Threshold Limit Values (TLV)
		Headache Nausea Dizziness Eye damag Substances (see BEI® s Danger of c	e for which there is section) utaneous absorpt	s a Biological Exposure Index or Indices
- 1. S.	i j	STEL	250.000000 ppm	USA. ACGIH Threshold Limit Values (TLV)
		Headache Nausea Dizziness Eye damag Substances (see BEI® s	e for which there is section) utaneous absorpt	s a Biological Exposure Index or Indices
		TWA	200.000000 ppm 260.000000 mg/m3	USA. NIOSH Recommended Exposure Limits
		Potential for	r dermal absorptio	n
		ST	250.000000 ppm 325.000000 mg/m3	USA. NIOSH Recommended Exposure Limits
		Potential for	r dermal absorptio	
		Potential for TWA	200.000000 ppm 260.000000 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants

Biological occupational exposure Biological CAS-No. Value Basis Component Parameters specimen Urine ACGIH - Biological Exposure Indices (BEI) 15.0000 67-56-1 Methanol Methanol mg/l Remarks End of shift (As soon as possible after exposure ceases)

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#### 8.2 Exposure controls

#### Appropriate engineering controls

Avoid contact with skin, eyes and clothing. Wash hands before breaks and immediately after handling the product.

#### **Personal protective equipment**

#### **Eye/face protection**

Tightly fitting safety goggles. Faceshield (8-inch minimum). Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

#### **Skin protection**

Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Full contact Material: Nitrile rubber Minimum layer thickness: 0.11 mm Break through time: 480 min Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

Splash contact Material: Nitrile rubber Minimum layer thickness: 0.2 mm Break through time: 60 min Material tested:Dermatril® P (KCL 743 / Aldrich Z677388, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374

If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

#### **Body Protection**

Complete suit protecting against chemicals. The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

#### **Respiratory protection**

Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multipurpose combination (US) or type ABEK (EN 14387) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

#### **Control of environmental exposure**

Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

#### 9. PHYSICAL AND CHEMICAL PROPERTIES

#### 9.1 Information on basic physical and chemical properties

a)	Appearance	Form: liquid, clear Colour: colourless
b)	Odour	pungent
c)	Odour Threshold	No data available
d)	pН	No data available
e)	Melting point/freezing point	No data available
f)	Initial boiling point and boiling range	100 °C (212 °F)
g)	Flash point	64 °C (147 °F) - closed cup

	h)	Evaporation rate	1			
	i)	Flammability (solid, gas)	No data available			
	j)	Upper/lower flammability or explosive limits	Upper explosion limit: 70 %(V) Lower explosion limit: 7 %(V)			
	k)	Vapour pressure	53 hPa (40 mmHg) at 39 °C (102 °F)			
	I)	Vapour density	1.04 - (Air = 1.0)			
	m)	Relative density	1.090 g/cm3			
	n)	Water solubility	completely soluble			
	o)	Partition coefficient: n- octanol/water	log Pow: 0.35	24		
	p)	Auto-ignition temperature	No data available			
	q)	Decomposition temperature	No data available			
	г)	Viscosity	No data available			
	s)	Explosive properties	No data available			
	t)	Oxidizing properties	No data available			
9.2	Oth	er safety information				
		Relative vapour density	1.04 - (Air = 1.0)			
10. S	ABI	LITY AND REACTIVITY	· · · · · · · · · · · · · · · · · · ·			
10.1	Rea No	<b>ictivity</b> data available				
10.2	<b>Che</b> Stal	emical stability ble under recommended s	torage conditions.			
10.3	Pos No	sibility of hazardous rea	ctions			
10.4	Cor Hea	nditions to avoid at, flames and sparks.				
10.5	Inc Stro Per	o <b>mpatible materials</b> ong oxidizing agents, Anilir oxides, Acid chlorides, Alk	ne, Phenol, Isocyanates, Acid anhydrides, a ali metals, Reducing agents	Strong acids,	Strong bases, Amines,	
10.6	Haz Oth In ti	cardous decomposition products er decomposition products ne event of fire: see section	p <b>roducts</b> s - No data available n 5			
11. TO	DXIC	OLOGICAL INFORMATIC	ON			
11.1	Info	ormation on toxicologica	leffects			
	Acu No	<b>ite toxicity</b> data available				
	Inha	alation: No data available				
	Der	mal: No data available				
	No	data available				
	<b>Ski</b> No	n corrosion/irritation				

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Serious eye damage/eye irritation No data available

Respiratory or skin sensitisation May cause sensitisation by skin contact.

Germ cell mutagenicity No data available

#### Carcinogenicity

IARC: 1 - Group 1: Carcinogenic to humans (Formaldehyde)

NTP: Known to be human carcinogen (Formaldehyde)

OSHA: OSHA specifically regulated carcinogen (Formaldehyde)

Reproductive toxicity No data available No data available

Specific target organ toxicity - single exposure No data available

Specific target organ toxicity - repeated exposure No data available

Aspiration hazard No data available

Additional Information RTECS: Not available

burning sensation, Cough, wheezing, laryngitis, Shortness of breath, spasm, inflammation and edema of the larynx, spasm, inflammation and edema of the bronchi, pneumonitis, pulmonary edema, Material is extremely destructive to tissue of the mucous membranes and upper respiratory tract, eyes, and skin.

Liver - Irregularities - Based on Human Evidence Stomach - Irregularities - Based on Human Evidence Liver - Irregularities - Based on Human Evidence (Formaldehyde) Stomach - Irregularities - Based on Human Evidence (Methanol)

#### **12. ECOLOGICAL INFORMATION**

- 12.1 Toxicity No data available
- 12.2 Persistence and degradability No data available
- 12.3 Bioaccumulative potential No data available
- 12.4 Mobility in soil No data available
- 12.5 Results of PBT and vPvB assessment PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

#### 12.6 Other adverse effects

An environmental hazard cannot be excluded in the event of unprofessional handling or disposal. Harmful to aquatic life.

#### **13. DISPOSAL CONSIDERATIONS**

### 13.1 Waste treatment methods

#### Product

This combustible material may be burned in a chemical incinerator equipped with an afterburner and scrubber. Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material.

#### Contaminated packaging

Dispose of as unused product.

#### **14. TRANSPORT INFORMATION**

#### DOT (US)

UN number: 2209 Class: 8 Packing group: III Proper shipping name: Formaldehyde solutions Reportable Quantity (RQ): 286 lbs

Poison Inhalation Hazard: No

#### IMDG

UN number: 2209 Class: 8 Packing group: III EMS-No: F-A, S-B Proper shipping name: FORMALDEHYDE SOLUTION

#### ΙΑΤΑ

UN number: 2209 Class: 8 Packing group: III Proper shipping name: Formaldehyde solution

#### **15. REGULATORY INFORMATION**

SARA 302 Components		
The following components are subject to reporting levels establish	ned by SARA Title III,	Section 302:
	CAS-No.	Revision Date
Formaldehyde	50-00-0	2007-07-01
SARA 313 Components		
The following components are subject to reporting levels establish	ned by SARA Title III,	Section 313:
	CAS-No.	Revision Date
Methano!	67-56-1	2007-07-01
Formaldehyde	50-00-0	2007-07-01
SARA 311/312 Hazards		
Fire Hazard, Acute Health Hazard, Chronic Health Hazard		
Massachusetts Right To Know Components		
	CAS-No.	Revision Date
Formaldehyde	50-00-0	2007-07-01
Methanol	67-56-1	2007-07-01
Pennsylvania Right To Know Components		
	CAS-No.	Revision Date
Water	7732-18-5	
Formaldehyde	50-00-0	2007-07-01
Methanol	67-56-1	2007-07-01
New Jersey Right To Know Components		
	CAS-No.	Revision Date
Water	7732-18-5	
Formaldehyde	50-00-0	2007-07-01
Methanol	67-56-1	2007-07-01
California Prop. 65 Components		
WARNING! This product contains a chemical known to the	CAS-No.	Revision Date
State of California to cause cancer.	50-00-0	2007-09-28

#### Formaldehyde

WARNING: This product contains a chemical known to the State of California to cause birth defects or other reproductive harm. Methanol CAS-No. 67-56-1 Revision Date 2012-03-16

#### **16. OTHER INFORMATION**

Full text of H-Statements referred to under sections 2 and 3.

Acute toxicity
Acute aquatic toxicity
Carcinogenicity
Serious eye damage
Flammable liquids
Highly flammable liquid and vapour.
Combustible liquid.
Toxic if swallowed.
Toxic if swallowed, in contact with skin or if inhaled
Toxic in contact with skin.
Causes severe skin burns and eye damage.
May cause an allergic skin reaction.
Causes serious eye damage.
Toxic if inhaled.
Suspected of causing genetic defects.
May cause cancer.
Causes damage to organs.
Harmful to aquatic life.
Germ cell mutagenicity
Skin corrosion
Skin sensitisation
Specific target organ toxicity - single exposure

#### **HMIS Rating**

Health hazard:	3
Chronic Health Hazard:	*
Flammability:	2
Physical Hazard	0
NFPA Rating	
Linelik hereads	2

Health hazard;	3
Fire Hazard:	2
Reactivity Hazard:	0

#### **Further information**

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Aldrich - 433284

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Preparation Information Sigma-Aldrich Corporation Product Safety – Americas Region 1-800-521-8956

Version: 4.10

1. 1. 4. 1

13.11.1

Revision Date: 04/10/2015

Print Date: 10/08/2015





Personal Protection	H
Reactivity	0
Fire	0
Health	2

# Material Safety Data Sheet Glutaraldehyde Solution, 50% MSDS

Section 1: Chemical Product and Company Identification		
Product Name: Giutaraldehyde Solution, 50%	Contact Information:	
Catalog Codes: SLG2182	Sciencelab.com, Inc. 14025 Smith Rd. Houston, Texas 77396	
CAS#: Mixture.		
RTECS: MA2450000	US Sales: 1-800-901-7247	
TSCA: TSCA 8(b) inventory: Glutaraldehyde; Water	International Sales: 1-281-441-4400	
	Order Online: ScienceLab.com	
Synonym: Glutaraldehyde Solution, 50%; Petanedial;	CHEMTREC (24HR Emergency Telephone), call: 1-800-424-9300	
Glutaric Dialdehyde, 50% in water	International CHEMTREC, call: 1-703-527-3887	
Chemical Name: Not applicable.	For non-emergency assistance, call: 1-281-441-4400	
Chemical Formula: C5-H8-O2		

# Section 2: Composition and Information on Ingredients

#### **Composition:**

Name	CAS #	% by Weight
Giutaraldehyde	111-30-8	50
Water	7732-18-5	50

Toxicological Data on Ingredients: Glutaraldehyde: ORAL (LD50): Acute: 134 mg/kg [Rat]. 100 mg/kg [Mouse]. DERMAL (LD50): Acute: >2500 mg/kg [Rat]. >5840 mg/kg [Mouse]. VAPOR (LC50): Acute: 480 mg/m 4 hours [Rat].

# Section 3: Hazards Identification

#### **Potential Acute Health Effects:**

Hazardous in case of skin contact (irritant), of eye contact (irritant), of ingestion, of inhalation (lung irritant, lung sensitizer). Slightly hazardous in case of skin contact (sensitizer, permeator). Liquid or spray mist may produce tissue damage particularly on mucous membranes of eyes, mouth and respiratory tract. Skin contact may produce burns. Inhalation of the spray mist may produce severe irritation of respiratory tract, characterized by coughing, choking, or shortness of breath. Severe over-exposure can result in death.

#### stential Chronic Health Effects:

CARCINOGENIC EFFECTS: Classified A4 (Not classifiable for human or animal.) by ACGIH [Glutaraldehyde]. MUTAGENIC EFFECTS: Mutagenic for mammalian somatic cells. [Glutaraldehyde]. Mutagenic for bacteria and/or yeast. [Glutaraldehyde]. TERATOGENIC EFFECTS: Not available. DEVELOPMENTAL TOXICITY: Classified Reproductive system/toxin/female,

Reproductive system/toxin/male [SUSPECTED] [Glutaraldehyde]. The substance may be toxic to blood, the reproductive system, liver, mucous membranes, spleen, central nervous system (CNS), Urinary System. Repeated or prolonged exposure to the substance can produce target organs damage. Repeated or prolonged contact with spray mist may produce chronic eye irritation and severe skin irritation. Repeated or prolonged exposure to spray 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.

# **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 immediately.

#### Serious Inhalation:

Evacuate the victim to a safe area as soon as possible. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, administer oxygen. If the victim is not breathing, perform mouth-to-mouth resuscitation. WARNING: It may be hazardous to the person providing aid to give mouth-to-mouth resuscitation when the inhaled material is toxic, infectious corrosive. Seek immediate medical attention.

#### Ingestion:

If swallowed, do not induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. Loosen tight clothing such as a collar, tie, belt or waistband. Get medical attention immediately.

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: When heated to decomposition, it emits acrid smoke and fumes.

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:

ute with water and mop up, or absorb with an inert dry material and place in an appropriate waste disposal container.

#### Large Spill:

Poisonous liquid. Stop leak if without risk. Do not get water inside container. Do not touch spilled material. Use water spray to reduce vapors. Prevent entry into sewers, basements or confined areas; dike if needed. Call for assistance on disposal. 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:**

Keep locked up.. Do not ingest. Do not breathe gas/fumes/ vapor/spray. Wear suitable protective clothing. 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. Keep away from incompatibles such as oxidizing agents, alkalis.

#### Storage:

Light Sensitive. Refrigerate. Store in light-resistant containers. Keep containers tightly closed. Keep containers in a cool, well-ventilated area.

# **Section 8: Exposure Controls/Personal Protection**

#### **Engineering Controls:**

Provide exhaust ventilation or other engineering controls to keep the airborne concentrations of vapors below their respective threshold limit value. Ensure that eyewash stations and safety showers are proximal to the work-station location.

#### **Protection:**

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

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

Splash goggles. Full suit. Vapor 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:**

Glutaraldehyde TWA: 0.2 (ppm) [Australia] TWA: 0.82 (mg/m3) [Australia] TWA: 0.25 CEIL: 0.2 (ppm) from NIOSH CEIL: 0.2 (ppm) from OSHA (PEL) [United States] TWA: 0.05 STEL: 0.05 (ppm) [United Kingdom (UK)] Consult local authorities for acceptable exposure limits.

### **Section 9: Physical and Chemical Properties**

Physical state and appearance: Liquid.

Odor: Pungent. Like rotten apples

Taste: Not available.

Molecular Weight: Not applicable.

Color: Colorless to light yellow.

pH (1% soln/water): Not available

biling Point: 101°C (213.8°F)

Melting Point: -6°C (21.2°F) - -7

Critical Temperature: Not available.

Specific Gravity: 1.062 - 1.124 (Water = 1)

Vapor Pressure: 0 kPa (@ 20°C)

Vapor Density: 1.05 (Air = 1)

Volatility: Not available.

Odor Threshold: 0.04 ppm

Water/Oil Dist. Coeff.: Not available.

Ionicity (in Water): Not available.

Dispersion Properties: See solubility in water, diethyl ether.

Solubility:

Easily soluble in cold water. Soluble in diethyl ether. Soluble in benzene, ethanol and other organic solvents.

# Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Conditions to avoid: exposure to air, and excess heat. (Glutaraldehyde)

Incompatibility with various substances: Reactive with oxidizing agents, alkalis.

Corrosivity: Non-corrosive in presence of glass.

#### **Special Remarks on Reactivity:**

Also incompatible with amines, ammonia and other caustics (e.g. ammonium hydroxide, calcium hydroxide, potassium hydroxide, and sodium hydroxide). Alkaline solutions react with alcohol, ketones, amines, hydrazines and proteins. (Glutaraldehyde)

Special Remarks on Corrosivity: Not available.

Polymerization: Will not occur.

# Section 11: Toxicological Information

Routes of Entry: Absorbed through skin. Eye contact. Inhalation. Ingestion.

#### **Toxicity to Animals:**

WARNING: THE LC50 VALUES HEREUNDER ARE ESTIMATED ON THE BASIS OF A 4-HOUR EXPOSURE. Acute oral toxicity (LD50): 100 mg/kg [Mouse]. Acute dermal toxicity (LD50): >2500 mg/kg [Rat]. Acute toxicity of the vapor (LC50): 480 mg/m 4 hours [Rat]. 3

#### **Chronic Effects on Humans:**

CARCINOGENIC EFFECTS: Classified A4 (Not classifiable for human or animal.) by ACGIH [Glutaraldehyde]. MUTAGENIC EFFECTS: Mutagenic for mammalian somatic cells. [Glutaraldehyde]. Mutagenic for bacteria and/or yeast. [Glutaraldehyde]. DEVELOPMENTAL TOXICITY: Classified Reproductive system/toxin/female, Reproductive system/toxin/male [SUSPECTED] [Glutaraldehyde]. Contains material which may cause damage to the following organs: blood, the reproductive system, liver, mucous membranes, spleen, central nervous system (CNS), Urinary system.

#### Other Toxic Effects on Humans:

Hazardous in case of skin contact (irritant), of ingestion, of inhalation (lung irritant, lung sensitizer). Slightly hazardous in case of skin contact (sensitizer, permeator).

#### Special Remarks on Toxicity to Animals:

Acute Toxicity: LD50 [Rabbit] dermal: Dose: 560 ul/kg. Reproductive Effects: TDL [male Rat] oral: Dose: 875 mg/kg given 35 days prior to mating TDL [female rat] oral: Dose 4370 mg/kg given 35 days prior to mating. (Glutaraldehyde)

Special Remarks on Chronic Effects on Humans:

May affect genetic material. Reproductive Effects in animals (rat): Paternal effects: testes, epididymis, sperm duct, prostate, seminal vesicle, Cowper's gland, accessory. Maternal effects: uterus, cervix, vagina (Glutaraldehyde)

#### Special Remarks on other Toxic Effects on Humans:

Detential Health Effects: Eye: Causes severe eye irritation. May cause eye injury or chemical conjunctivitis. Skin: Causes moderate to severe skin irritation. It may be absorbed through the skin, although poorly. May cause allergic contact dermatitis with itching and skin rash. May cause staining of the skin and nails to a brown or golden brown color. Ingestion: Harmful if swallowed. May cause severe irritation of the digestive tract with burning sensation in the chest, abdominal pain, cramping, vomiting, diarrhea (perhaps bloody diarrhea), vascular collapse, and coma. May also affect liver (increased liver enzymes, liver damage), spleen, blood (normocytic anemia), metabolism (weight loss), behavior (somnolence, excitement, dizziness, lethargy, ataxia, seizures), metabolism (weight loss), urinary system ( abnormal reneal function, anuria) Inhalation: Harmful if inhaled. Can cause respiratory tract irritation and sudden headaches, nausea, and

# 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 less toxic than the product itself.

Special Remarks on the Products of Biodegradation: Not available.

# Section 13: Disposal Considerations

aste Disposal:

vaste must be disposed of in accordance with federal, state and local environmental control regulations.

# Section 14: Transport Information

DOT Classification: CLASS 6.1: Poisonous material.

Identification: : Toxic Liquid, Organic, n.o.s (Glutaraldehyde solution) UNNA: 2810 PG: III

Special Provisions for Transport: Not available.

# **Section 15: Other Regulatory Information**

#### Federal and State Regulations:

Pennsylvania RTK: Glutaraldehyde Florida: Glutaraldehyde Massachusetts RTK: Glutaraldehyde New Jersey: Glutaraldehyde California Director's list of Hazardous Substances: Glutaraldehyde TSCA 8(b) inventory: Glutaraldehyde; Water TSCA 8(a) PAIR: Glutaraldehyde TSCA 8(d) H and S data reporting: Glutaraldehyde: 9/30/91 to 9/30/01

#### **Other Regulations:**

OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200). EINECS: This product is on the European Inventory of Existing Commercial Chemical Substances.

#### **Other Classifications:**

#### '∿HMIS (Canada):

ASS D-1A: Material causing immediate and serious toxic effects (VERY TOXIC). CLASS D-2B: Material causing other toxic effects (TOXIC). CLASS E: Corrosive liquid.

DSCL (EEC):

HMIS (U.S.A.):

Health Hazard: 2

Fire Hazard: 0

Reactivity: 0

Personal Protection: h

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

Health: 2

Flammability: 0

Reactivity: 0

**Specific hazard:** 

#### **Protective Equipment:**

Gloves. Lab coat. Vapor 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.

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

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Personal Protection	H
Reactivity	0
Fire	0
Health	2

# Material Safety Data Sheet Glutaraldehyde Solution, 50% MSDS

Section 1: Chemical Product and Company Identification		
Product Name: Giutaraldehyde Solution, 50%	Contact Information:	
Catalog Codes: SLG2182	Sciencelab.com, Inc. 14025 Smith Rd. Houston, Texas 77396	
CAS#: Mixture.		
RTECS: MA2450000	US Sales: 1-800-901-7247	
TSCA: TSCA 8(b) inventory: Glutaraldehyde; Water	International Sales: 1-281-441-4400	
	Order Online: ScienceLab.com	
Synonym: Glutaraldehyde Solution, 50%; Petanedial;	CHEMTREC (24HR Emergency Telephone), call: 1-800-424-9300	
Glutaric Dialdehyde, 50% in water	International CHEMTREC, call: 1-703-527-3887	
Chemical Name: Not applicable.	For non-emergency assistance, call: 1-281-441-4400	
Chemical Formula: C5-H8-O2		

# Section 2: Composition and Information on Ingredients

#### **Composition:**

Name	CAS #	% by Weight
Giutaraldehyde	111-30-8	50
Water	7732-18-5	50

Toxicological Data on Ingredients: Glutaraldehyde: ORAL (LD50): Acute: 134 mg/kg [Rat]. 100 mg/kg [Mouse]. DERMAL (LD50): Acute: >2500 mg/kg [Rat]. >5840 mg/kg [Mouse]. VAPOR (LC50): Acute: 480 mg/m 4 hours [Rat].

# Section 3: Hazards Identification

#### **Potential Acute Health Effects:**

Hazardous in case of skin contact (irritant), of eye contact (irritant), of ingestion, of inhalation (lung irritant, lung sensitizer). Slightly hazardous in case of skin contact (sensitizer, permeator). Liquid or spray mist may produce tissue damage particularly on mucous membranes of eyes, mouth and respiratory tract. Skin contact may produce burns. Inhalation of the spray mist may produce severe irritation of respiratory tract, characterized by coughing, choking, or shortness of breath. Severe over-exposure can result in death.

#### stential Chronic Health Effects:

CARCINOGENIC EFFECTS: Classified A4 (Not classifiable for human or animal.) by ACGIH [Glutaraldehyde]. MUTAGENIC EFFECTS: Mutagenic for mammalian somatic cells. [Glutaraldehyde]. Mutagenic for bacteria and/or yeast. [Glutaraldehyde]. TERATOGENIC EFFECTS: Not available. DEVELOPMENTAL TOXICITY: Classified Reproductive system/toxin/female,

Reproductive system/toxin/male [SUSPECTED] [Glutaraldehyde]. The substance may be toxic to blood, the reproductive system, liver, mucous membranes, spleen, central nervous system (CNS), Urinary System. Repeated or prolonged exposure to the substance can produce target organs damage. Repeated or prolonged contact with spray mist may produce chronic eye irritation and severe skin irritation. Repeated or prolonged exposure to spray 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.

# **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 immediately.

#### Serious Inhalation:

Evacuate the victim to a safe area as soon as possible. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, administer oxygen. If the victim is not breathing, perform mouth-to-mouth resuscitation. WARNING: It may be hazardous to the person providing aid to give mouth-to-mouth resuscitation when the inhaled material is toxic, infectious corrosive. Seek immediate medical attention.

#### Ingestion:

If swallowed, do not induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. Loosen tight clothing such as a collar, tie, belt or waistband. Get medical attention immediately.

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: When heated to decomposition, it emits acrid smoke and fumes.

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:

ute with water and mop up, or absorb with an inert dry material and place in an appropriate waste disposal container.

#### Large Spill:

Poisonous liquid. Stop leak if without risk. Do not get water inside container. Do not touch spilled material. Use water spray to reduce vapors. Prevent entry into sewers, basements or confined areas; dike if needed. Call for assistance on disposal. 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:**

Keep locked up.. Do not ingest. Do not breathe gas/fumes/ vapor/spray. Wear suitable protective clothing. 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. Keep away from incompatibles such as oxidizing agents, alkalis.

#### Storage:

Light Sensitive. Refrigerate. Store in light-resistant containers. Keep containers tightly closed. Keep containers in a cool, well-ventilated area.

# **Section 8: Exposure Controls/Personal Protection**

#### **Engineering Controls:**

Provide exhaust ventilation or other engineering controls to keep the airborne concentrations of vapors below their respective threshold limit value. Ensure that eyewash stations and safety showers are proximal to the work-station location.

#### **Protection:**

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

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

Splash goggles. Full suit. Vapor 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:**

Glutaraldehyde TWA: 0.2 (ppm) [Australia] TWA: 0.82 (mg/m3) [Australia] TWA: 0.25 CEIL: 0.2 (ppm) from NIOSH CEIL: 0.2 (ppm) from OSHA (PEL) [United States] TWA: 0.05 STEL: 0.05 (ppm) [United Kingdom (UK)] Consult local authorities for acceptable exposure limits.

### **Section 9: Physical and Chemical Properties**

Physical state and appearance: Liquid.

Odor: Pungent. Like rotten apples

Taste: Not available.

Molecular Weight: Not applicable.

Color: Colorless to light yellow.

pH (1% soln/water): Not available

biling Point: 101°C (213.8°F)

Melting Point: -6°C (21.2°F) - -7

Critical Temperature: Not available.

Specific Gravity: 1.062 - 1.124 (Water = 1)

Vapor Pressure: 0 kPa (@ 20°C)

Vapor Density: 1.05 (Air = 1)

Volatility: Not available.

Odor Threshold: 0.04 ppm

Water/Oil Dist. Coeff.: Not available.

Ionicity (in Water): Not available.

Dispersion Properties: See solubility in water, diethyl ether.

Solubility:

Easily soluble in cold water. Soluble in diethyl ether. Soluble in benzene, ethanol and other organic solvents.

# Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Conditions to avoid: exposure to air, and excess heat. (Glutaraldehyde)

Incompatibility with various substances: Reactive with oxidizing agents, alkalis.

Corrosivity: Non-corrosive in presence of glass.

#### **Special Remarks on Reactivity:**

Also incompatible with amines, ammonia and other caustics (e.g. ammonium hydroxide, calcium hydroxide, potassium hydroxide, and sodium hydroxide). Alkaline solutions react with alcohol, ketones, amines, hydrazines and proteins. (Glutaraldehyde)

Special Remarks on Corrosivity: Not available.

Polymerization: Will not occur.

# Section 11: Toxicological Information

Routes of Entry: Absorbed through skin. Eye contact. Inhalation. Ingestion.

#### **Toxicity to Animals:**

WARNING: THE LC50 VALUES HEREUNDER ARE ESTIMATED ON THE BASIS OF A 4-HOUR EXPOSURE. Acute oral toxicity (LD50): 100 mg/kg [Mouse]. Acute dermal toxicity (LD50): >2500 mg/kg [Rat]. Acute toxicity of the vapor (LC50): 480 mg/m 4 hours [Rat]. 3

#### **Chronic Effects on Humans:**

CARCINOGENIC EFFECTS: Classified A4 (Not classifiable for human or animal.) by ACGIH [Glutaraldehyde]. MUTAGENIC EFFECTS: Mutagenic for mammalian somatic cells. [Glutaraldehyde]. Mutagenic for bacteria and/or yeast. [Glutaraldehyde]. DEVELOPMENTAL TOXICITY: Classified Reproductive system/toxin/female, Reproductive system/toxin/male [SUSPECTED] [Glutaraldehyde]. Contains material which may cause damage to the following organs: blood, the reproductive system, liver, mucous membranes, spleen, central nervous system (CNS), Urinary system.

#### Other Toxic Effects on Humans:

Hazardous in case of skin contact (irritant), of ingestion, of inhalation (lung irritant, lung sensitizer). Slightly hazardous in case of skin contact (sensitizer, permeator).

#### Special Remarks on Toxicity to Animals:

Acute Toxicity: LD50 [Rabbit] dermal: Dose: 560 ul/kg. Reproductive Effects: TDL [male Rat] oral: Dose: 875 mg/kg given 35 days prior to mating TDL [female rat] oral: Dose 4370 mg/kg given 35 days prior to mating. (Glutaraldehyde)

Special Remarks on Chronic Effects on Humans:

May affect genetic material. Reproductive Effects in animals (rat): Paternal effects: testes, epididymis, sperm duct, prostate, seminal vesicle, Cowper's gland, accessory. Maternal effects: uterus, cervix, vagina (Glutaraldehyde)

#### Special Remarks on other Toxic Effects on Humans:

Detential Health Effects: Eye: Causes severe eye irritation. May cause eye injury or chemical conjunctivitis. Skin: Causes moderate to severe skin irritation. It may be absorbed through the skin, although poorly. May cause allergic contact dermatitis with itching and skin rash. May cause staining of the skin and nails to a brown or golden brown color. Ingestion: Harmful if swallowed. May cause severe irritation of the digestive tract with burning sensation in the chest, abdominal pain, cramping, vomiting, diarrhea (perhaps bloody diarrhea), vascular collapse, and coma. May also affect liver (increased liver enzymes, liver damage), spleen, blood (normocytic anemia), metabolism (weight loss), behavior (somnolence, excitement, dizziness, lethargy, ataxia, seizures), metabolism (weight loss), urinary system ( abnormal reneal function, anuria) Inhalation: Harmful if inhaled. Can cause respiratory tract irritation and sudden headaches, nausea, and

# 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 less toxic than the product itself.

Special Remarks on the Products of Biodegradation: Not available.

# Section 13: Disposal Considerations

aste Disposal:

vaste must be disposed of in accordance with federal, state and local environmental control regulations.

# Section 14: Transport Information

DOT Classification: CLASS 6.1: Poisonous material.

Identification: : Toxic Liquid, Organic, n.o.s (Glutaraldehyde solution) UNNA: 2810 PG: III

Special Provisions for Transport: Not available.

# **Section 15: Other Regulatory Information**

#### Federal and State Regulations:

Pennsylvania RTK: Glutaraldehyde Florida: Glutaraldehyde Massachusetts RTK: Glutaraldehyde New Jersey: Glutaraldehyde California Director's list of Hazardous Substances: Glutaraldehyde TSCA 8(b) inventory: Glutaraldehyde; Water TSCA 8(a) PAIR: Glutaraldehyde TSCA 8(d) H and S data reporting: Glutaraldehyde: 9/30/91 to 9/30/01

#### **Other Regulations:**

OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200). EINECS: This product is on the European Inventory of Existing Commercial Chemical Substances.

#### **Other Classifications:**

#### '∿HMIS (Canada):

ASS D-1A: Material causing immediate and serious toxic effects (VERY TOXIC). CLASS D-2B: Material causing other toxic effects (TOXIC). CLASS E: Corrosive liquid.

DSCL (EEC):

HMIS (U.S.A.):

Health Hazard: 2

Fire Hazard: 0

Reactivity: 0

Personal Protection: h

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

Health: 2

Flammability: 0

Reactivity: 0

**Specific hazard:** 

#### **Protective Equipment:**

Gloves. Lab coat. Vapor 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 05:38 PM

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

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sigma-aldrich.com

## **SAFETY DATA SHEET**

Version 5.9 Revision Date 06/17/2015 Print Date 10/09/2015

#### 1. PRODUCT AND COMPANY IDENTIFICATION 1.1 **Product identifiers** Product name Hydrochloric acid Product Number 258148 Brand Sigma-Aldrich 017-002-01-X Index-No. CAS-No. 7647-01-0 1.2 Relevant identified uses of the substance or mixture and uses advised against Identified uses Laboratory chemicals, Manufacture of substances : 1.3 Details of the supplier of the safety data sheet Company Sigma-Aldrich . 3050 Spruce Street SAINT LOUIS MO 63103 USA Telephone +1 800-325-5832 Fax +1 800-325-5052 1.4 **Emergency telephone number Emergency Phone #** : (314) 776-6555 2. HAZARDS IDENTIFICATION

## 2.1 Classification of the substance or mixture

Phyto Lab, RM

SIGMA-ALDRICH

## GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)

Corrosive to metals (Category 1), H290 Skin corrosion (Category 1B), H314 Serious eye damage (Category 1), H318 Specific target organ toxicity - single exposure (Category 3), Respiratory system, H335

For the full text of the H-Statements mentioned in this Section, see Section 16.

## 2.2 GHS Label elements, including precautionary statements

Pictogram

Signal word

Danger

Hazard statement(s)	
H290	May be corrosive to metals.
H314	Causes severe skin burns and eye damage.
H318	Causes serious eye damage.
H335	May cause respiratory irritation.
Precautionary statement(s)	
P234	Keep only in original container.
P261	Avoid breathing dust/ fume/ gas/ mist/ vapours/ spray.
P264	Wash skin thoroughly after handling.
P271	Use only outdoors or in a well-ventilated area.
P280	Wear protective gloves/ protective clothing/ eye protection/ face

	protection.
P301 + P330 + P331	IF SWALLOWED: Rinse mouth. Do NOT induce vomiting.
P303 + P361 + P353	IF ON SKIN (or hair): Remove/ Take off immediately all contaminated clothing. Rinse skin with water/ shower.
P304 + P340 + P310	IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing. Immediately call a POISON CENTER or doctor/ physician.
P305 + P351 + P338 + P310	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Immediately call a POISON CENTER or doctor/ physician.
P363	Wash contaminated clothing before reuse.
P390	Absorb spillage to prevent material damage.
P403 + P233	Store in a well-ventilated place. Keep container tightly closed.
P405	Store locked up.
P406	Store in corrosive resistant stainless steel container with a resistant inner liner.
P501	Dispose of contents/ container to an approved waste disposal plant.

## 2.3 Hazards not otherwise classified (HNOC) or not covered by GHS - none

## **3. COMPOSITION/INFORMATION ON INGREDIENTS**

## 3.2 Mixtures

MINCHIGO.		
Formula	:	HCI
Molecular weight		36.46 g/mol

## Hazardous components

Component		Classification	Concentration
Hydrochloric acid			
CAS-No.	7647-01-0	Met. Corr. 1; Skin Corr. 1B;	>= 30 - < 50 %
EC-No.	231-595-7	Eye Dam. 1; STOT SE 3;	
Index-No.	017-002-01-X	H290, H314, H335	
Registration number	01-2119484862-27-XXXX		

For the full text of the H-Statements mentioned in this Section, see Section 16.

## 4. FIRST AID MEASURES

## 4.1 Description of first aid measures

## **General advice**

Consult a physician. Show this safety data sheet to the doctor in attendance. Move out of dangerous area.

#### If inhaled

If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

#### In case of skin contact

Take off contaminated clothing and shoes immediately. Wash off with soap and plenty of water. Consult a physician.

## In case of eye contact

Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician.Continue rinsing eyes during transport to hospital.

## If swallowed

Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

## 4.2 Most important symptoms and effects, both acute and delayed The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

## 4.3 Indication of any immediate medical attention and special treatment needed No data available

## 5. FIREFIGHTING MEASURES

5.1 Extinguishing media

Suitable extinguishing media Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

- 5.2 Special hazards arising from the substance or mixture Hydrogen chloride gas
- 5.3 Advice for firefighters Wear self-contained breathing apparatus for firefighting if necessary.
- 5.4 Further information No data available

## 6. ACCIDENTAL RELEASE MEASURES

- 6.1 Personal precautions, protective equipment and emergency procedures Wear respiratory protection. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas. For personal protection see section 8.
- 6.2 Environmental precautions Do not let product enter drains.
- 6.3 Methods and materials for containment and cleaning up Soak up with inert absorbent material and dispose of as hazardous waste. Keep in suitable, closed containers for disposal.
- 6.4 Reference to other sections

For disposal see section 13.

## 7. HANDLING AND STORAGE

- 7.1 Precautions for safe handling Avoid contact with skin and eyes. Avoid inhalation of vapour or mist. For precautions see section 2.2.
- 7.2 Conditions for safe storage, including any incompatibilities Keep container tightly closed in a dry and well-ventilated place. Containers which are opened must be carefully resealed and kept upright to prevent leakage. Storage class (TRGS 510): Non-combustible, corrosive hazardous materials
- 7.3 Specific end use(s) Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

## 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

#### 8.1 Control parameters

#### Components with workplace control parameters

Component	CAS-No.	Value	Control parameters	Basis
Hydrochloric acid	7647-01-0	C	2.000000 ppm	USA. ACGIH Threshold Limit Values (TLV)
	Remarks	Upper Re Not class	spiratory Tract irritat	ion arcinogen
		C	5.000000 ppm 7.000000 mg/m3	USA. NIOSH Recommended Exposure Limits
	-	Often use	ed in an aqueous solu	ution.
		С	5.000000 ppm 7.000000 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
		The value	e in mg/m3 is approx	imate.

Ceiling limit is to be determined from breathing-zone air samples.		
С	2 ppm	USA. ACGIH Threshold Limit Values
		(TLV)
Upper Respir	ratory Tract irritatio	n
Not classifiat	ole as a human car	cinogen
С	5 ppm	USA. NIOSH Recommended
	7 mg/m3	Exposure Limits
Often used in	n an aqueous solut	ion.
С	5 ppm	USA. Occupational Exposure Limits
	7 mg/m3	(OSHA) - Table Z-1 Limits for Air
		Contaminants
The value in	mg/m3 is approxin	nate.
 Ceiling limit is to be determined from breathing-zone air samples.		
С	5 ppm	USA. OSHA - TABLE Z-1 Limits for
	7 mg/m3	Air Contaminants - 1910,1000

#### 8.2 Exposure controls

#### Appropriate engineering controls

Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

#### Personal protective equipment

#### Eye/face protection

Tightly fitting safety goggles. Faceshield (8-inch minimum). Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

#### Skin protection

Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Full contact Material: Nitrile rubber Minimum layer thickness: 0.4 mm Break through time: 480 min Material tested:Camatril® (KCL 730 / Aldrich Z677442, Size M)

Splash contact Material: Nitrile rubber Minimum layer thickness: 0.11 mm Break through time: 69 min Material tested:Dermatril® (KCL 740 / Aldrich Z677272, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374

If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

#### **Body Protection**

Complete suit protecting against chemicals, The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

#### **Respiratory protection**

Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multipurpose combination (US) or type ABEK (EN 14387) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

#### Control of environmental exposure

Do not let product enter drains.

## 9. PHYSICAL AND CHEMICAL PROPERTIES

## 9.1 Information on basic physical and chemical properties

a)	Appearance	Form: liquid Colour: light yellow
b)	Odour	pungent
c)	Odour Threshold	No data available
d)	pН	No data available
e)	Melting point/freezing point	-30 °C (-22 °F)
f)	Initial boiling point and boiling range	> 100 °C (> 212 °F) - lit.
g)	Flash point	Not applicable
h)	Evaporation rate	No data available
i)	Flammability (solid, gas)	No data available
j)	Upper/lower flammability or explosive limits	No data available
k)	Vapour pressure	227 hPa (170 mmHg) at 21.1 <sup>a</sup> C (70.0 547 hPa (410 mmHg) at 37.7 <sup>a</sup> C (99.9
I)	Vapour density	No data available
m)	Relative density	1.2 g/cm3 at 25 °C (77 °F)
n)	Water solubility	soluble
0)	Partition coefficient: n- octanol/water	No data available
р)	Auto-ignition temperature	No data available
q)	Decomposition temperature	No data available
r)	Viscosity	No data available
s)	Explosive properties	No data available
t)	Oxidizing properties	No data available
Oti No	n <b>er safety information</b> data available	

## **10. STABILITY AND REACTIVITY**

10.1 Reactivity No data available

9.2

- **10.2 Chemical stability** Stable under recommended storage conditions.
- 10.3 Possibility of hazardous reactions No data available
- 10.4 Conditions to avoid No data available

## 10.5 Incompatible materials Bases, Amines, Alkali metals, Metals, permanganates, e.g. potassium permanganate, Fluorine, metal acetylides, hexalithium disilicide

°F) °F) 10.6 Hazardous decomposition products Other decomposition products - No data available In the event of fire: see section 5

## **11. TOXICOLOGICAL INFORMATION**

## 11.1 Information on toxicological effects

#### Acute toxicity

No data available (Hydrochloric acid)

Inhalation: No data available

Inhalation: No data available (Hydrochloric acid)

Dermal: No data available (Hydrochloric acid)

No data available (Hydrochloric acid)

Skin corrosion/irritation Skin - Rabbit (Hydrochloric acid) Result: Causes burns.

Serious eye damage/eye irritation Eyes - Rabbit (Hydrochloric acid) Result: Corrosive to eyes

**Respiratory or skin sensitisation** No data available (Hydrochloric acid)

Germ cell mutagenicity No data available (Hydrochloric acid)

#### Carcinogenicity

This product is or contains a component that is not classifiable as to its carcinogenicity based on its IARC, ACGIH, NTP, or EPA classification. (Hydrochloric acid)

(Hydrochloric acid)

(Hydrochloric acid)

IARC: 3 - Group 3: Not classifiable as to its carcinogenicity to humans (Hydrochloric acid)

- NTP: No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.
- OSHA: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

#### **Reproductive toxicity**

No data available (Hydrochloric acid)

No data available (Hydrochloric acid)

#### Specific target organ toxicity - single exposure

The substance or mixture is classified as specific target organ toxicant, single exposure, category 3 with respiratory tract irritation. (Hydrochloric acid)

Specific target organ toxicity - repeated exposure No data available

Aspiration hazard No data available (Hydrochloric acid)

Additional Information RTECS: MW4025000

burning sensation, Cough, wheezing, laryngitis, Shortness of breath, spasm, inflammation and edema of the larynx, spasm, inflammation and edema of the bronchi, pneumonitis, pulmonary edema, Material is extremely destructive to tissue of the mucous membranes and upper respiratory tract, eyes, and skin. (Hydrochloric acid)

## **12. ECOLOGICAL INFORMATION**

## 12.1 Toxicity

Toxicity to fish

LC50 - Gambusia affinis (Mosquito fish) - 282 mg/l - 96 h (Hydrochloric acid)

- 12.2 Persistence and degradability No data available
- 12.3 Bioaccumulative potential No data available
- 12.4 Mobility in soil No data available (Hydrochloric acid)
- 12.5 Results of PBT and vPvB assessment PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

#### 12.6 Other adverse effects

No data available

## 13. DISPOSAL CONSIDERATIONS

#### 13.1 Waste treatment methods

#### Product

Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material. Dissolve or mix the material with a combustible solvent and burn in a chemical incinerator equipped with an afterburner and scrubber.

#### Contaminated packaging

Dispose of as unused product.

#### **14. TRANSPORT INFORMATION**

#### DOT (US)

UN number: 1789 Class: 8 Proper shipping name: Hydrochloric acid Reportable Quantity (RQ):

Poison Inhalation Hazard: No

#### IMDG

UN number: 1789 Class: 8 Proper shipping name: HYDROCHLORIC ACID

Packing group: II

Packing group: II

EMS-No: F-A, S-B

**IATA** 

UN number: 1789 Class: 8 Proper shipping name: Hydrochloric acid

Packing group: II

#### **15. REGULATORY INFORMATION**

SARA 302 Components	
No chemicals in this material are subject to the reporting requirements of SARA Title III.	Section 302

#### SARA 313 Components

The following components are subject to reporting levels establi	ished by SARA Title II	l, Section 313:
	CAS-No.	Revision Date
Hydrochloric acid	7647-01-0	1993-04-24
SARA 311/312 Hazards		
Acute Health Hazard		

## Massachusetts Right To Know Components

CAS-No. **Revision Date** 7647-01-0 1993-04-24 Hydrochloric acid

## Pennsylvania Right To Know Components

	CAS-No.	Revision Date
Water	7732-18-5	
Hydrochloric acid	7647-01-0	1993-04-24
New Jersey Right To Know Components		
•	CAS-No.	Revision Date
Water	7732-18-5	
Hydrochloric acid	7647-01-0	1993-04-24

## California Prop. 65 Components

This product does not contain any chemicals known to State of California to cause cancer, birth defects, or any other reproductive harm.

## **16. OTHER INFORMATION**

#### Full text of H-Statements referred to under sections 2 and 3.

Eye Dam.	Serious eye damage
H290	May be corrosive to metals.
H314	Causes severe skin burns and eye damage.
H318	Causes serious eye damage.
H335	May cause respiratory irritation.
Met. Corr.	Corrosive to metals
Skin Corr.	Skin corrosion
STOT SE	Specific target organ toxicity - single exposure

## **HMIS Rating**

Health hazard:	3
Chronic Health Hazard:	
Flammability:	0
Physical Hazard	0
NFPA Rating	
Health hazard:	3
Fire Hazard:	0
Reactivity Hazard:	0

## Further information

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#### **Preparation Information**

Sigma-Aldrich Corporation Product Safety – Americas Region 1-800-521-8956

Version: 5.9

Revision Date: 06/17/2015

Print Date: 10/09/2015



# **MSDS - Manganese Sulfate**

Issued June 3, 2008

## **Section 1. Product Information**

Product Name/Trade Name: Manganese Sulfate Monohydrate Synonym: Sulfuric Acid, Manganese salt monohydrate, Manganous Sulphate Formula: MnSO<sub>4</sub>H<sub>2</sub>O, MnSO<sub>4</sub> Chemical Name: Manganese Sulfate Monohydrate Chemical FormulaMnSO<sub>4</sub>H<sub>2</sub>O CAS No.: 10034-96-5 (monohydrate) 7785-87-7 (anhydrous) EINECS (Ec) No: 232-089-9

Distributed by Pestell Minerals & Ingredients, New Hamburg, ON Canada 24 Hour Emergency Telephone (Canutec): 613-996-6666

## Section 2. Hazards Ingredients

Ingredient: Manganese Sulfate Monohydrate 98-100% by Weight

Section 3. Physical Data Physical State: Solid Appearance: Slightly pink powder Odor: Odorless Specific Gravity: 2.95 pH Value: 5.0 - 7.0 Melting Point: 200°C Boiling Point: 850°C Decomposition: 200°C Liquid Density: N/A Vapor Pressure: N/A Vapor Density: N/A Evaporation Rate: N/A Solubility: Easily soluble in water, insoluble in ethanol

## Section 4. Stability and Reactivity

Chemical Stability: Stable under normal temperatures and pressures Incompatibility (Materials to Avoid): Strong oxidizing agents, strong acids, aluminum and magnesium

**Conditions to Avoid:** Incompatible materials, exposure to moist air or water, excessive heat **Hazardous Decomposition Products:** Carbon dioxide, sulfur oxides, oxides of manganese **Hazardous Polymerization:** Will not occur

## Section 5. Hazardous Identification

**Overview:** Harmful if swallowed or inhaled. Affects lungs, central nervous system, blood and kidneys. May cause irritation to skin, eyes and respiratory tract.

## **Potential Acute Health Effects**

Eyes: May cause mild eye irritation

Skin: May cause skin irritation. Low hazard for usual industrial handling.

**Ingestion:** Harmful if swallowed. May cause gastrointestinal irritation with nausea, vomiting and diarrhea.

Inhalation: Harmful if inhaled. May cause respiratory tract irritation.

## **Potential Chronic Health Effects**

Chronic manganese poisoning can result from excessive inhalation and ingestion exposure and involves impairment of the central nervous system. Kidney effects, blood changes and manganese psychosis also may occur as a result of chronic exposure. Chronic inhalation exposure can cause lung damage. Please refer to Section 12: Toxicological Information of this MSDS to get more details about the potential chronic health effects.

## Section 6. First Aid

Eyes: Flush eyes with plenty of water for at least 15 minutes. Seek medical advice if effects persist. Skin: Flush affected area with plenty of water and mild detergent for several minutes. Remove contaminated clothing and wash before re-use. Seek medical advice if effects persist.

**Ingestion:** If victim is conscious and alert, give 2-4 cupful of milk or water. Never give anything by mouth to an unconscious person. Seek medical attention.

**Inhalation:** Remove victim to fresh air. Employ artificial respiration if indicated. Seek medical attention.

## Section 7. Fire Fighting Measures

Flash Point: N/A

**Explosive Limit:** N/A

Autoignition Temperature: N/A

Fire/Explosion: Not considered to be a fire and explosion hazard

Extinguishing Medium: Water fog or other medium appropriate to surrounding fire conditions.

## **Fire Fighting Instructions**

Use suitable protective equipment for surrounding fire. The use of fire extinguishers of the chlorinated hydrocarbon type is not recommended, as toxic products will probably be produced by the decomposition of the extinguishing medium when it come into contact with hot manganese compounds.

## Section 8. Spills and Disposals

Don't touch or walk through this product. Stop leak if safe to do so. Prevent entry into waterways, drains, confined areas. Prevent dust cloud. Use clean non-sparking tools to collect material and place it into loosely covered plastic containers for later disposal.

## Section 9. Handling and Storage

Handling: Wash hands before eating. Use with adequate ventilation. Avoid breathing dust. Avoid contacting skin, eyes and clothing. Avoid prolonged or repeated exposure.

Storage: Keep in a tightly closed container and store in a cool, dry, well ventilated place. Protect against physical damage. Isolate from all incompatible substances.

## Section 10. Disposal Suggestions

Dispose of in accordance with all applicable local, state and federal regulations at an approved waste disposal facility.

## Section 11. Exposure Controls & Personal Protection

**Exposure** Limits

OSHA PEL: 5mg/CBM Ceiling for manganese compounds as Mn ACGIH TLV: 0.2 mg/CBM (TWA) for manganese, elemental and inorganic compounds as Mn. Engineering Controls Use adequate exhaust ventilation to keep airborne concentrations below the allowable exposure limit. Personal Protective Equipment Eyes: Wear appropriate protective eyeglasses or chemical safety goggles Skin: Wear appropriate protective gloves Respiratory System: Approved or certified respirators Other Protective Equipments: Overalls or similar protective apparel, clean up facilities. Don't eat, drink or smoke in work areas. Wash hands thoroughly after handling this material.

## Section 12. Toxicological Information

**Toxicity to Animals:** LD50/LC50, N/A. Oral (Rat) 2150mg/kg. Does not belong to toxic substances. **Chronic Effects on Humans** 

**Overview:** The substance is toxic to lungs, central nervous system (CNS), liver and kidney. Chronic manganese poisoning can result from excessive inhalation and ingestion exposure and involves impairment of the central nervous system. Early symptoms include sluggishness, sleepiness and weakness in the legs. Advanced cases have shown fixed facial expression, emotional disturbances, spastic gait and falling. Illness closely resembles Parkinson's Disease. Kidney effects, blood changes and manganese psychosis also may occur as a result of long term exposure. Chronic inhalation exposure can cause lung damage.

Carcinogenicity: Not listed as a suspected/confirmed carcinogen by ACGIH, IARC, NTP, SHA. Mutagenicity: Possible for humans. Laboratory experiments have shown mutagenic effects. Reproductive Toxicity: N/A. May damage the reproductive system. Teratogenicity: Teratogenic effects shown in lab animals.

## Section 13. Ecological Information

Degradability: N/A

**Aquatic Toxicity:** This product is classified as an environmental factor by EC with phrases N R51-53. Environmental Precautions: Environmentally Hazardous Material. DO NOT DISCHARGE into drains and rivers.

## Section 14. Transport and Label Information

Transport: Not redefined as hazardous material by IMDG Code and IATA

See UN suggestion if not redefined in your area

## **Label Hazard and Precautions**

Warning! Harmful is swallowed or inhaled. May affect central nervous system, blood and respiratory system. Do not breathe dust. Use only with adequate ventilation. Wash thoroughly after handling. Wear work gloves, safety goggles, breathing mask and overalls when handling. Avoid release to environment. Keep our of reach of Children!. Label First Aid: See Section 6: First Aid Measures of this MSDS

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ACROS COM



MATERIAL SAFETY DATA SHEET Mercury(II) chloride

	Section 1 - Chemical Product and	Company Identification
MSDS Name:	Mercury(II) chloride	
Catalog Numbers:	20143-0000, 20143-0250, 20143-1000, 1000, 42393-5000	, 20143-5000, 42393-0000, 42393-0050, 42393-
Synonyms:	Mercuric chloride	
Company Identi	fication:	Acros Organics BVBA Janssen Pharmaceuticalaan 3a 2440 Geel, Belgium
Company Identi	fication: (USA)	Acros Organics One Reagent Lane Fair Lawn, NJ 07410
For information	in the US, call:	800-ACROS-01
For information	in Europe, call:	+32 14 57 52 11
Emergency Number, Europe:		+32 14 57 52 99
<b>Emergency Num</b>	iber US:	201-796-7100
CHEMTREC Pho	ne Number, US:	800-424-9300
CHEMTREC Pho	ne Number, Europe:	703-527-3887



## Section 3 - Hazards Identification

## **EMERGENCY OVERVIEW**

Very toxic if swallowed. Causes burns. Toxic : danger of serious damage to health by prolonged exposure in contact with skin and if swallowed. Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

## **Potential Health Effects**

- **Eye:** Causes eye burns.
- **Skin:** May be fatal if absorbed through the skin. Causes skin burns.
- **Ingestion:** May be fatal if swallowed. Causes gastrointestinal irritation with nausea, vomiting and diarrhea. May cause muscle tremor and impaired motor function. May cause liver and kidney damage. May cause cardiac disturbances.

- **Inhalation:** May cause severe irritation of the respiratory tract with sore throat, coughing, shortness of breath and delayed lung edema. May cause central nervous system effects including vertigo, anxiety, depression, muscle incoordination, and emotional instability. May cause gastrointestinal effects including gum and mouth inflammation, jaw necrosis, and loosening of the teeth.
- **Chronic:** Prolonged or repeated skin contact may cause dermatitis. Chronic inhalation and ingestion may cause effects similar to those of acute inhalation and ingestion.

	Section 4 - First Aid Measures				
Eyes:	Immediately flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower eyelids. Get medical aid immediately.				
Skin:	Get medical aid immediately. Immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse.				
Ingestion:	If victim is conscious and alert, give 2-4 cupfuls of milk or water. Get medical aid immediately. Wash mouth out with water.				
<b>Inhalation:</b> Get medical aid immediately. Remove from exposure and move to fresh air immed If not breathing, give artificial respiration. If breathing is difficult, give oxygen.					
Notes to Physician:					
	Section 5 - Fire Fighting Measures				
General Informatio	As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. During a fire, irritating and highly toxic gases may be generated by thermal decomposition or combustion. Substance is noncombustible.				
Extinguish Media:	Use water spray, dry chemical, carbon dioxide, or chemical foam.				
	Section 6 - Accidental Release Measures				
General Informatio	n: Use proper personal protective equipment as indicated in Section 8.				
Spills/Lea	<b>(S:</b> Vacuum or sweep up material and place into a suitable disposal container. Avoid runoff into storm sewers and ditches which lead to waterways. Wear a self contained breathing apparatus and appropriate personal protection. (See Exposure Controls, Personal Protection section). Sweep up or absorb material, then place into a suitable clean, dry, closed container for disposal. Avoid generating dusty conditions. Do not let this chemical enter the environment.				
	Section 7 - Handling and Storage				
Handling:	Wash thoroughly after handling. Remove contaminated clothing and wash before reuse. Use only in a well-ventilated area. Minimize dust generation and accumulation. Do not breathe dust, vapor, mist, or gas. Do not get in eyes, on skin, or on clothing. Do not ingest or inhale. Use only in a chemical fume hood.				
Storage:	Store in a tightly closed container. Store in a cool, dry, well-ventilated area away from incompatible substances. Poison room locked.				
	Section 8 - Exposure Controls, Personal Protection				

## **Engineering Controls:**

Use adequate ventilation to keep airborne concentrations low. Use adequate general or local exhaust ventilation to keep airborne concentrations below the permissible exposure limits.

Exposure Limits

CAS# 7487-94-7:

France - VME: (mercury inorganic compounds): 0.1 mg/m3 VME (as Hg) Germany: (mercury inorganic compounds): 0.1 mg/m3 VME (as Hg) Germany: (mercury inorganic compounds): skin notation

Malaysia: (mercury inorganic compounds): 0.025 mg/m3 TWA (as Hg) Netherlands: (mercury inorganic compounds): 0.15 mg/m3 STEL Netherlands: (mercury inorganic compounds): 0.05 mg/m3 MAC

Russia: (mercury inorganic compounds): 0.005 mg/m3 TWA (aerosol, as Hg) Spain: (mercury inorganic compounds): 0.025 mg/m3 VLA-ED (as Hg)

## **Personal Protective Equipment**

**Eyes:** Wear chemical splash goggles.

**Skin:** Wear appropriate protective gloves to prevent skin exposure.

**Clothing:** Wear appropriate protective clothing to prevent skin exposure.

**Respirators:** Follow the OSHA respirator regulations found in 29 CFR 1910.134 or European Standard EN 149. Use a NIOSH/MSHA or European Standard EN 149 approved respirator if exposure limits are exceeded or if irritation or other symptoms are experienced.

Section 9 - Physical and Chemical Properties

Physical State:	Crystals
Color:	white
Odor:	Not available
pH:	3.3 (10 g/l aq.sol.)
Vapor Pressure:	0.001mbar @20 deg C
Viscosity:	Not available
Boiling Point:	302 deg C @760mmHg ( 575.60°F)
Freezing/Melting Point:	277 deg C ( 530.60°F)
Autoignition Temperature:	Not available
Flash Point:	Not available
<b>Explosion Limits: Lower:</b>	Not available
<b>Explosion Limits: Upper:</b>	Not available
<b>Decomposition Temperature:</b>	Not available
Solubility in water:	7.4 g/100 ml (20°C)
Specific Gravity/Density:	
Molecular Formula:	Cl2Hg
Molecular Weight:	271.5

	Section 10 - Stability and Reactivity
Chemical Stability:	Light sensitive.
<b>Conditions to Avoid:</b>	Incompatible materials, light, excess heat, organic matter.
Incompatibilities with Other Materials	Metals, strong oxidizing agents, acids, bases, ammonia, copper, iron, potassium, antimony, sodium, sulfides (inorganic, e.g. ferric sulfide, lead sulfide, sodium sulfide), lead, hypophosphites, formates, phosphates, gelatin, lime water, arsenic, bromides, borax, carbonates, reduced iron, tannic acid.
Hazardous Decomposition Products	Carbon monoxide, carbon dioxide, toxic fumes of mercury, fluoride fumes.
Hazardous Polymerization	Has not been reported.
	Section 11 - Toxicological Information

	IATA	IMO	RID/ADR
	Section 14	- Transport Information	
Dispose of in a m	nanner consistent with federa	al, state, and local regulations.	
	Section 13	- Disposal Considerations	
Other:	Do not empty into dra	ains.	
	Section 12	- Ecological Information	
Other:	See actual entry in RTECS for not been fully investigated.	or complete information. The to	oxicological properties have
Carcinogenicity:	Mercury(II) chloride - IARC:	Group 3 (not classifiable)	
LD50/LC50:	RTECS: <b>CAS# 7487-94-7:</b> Draize te Draize test, rabbit, skin: 500 Oral, mouse: LD50 = 6 mg/l Oral, rat: LD50 = 1 mg/kg; Skin, rat: LD50 = 41 mg/kg;	st, rabbit, eye: 50 ug/24H Sev ) mg/24H Severe; <g;< th=""><th>ere;</th></g;<>	ere;
RTECS#:	CAS# 7487-94-7: OV910000	0	

Packing Group: Severe Marine Pollutant

**UN Number:** 

Shipping Name: Hazard Class:

Section 15 - Regulatory Information

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## **European/International Regulations**

European Labeling in Accordance with EC Directives

MERCURIC CHLORIDE

Hazard Symbols: T+ N

Risk Phrases:

R 28 Very toxic if swallowed.

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R 34 Causes burns.

R 48/24/25 Toxic : danger of serious damage to health by prolonged exposure in contact with skin and if swallowed.

MERCURIC CHLORIDE

MERCURIC CHLORIDE

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R 50/53 Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

Safety Phrases:

S 36/37/39 Wear suitable protective clothing, gloves and eye/face protection.

S 45 In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).

S 60 This material and its container must be disposed of as hazardous waste.

S 61 Avoid release to the environment. Refer to special instructions/safety data sheets.

WGK (Water Danger/Protection)

CAS# 7487-94-7: 3

Canada

CAS# 7487-94-7 is listed on Canada's DSL List

## US Federal

TSCA

CAS# 7487-94-7 is listed on the TSCA Inventory.

## MSDS Creation Date: 7/16/1996

Revision #1 Date 3/31/2008

Revisions were made in Sections: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10,

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Health	1
Fire	0
Reactivity	0
Personal Protection	E

# Material Safety Data Sheet Potassium Iodide MSDS

## Section 1: Chemical Product and Company Identification

Product Name: Potassium Iodide Catalog Codes: SLP2050, SLP1042, SLP2854 CAS#: 7681-11-0 RTECS: TT2975000 TSCA: TSCA 8(b) inventory: Potassium Iodide

Cl#: Not available.

Synonym:

Chemical Name: Potassium Iodide

Chemical Formula: Kl

## **Contact Information:**

Sciencelab.com, Inc. 14025 Smith Rd. Houston, Texas 77396

US Sales: 1-800-901-7247 International Sales: 1-281-441-4400

Order Online: ScienceLab.com

CHEMTREC (24HR Emergency Telephone), call: 1-800-424-9300

International CHEMTREC, call: 1-703-527-3887

For non-emergency assistance, call: 1-281-441-4400

## Section 2: Composition and Information on Ingredients

## Composition:

Name	CAS #	% by Weight
Potassium Iodide	7681-11-0	100

**Toxicological Data on Ingredients:** Potassium Iodide LD50: Not available. LC50: Not available. Lowest Published Lethal Dose: LDL [Mouse] - Route: Oral; Dose: 1862 mg/kg LDL [Rabbit] - Route: Oral; Dose: 916 mg/kg

Section 3: Hazards Identification

Potential Acute Health Effects: Slightly hazardous in case of skin contact (irritant), of eye contact (irritant), of ingestion, of inhalation.

## Potential Chronic Health Effects:

CARCINOGENIC EFFECTS: Not available. MUTAGENIC EFFECTS: Mutagenic for mammalian somatic cells. TERATOGENIC EFFECTS: Not available. DEVELOPMENTAL TOXICITY: Classified Reproductive system/toxin/female, Development toxin [POSSIBLE]. The substance may be toxic to thyroid. Repeated or prolonged exposure to the substance can produce target organs damage.

## Section 4: First Aid Measures

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 if irritation occurs.

## Skin Contact:

'ash with soap and water. Cover the irritated skin with an emollient. Get medical attention if irritation develops. Cold water

Serious Skin Contact: Not available.

## 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.

19.4

## 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.

oducts of Combustion: Some hazardous decomposition products are: Hydrogen lodide, Oxides of potassium , iodine

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: Potassium iodide + Fluorine Perchlorate will explode on contact.

## 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.

## Section 7: Handling and Storage

## . recautions:

Do not breathe dust. Wear suitable protective clothing. If you feel unwell, seek medical attention and show the label when possible. Keep away from incompatibles such as oxidizing agents, reducing agents, metals, acids, moisture.

## Storage:

Moisture Sensitive. Light Sensitive. Air SensitiveKeep container tightly closed in light-resistant containers. 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:** Safety glasses. 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: Not available.

## **Section 9: Physical and Chemical Properties**

Physical state and appearance: Solid. (Deliquescent crystals solid.)

Odor: Odorless.

Taste: Bitter. Saline. (Strong.)

blecular Weight: 166 g/mole

Color: White.

pH (1% soln/water): Not available.

Boiling Point: 1330°C (2426°F)

Melting Point: 681°C (1257.8°F)

Critical Temperature: Not available.

Specific Gravity: 3.1 (Water = 1)

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, methanol, acetone.

Solubility:

Easily soluble in cold water, hot water. Soluble in methanol. Partially soluble in acetone.

## Section 10: Stability and Reactivity Data

Stability: The product is stable.

## Instability Temperature: Not available.

## **Conditions of Instability:**

Light, moisture, incompatible materials. It is stable under ordinary conditions of use and storage. On long exposure to air, it incomes yellow due to release of iodine.

Incompatibility with various substances: Reactive with oxidizing agents, reducing agents, organic materials, metals, acids.

## **Corrosivity:**

Corrosive in presence of steel, of aluminum, of zinc. Non-corrosive in presence of glass, of copper, of stainless steel(304), of stainless steel(316).

## Special Remarks on Reactivity:

Moisture Sensitive. Light Sensitive. Air Sensitive. Air causes decomposition to iodine. Reacts violently with strong oxidizers, bromotrifluorides, chlorotrifluorides, fluorine perchlorate, metallic salts. Attacks metals in moist environments. Also incompatible with salts of alkaloids, chloral hydrate, calomel (mercurous chloride), potassium chlorate, tartaric and other acids, oxidants, diazonium salts, charcoal, ozone, strong reducers, alkali metals, metals (brass, aluminum magnesium, zinc, cadmium, copper, tin, nickel, steel), metallic salts, organic materials, light.

## Special Remarks on Corrosivity:

Incompatible with water, producing a corrosive. Corrosive in all concentrations to most metals, except stainless steel, titanium, and tantalum.

Polymerization: Will not occur.

## Section 11: Toxicological Information

Routes of Entry: Inhalation. Ingestion.

## **Toxicity to Animals:**

LD50: Not available. LC50: Not available.

## nronic Effects on Humans:

MUTAGENIC EFFECTS: Mutagenic for mammalian somatic cells. DEVELOPMENTAL TOXICITY: Classified Reproductive system/toxin/female, Development toxin [POSSIBLE]. May cause damage to the following organs: thyroid.

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

## **Special Remarks on Toxicity to Animals:**

Lowest Published Lethal Dose: LDL [Mouse] - Route: Oral; Dose: 1862 mg/kg LDL[Rabbit] - Route: Oral; Dose: 916 mg/kg

## Special Remarks on Chronic Effects on Humans:

Can cause adverse reproductive efects and birth defects based on animal data. May affect genetic material based on animal data

## Special Remarks on other Toxic Effects on Humans:

Acute Potential Health Effects: Skin: May cause skin irritation. Eyes: May cause eye irritation. Inhalation: May cause respiratory tract and mucous membrane irritation and a productive cough. May cause pulmonary edema and inflammation of the tonsils. Ingestion: Causes gastrointestinal tract irritation with nausea, vomiting and diarrhea. May affect behavior (somnolence, muscle weakness), respiration (dyspnea). Serum-sickness type of hypersensitivity such as fever, arthralgia, lymph node enlargement, and eosinophilia may appear. Thrombotic thrombocytopenic purpura, and fatal periarteritis nodosa attributed to hypersensitivity to iodide has been described. Chronic Potential Health Effects: Can lead to iodism characterized by salivation, nasal discharge, sneezing, conjunctivitis, fever, headache, laryngitis, bronchitis, stomatits, parotitis, anemia, and skin rashes. Chronic ingestion may also affect metabolism (anorexia), and thyroid gland (hypothyroidism, goiter). Furthermore, chronic ingestion of iodides (in animals) during pregnancy has resulted in fetal deaths, severe goiter and cretinoid appearance of the newborn.

## Section 12: Ecological Information

Ecotoxicity: Not available.

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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 product itself and its products of degradation are not toxic.

pecial Remarks on the Products of Biodegradation: Not available.

## **Section 13: Disposal Considerations**

## Waste Disposal:

Waste must be disposed of in accordance with federal, state and local environmental control regulations.

## Section 14: Transport Information

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

Identification: Not applicable.

Special Provisions for Transport: Not applicable.

## Section 15: Other Regulatory Information

Federal and State Regulations: TSCA 8(b) inventory: Potassium lodide

Other Regulations: EINECS: This product is on the European Inventory of Existing Commercial Chemical Substances.

Other Classifications:

HMIS (Canada): CLASS D-2A: Material causing other toxic effects (VERY TOXIC).

DSCL (EEC): Not available Not applicable.

HMIS (U.S.A.):

Health Hazard: 1

Fire Hazard: 0

Reactivity: 0

Personal Protection: E

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

Health: 1

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. Safety glasses.

## Section 16: Other Information

References: Not available.

Other Special Considerations: Not available.

Created: 10/11/2005 12:21 PM

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

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ACROS COM



## MATERIAL SAFETY DATA SHEET

Sodium thiosulfate

## Section 1 - Chemical Product and Company Identification

MSDS Name:	Sodium thiosulfate	
Catalog Numi	bers: 20287-0000, 20287-0010, 2	<b>0287-0025, 2028</b> 7-0050, 20287-5000
Synonyms:		
Company Ide	ntification:	Acros Organics BVBA Janssen Pharmaceuticalaan 3a 2440 Geel, Belgium
Company Ide	ntification: (USA)	Acros Organics One Reagent Lane Fair Lawn, NJ 07410
For information	on in the US, call:	800-ACROS-01
For information	on in Europe, call:	+32 14 57 52 11
Emergency N	umber, Europe:	+32 14 57 52 99
Emergency N	umber US:	201-796-7100
CHEMTREC P	hone Number, US:	800-424-9300
CHEMTREC P	hone Number, Europe:	703-527-3887
	Section 2 - Composition, I	nformation on Ingredients
Haza Risk	CAS# Chemical Na 7772-98-7 Sodium thios rd Symbols: None listed Phrases: None listed	me: % EINECS# ulfate 98.5% 231-867-5
	Section 3 - Haza	rds Identification
	EMERGENCY	OVERVIEW
	Not av	ailable
Potential Hea	Ith Effects	
Eye:	May cause eye irritation.	
Skin:	May cause skin irritation. May be har	mful if absorbed through the skin.
Ingestion:	May cause irritation of the digestive	rract. May be harmful if swallowed.
Inhalation:	May cause respiratory tract irritation.	May be harmful if inhaled.
Chronic:	Prolonged or repeated skin contact m	ay cause dermatitis.
	Section 4 - Firs	st Aid Measures
Eyes:	Flush eyes with plenty of water fo and lower eyelids. Get medical aid	r at least 15 minutes, occasionally lifting the upper
Skin:	Get medical aid. Flush skin with pl contaminated clothing and shoes.	enty of water for at least 15 minutes while removing

Ingestion:	Get medical aid. Wash mouth out with water.						
Inhalation:	Remove from exposure and move to fresh air immediately. Get medical aid.						
Notes to Physician:	otes to Treat symptomatically and supportively.						
	Section 5 - Fire Fighting Measures						
General Information:	As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. Substance is noncombustible.						
Extinguishing Media:	Use extinguishing media most appropriate for the surrounding fire.						
	Section 6 - Accidental Release Measures						
General Information:	Use proper personal protective equipment as indicated in Section 8.						
Spills/Leaks:	Vacuum or sweep up material and place into a suitable disposal container. Do not let this chemical enter the environment.						
	Section 7 - Handling and Storage						
Handling: Avoid and ir	breathing dust, vapor, mist, or gas. Avoid contact with skin and eyes. Avoid ingestion halation.						
Storage: Store	in a cool, dry place. Store in a tightly closed container.						
	Section 8 - Exposure Controls, Personal Protection						

## **Engineering Controls:**

Use adequate ventilation to keep airborne concentrations low.

**Exposure Limits** 

CAS# 7772-98-7:

## **Personal Protective Equipment**

**Eyes:** Wear chemical splash goggles.

**Skin:** Wear appropriate protective gloves to prevent skin exposure.

**Clothing:** Wear appropriate protective clothing to prevent skin exposure.

**Respirators:** Follow the OSHA respirator regulations found in 29 CFR 1910.134 or European Standard EN 149. Use a NIOSH/MSHA or European Standard EN 149 approved respirator if exposure limits are exceeded or if irritation or other symptoms are experienced.

## Section 9 - Physical and Chemical Properties

Physical State:Crystalline powderColor:whiteOdor:odorlesspH:6.0-8.5 (5% aq. sol. 20°C)Vapor Pressure:Not availableViscosity:Not availableBoiling Point:100 deg C ( 212.00°F)Freezing/Melting Point:48 deg C ( 118.40°F)Autoignition Temperature:Not availableFlash Point:Not availableExplosion Limits: Lower:Not available

Explosion Limits: Upper: Not available Decomposition Temperature: Not available Solubility in water: 500 g/l(20°C) Specific Gravity/Density: 1.660 Molecular Formula: Na2O3S2 Molecular Weight: 158.1

		Section 10 - Stability and Reactivity				
Chemical Stabilit	y:	Stable under normal temperatures and pressures.				
Conditions to Avoid:		High temperatures, incompatible materials, light, exposure to moist air or water.				
Incompatibilities Other Materials	with	Strong oxidizing agents, strong oxidizing agents, acids, chlorates, permanganates, silver salts, mercury, metal nitrates, sodium nitrite, iodine.				
Hazardous Deco Products	mposition	Carbon monoxide, oxides of sulfur, carbon dioxide, sodium oxide.				
Hazardous Polyn	nerization	Will not occur.				
		Section 11 - Toxicological Information				
RTECS#:	CAS# 7772-98-7: XN6476000					
LD50/LC50: RTECS: No		t available. Other: Oral, rat : LD50 = >5000mg/kg				
Carcinogenicity:	Sodium th	iosulfate - Not listed as a carcinogen by ACGIH, IARC, NTP, or CA Prop 65.				
Other: See actual e not been fu		entry in RTECS for complete information. The toxicological properties have ully investigated.				
		Section 12 - Ecological Information				
Ecotoxicity:	Fi	sh: Mosquito Fish: 24000mg/l; 96h; .				
Other:	Do r log l	not empty into drains. Pow : -4.35				
		Section 13 - Disposal Considerations				
Dispose of in a m	anner cons	sistent with federal, state, and local regulations.				

Section 14 - Transport Information							
	IATA	IMO	RID/ADR				
Shipping Name: Hazard Class:	Not regulated.	Not regulated.	Not regulated.				
UN Number: Packing Group:							

Section 15 - Regulatory Information

## **European/International Regulations**

European Labeling in Accordance with EC Directives

Hazard Symbols:Not available

Risk Phrases:

Safety Phrases:

S 24/25 Avoid contact with skin and eyes.

WGK (Water Danger/Protection)

CAS# 7772-98-7: 0

## Canada

CAS# 7772-98-7 is listed on Canada's DSL List

## **US Federal**

TSCA

CAS# 7772-98-7 is listed on the TSCA Inventory.

## Section 16 - Other Information

#### MSDS Creation Date: 7/16/1996

Revision #1 Date 2/20/2008

**Revisions were made in Sections:** 1, 2, 3, 4, 5, 6, 7, 8, 9, 11,

The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantibility or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. In no event shall the company be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential, or exemplary damages howsoever arising, even if the company has been advised of the possibility of such damages.

P304 + P340 + P310     IF INHALED: Remove person to fresh air and keep comfortable for breathing. Immediately call a POISON CENTER or doctor/ physician.       P305 + P351 + P338 + P310     IF IN EYES: Runse cautiously with water for several minutes. Remove confact lanes, if present and easy to do. Continue inishig. Immediately call a POISON CENTER or doctor/ physician.       P363     Wtash contaminued continue inishing. Immediately wash contaminued continue doctor/ physician.       P363     Wtash contaminued continue doctor physician.       P363     Absorb spillage to prevent material damage.       P365     Store locked up.	P406 Store in corrosive resistent stainless steel container with a resistant inner liner. Dispose of container to an approved waste disposal plant.	<ol> <li>2.3 Hazards not otherwise classified (HNOC) or not covered by GHS - none</li> <li>3. COMPOSITIONINFORMATION ON INGREDIENTS</li> </ol>	3.1 Substances Formula : H2O4S Mocutar weight 98.08 g/mol CAS-No. : 7664-93-9 EC-No. : 21-639-5	Index-No. 016-020-00-8 Registration number 01-2119458838-20-XXXX Mazardous components 01-2119458838-20-XXXX Component Concentration Concentration	Surrunc acted Wei, Corr. 1; Skin Corr. 1A; <= 100 % Eye Dam. 1; H290, H314, H318 For the full text of the H-Statements mentioned in this Section, see Section 16.	4. FIRST AID MEASURES 4.1 Description of first aid measures General advice	consurt a privacean. Snow this safety data sneet to the occion in antendance, more out of cangerous area. If inhaled If breathed in, move person into fresh air, if not breathing, give artificial respiration. Consult a physician,	Take off contaminated clothing and shoes immediately. Wash off with scap and plenty of water. Consult a physician. In case of eye contact Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician.Continue rinsing eyes during In sumport to hospital.	Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician. A.2 Most important symptoms and effects, both acute and delayed The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11 4.3 Indication of any immediate medical attention and special treatment needed No data available	5. FIREFIGHTING MEASURES 5.1 Extinguishing media Suitable extinguishing media Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.	Autoch - 339741 Page 2 of 6
A-ALDRICH SAFETY DATA SHEET Version 5.7 Revision 5.7 Revi	aduct identifiers Sulfuric acid	duct Number 339741 nd Archich Adritch ax-No. 016-020-00-8	S-No. 7664-93-9 evant identified uses of the substance or mixture and uses advised against nitified uses : Laboratory chemicals, Manufacture of substances	The supplier of the safety data sheet Theny : Sigma-Adrich 3050 Spruce Street SAINT LOUIS MO 63103 USA	bhione + 1 800-325-5832 + + 1 800-325-5652 -rgency telephone number ergency Phone # + (314) 776-8555	DS IDENTIFICATION La Action of the substance or mixture & Classification in accordance with 29 CFR 1910 (DSMA MCS)	rostive to metals (Category 1), H290 n corrostion (Category 1A), H314 ious eye damage (Category 1), H318 the full text of the H-Statements mentioned in this Section, see Section 16.	bgram Arguments, including precautionary statements	nal word card statement(s) May be corrosive to metals. 20 Causes severe skin burns and eye damage. 14 Causes serious eye damage. 24 Keep only in original container. 24 Wesh skin thoroughly after handling.	Wear protective gloves/ protective clothing/ eye protection/ face protection gloves/ protective gloves/ protection/ face 11 + P330 + P331 IF SWAILLOWED: Rinse mouth. Do NOT induce vomiting. 13 + P361 + P353 IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower.	Page 1 of 6

or firefighters -c-contained breathing appendus for firefighting if necessary. -c-contained breathing appendus for firefighting if necessary. - C-contained breathing appendus for firefighting if necessary. - <b>C-ELEASE MEASURES</b> - <b>C-ELEASE MEASURE</b>	estment plant Band els glareering controls ance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of the equipment protection on safety googles. Facestheld (8-inch minimum). Use equipment for eye protection tested and ander appropriate government standards such as NIOSH (US) or EN 166(EU). redion and articley googles. Facestheld (8-inch minimum). Use equipment for eye protection tested and and articley googles. Facestheld (8-inch minimum). Use equipment for eye protection article appropriate government standards such as NIOSH (US) or EN 166(EU). redion and article and a void skin contact with this product. Dispose of contaminated gloves after the article article article are and good laboratory practices. Wash and dry hands. the intervence of the article artis article article artis article article article article
Information     Appropriate Information       available     Appropriate Information       available     Appropriate Handle In accounter and emergency procedures       Information     Presented       presentions, protection, Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Evacuate personnel presenter and emergency procedures       presentions     Presented       presentions     Presenter and presentions       presentions     Presentions       mail protection see section 8.     Presentions       montal protection see section 8.     Presentions       nental protection see section 8.     Presentions       nental protection see section 8.     Presentions       reprotection see section 1.     Presentions       reprotection see section 1.     Presentions       reports     Evacuate personnel       reports     Fundations       reports     Evacuate personnel       reports     Evacuate personnel       reports     Evacuate personnel       reports     Evacuate personnel       reports     Evacuate       reports     Evacuate personnel       reports     Fu	pineering controls lance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of sitve equipment providention and safety googles. Faceshield (B-inch minimum). Use equipment for eye protection tested and moder appropriate government standards such as NIOSH (US) or EN 166(EU). A gloves must be inspected prior to use. Use proper glove removal technique (without to vers outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after ordance with applicable laws and good laboratory practices. Wash and dry hands. A glores: 0.7 mm ugh time: 480 min ated://tiplect@ (KCL 830 / Adrich Z677698, Size M) dired afted to ber are thickness: 0.2 mm uph time: 0.2 mm
L RELEASE MEASURES Personnal price declors, protections, protections, protections, protections, protections, protections, protections, protections, protections, and emergency proceedures piratory protection. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Evacuate personnel mail protection see section 8. Tighty meaning up to declorate and dispose of as hazardous waste. Keep in suitable, closed containers for the odduct enter drains, the odduct enter drains, the odder and material and dispose of as hazardous waste. Keep in suitable, closed containers for with inert absorbent material and dispose of as hazardous waste. Keep in suitable, closed containers for the odder section for sections and the section for the s	it've equipment rotestion ng stely goggles. Faceshield (8-inch minimum). Use equipment for eye protection tested and ng stely goggles. Faceshield (8-inch minimum). Use equipment for eye protection tested and retion in gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without hertion in gloves. Cloves must be inspected prior to use. Use product. Dispose of contaminated gloves after notance with applicable laws and good laboratory practices. Wash and dry hands. and this applicable laws and good laboratory practices. Wash and dry hands. are thickness: 0.7 mm ugh time: 480 min steri (Kibject® (KCL 830 / Adrich Z677698, Size M) after table are thickness: 0.2 mm ugh time: 0.2 mm
I procentions, protective equipment and emergency procedures piratory protection. Avoid breathing vapours, mist or gas. Ensure adequate vanitation. Evacuate personnel proving protection see section 8. Tightis and protection see section 8. Tightis product enter drains. I and materials for containment and cleaning up with inert absorbent material and dispose of as hazardous waste. Keep in suitable, closed containers for t product enter drains. I and materials for containers for with inert absorbent material and dispose of as hazardous waste. Keep in suitable, closed containers for with inert absorbent material and dispose of as hazardous waste. Keep in suitable, closed containers for with inert absorbent material and dispose of as hazardous waste. Keep in suitable, closed containers for with absorbent material and dispose of as hazardous waste. Keep in suitable, closed containers for with absorbent material and dispose of as hazardous waste. Keep in suitable, closed containers for t and materials for containers for containers for the section of the section 2.	and extension and and and such as NIOSH (US) or EN 166(EU). And a
The markal precautions     Skin precautions       It product enter drains,     It ands       It ands     Product enter drains,       It and the materials for containment and cleaning up     Used in       with inert absorbent material and dispose of as hazardous waste. Keep in suitable, closed containers for     Full or       Full or     Full or       State     Eat to other sections       sell see section 13.     Material       UND STORAGE     Splast       ons for seale section 22.     Splast	ection in gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without love's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after ordance with applicable laws and good laboratory practices. Wash and dry hands. I worinsted rubber ayer thickness: 0.7 mm ugh time: 480 min sted: Vitoject® (KCL 890 / Adrich Z577698, Size M) filter nbher ayer thickness: 0.2 mm ayer thickness: 0.2 mm out time: 400 min ayer thickness: 0.2 mm ayer thickness: 0.2 mm
t and materials for containment and cleaning up with inert absorbent material and dispose of as hazardous waste. Keep in suitable, closed containers for te to other sections asel see section 13. AND STORAGE ons for safe handling anation of vepour or mist. Brask Materi Splast Wateri Brask	ordence with applicable laws and good laboratory practices. Wash and dry hands. I worinsted rubber ayer thickness: 0.7 mm ugh time: 480 min sted: Vitoject® (KCL 890 / Adrich Z677698, Size M) ated thickness: 0.2 mm ayer thickness: 0.2 mm ayer thickness: 0.2 mm ayer thickness: 0.2 mm
ce to other sections ball see section 13. Auto STORAGE Splast Auto STORAGE Splast Splast Materi Minim sultion of vapour or mist. Brask	ayer thickness: D.7 mm ugh time: 480 min sted:Vitoject® (KCL 890 / Aldrich Z677698, Size M) ated: the tubber ayer thickness: D.2 mm ugh time: 30 min
AND STORAGE Splast cons for safe handling Materi Minim sutions see section 2.2.	rlact ayer thickness: 0.2 mm vych time: 30 min
ons for safe handling Minten autions see section 2.2. Break	itride rubber ayer thickness: 0.2 mm vogh time::20 min
	The set of the state of the state of the set
ins for safe storage, including any incompatibilities Tabler tighty closed in a dry and well-ventilated place. Containers which are opened must be carefully and tand includin to convexit lasters.	steerubermanner Fronu raar Avenica zoor soos, oke my s: KCL GmbH, D-36124 Eichenzeil, phone 449 (0)6659 87300, e-meil seles@kcl.de, test method:
and maps oprogram to protone manage. If used end useds markings of a contract of a contract was an attentials with useds	colution, or mixed with other substances, and under conditions which differ from EN 374, contact the the CE approved gloves. This recommendation is advisory only and must be evaluated by an vygianist and safety officer familiar with the specific situation of anticipated use by our customers. It
	. De construed as offering an approval for any specific use scenario.
constructor Exact AL TAUES I CONSTRUCTOR COMPANY AND A CONSTRUCTION CONSTRUCTURA CONST	actory. Suit protecting, against chemicals. The type of protective equipment must be selected according to tration and amount of the dangerous substance at the specific workplace.
ents with workplace control parameters	
ent CAS-No. Value Control Basis Viter Viter	, spreasement sinows air-puritying respirators are appropriate use a full-face respirator with mutti- cassessement sinows air-puritying respirators are appropriate use a full-face respirator with mutti- ombinistion (US) or type ABEK (EN 14397) respirator cardidges as a backup to engineering control
tcid 7664-93-9 TWA 0.2 mg/m3 USA, ACGIH Threshold Limit Values	trator is the sole means of protection, use a full-face supplied air respirator. Use respirators and the tested and any neuronal index supplied are mean event and the sole of the factor. The Martine supplied are supplied as the sole of the sole o
TWA 1 mg/m3 USA OSHA - TABLE Z-1 Limits for Contaminants - 1910.1000 Contr	
TWA         1 mg/m3         USA. Occupational Exposure Limits         Do no           (05HA) - Table Z-1 Limits for Air         9. PHYSICAL AND         Contaminants	product enter drains. EMICAL PROPERTIES
No Effect Level (DNEL) 9.1 Information	basic physical and chemical properties
on Area Exposure Health effect Value a) Appears	Form: clear, liquid Also date accollable
Inhatstion Acute local effects 0.1 mg/m3 c) Odour 1 [Inhatstion Long-term local effects 0.05 mg/m3 c)	shold No data available
d No Effect Concentration (PNEC)	1.2 at 5 g/
trrent Vetue 0 Methy	00002010 3 °C (37 °F)
rater 0.00025 mg/l fritial bo	point and 290 °C (554 °F) - #L

	g) Flash point	Not applicable	No data availatife
-	h) Evaporation rate	No data available	Skin corrosion/initation Stin - Babby
	i) Flammability (solid, gas)	No data avaitable	Result: Extremely corresive and destructive to fissue.
-	i) Upperflower	No data available	Serious eye damage/eye Irritation
	ttemmabirty or explosive timits		Eyes - Rabbit Result: Corrosive to eyes
-	k) Vapour pressure	1.33 hPa (1.00 mmHg) at 145.8 °C (294.4 °F)	Respiratory or skin sensitisation
-	<ol> <li>Vapour density</li> </ol>	3.39 - (Air = 1.0)	No data avaitable
-	m) Relative density	1.84 g/cm3 al 25 °C (77 °F)	Germ cell mutagenicity No determination
~	n) Water solubility	soluble	
-	<ul> <li>Partition coefficient: n- octanol/water</li> </ul>	No data available	The International Agency for Research on Cancer (IARC) has determined that occupational exposure to strong-
_	p) Auto-ignition	No data avaitable	inorganic-acid mists containing suffuric acid is carchrogenic to humans (group 1).
	temperature a) Decomposition	No data available	IANC: No component of this product present at levels greater than or equal to U.1% is identified as probable, possible or confirmed human carcinogen by IARC.
	lemperature		ACGIH: No component of this product present at levels greater than or equal to 0.1% is identified as a carriented carrienteen by ATCIIH
-	r) Viscosity	No data available	ust un regent un portentiss ten anogen up Aucent). Alto composants of this conduct some of a locals consists that account in 0.490 in (A-mittin 4 and 2
	s) Explosive properties	No data available	NUTY: NO COMPONENT OF UND PRODUCT PRESENT AL REVENS GREATER INSU OF EQUAL TO ULT A IS IDENTIFIED AS A KNOWN OF AND/PARENT CARCANOPEN by MTP.
87	u – uxutzing propenses Other safety information		OSHA: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinosen or potential carcinosen by OSHA.
	Surface tension	55.1 mN/m at 20 °C (68 °F)	Reproductive toxicity
	Relative vanour density	339 - (Air = 1.0)	No. data musikahis. No. data musikahis
	fusion modes name		
10. STJ	ABILITY AND REACTIVITY		opeciato target organ toxicity - single exposure No data avaitable
1.01	Keactivity No data avaitable		Specific target organ toxicity - repeated exposure No dete sectioned
10.2	Chemical stability Stable under recommended e	jorana eventijione.	Aspiration hazard
	Description of heredone and		No data avaitable
	rossionity of nazaroous rev No data avallable		Additional Information RTECS: WS560000
10.4	Conditions to avoid No data available		Material is extremely destructive to tissue of the muccus membranes and upper respiratory tract, eyes, and skin,
10.5	Incompetible materials Bases, Haides, Organic mate	ritais. Carbides. fukininates. Nitrates. Dicrates. Ovanides. Chilorates. aškali halides. Žinc	spasm, mnammaton and etema or tre larynt, spasm, mnammaton and edema or ne bronch, pneumonitis, pulmonary edema, burning sensation. Cough, wheazing, laryngitis, Shorthers of breath, Headache, Nausea, Vomiting, Pulmonary edema. Effects may be delaved. To the best for our knowledon. The chemical ministral ministral industral monste
	salts, permanganates, e.g. pt nhrenhomus. Reacts vinlenti	kassium permanganate, Hydrogen peroxide, Azidea, Perchloratea,, Nitromethane, v with: conformatadiaros mechanona oxima mitmand amines havalithium distincta	have not been thoroughly investigated.
_	phosphorous(III) oxide, Powd		Stormach - Irregularities - Based on Human Evidence Stormach - Irregularities - Based on Human Evidence
10.6	Hazardous decomposition   Other decomposition products	products s - No data svallable	12. ECOLOGICAL INFORMATION
_	In the event of fire: see sectio	Lin E	12.1 Taxicity
11. TO	XICOLOGICAL INFORMATH	NO	Toxicity to fish LC50 - Gambusia affinis (Mosquito fish) - 42 mg/l - 96 h
11.1	Information on texicologica	l effects	Toxicity to dephnia and EC50 - Dephnia magna (Water flea) - 29 mg/l - 24 h
	Acute toxicity LD50 Oral - Rat - 2,140 ma/ki		other aquatic invertebrates
_	LC50 Inhalation - Rat - 2 h - 5	10 mg/m3	12.2 Persistence and degradability The methods for deterministic the biological descendebility are not exolocitable to increase a substance.
	Dermal: No data available		
Adrict -	339741	Page 5 of 8	Page 6 of 8

CAS-No. Revision Date 7664-93-9 2007-09-28		nd 3.	пада,					make untimited paper copies for internal use only. A purport to be all inclusive and shall be used only as a sent state of our knowledge and is applicable to the	so hay represent any guerance or une properties of une observations any damage resulting from handling drich.com and/or the reverse side of invoice or packing		015 Date: 20140 More							Page 8 -
California Prop. 65 Components WARNINGI This product contains a chemical known to the State of Catifornia to cause cancer. Suituric acid	16. OTHER INFORMATION	Full taxt of H-Statements referred to under sections 2 an Eye Dam.	H290 May be corrosive to metals. H314 Causes server skin burns and eye dam H318 Causes serious eye damage. Met. Corr. Corrosive to metals	Skin Corr. Skin corroston HMKS Rating HaaMh hazord	riesmi nazaru: Chrombith Hazard: • Flammabith Jazard: •	Physical Nazard 2 Physical Nazard 2 NFPA Rating 3 Health nazard: 3 Fine Mazard: 0	Reactivity Hazard: 0	Lucturer intermation Copyright 2015 Sigma-Addrich Co. LLC. License granted to r The above information is believed to be correct but does not guide. The information in this document is based on the pres	product want regard to a poproprise a servery product. Note product. Sigma-Addrich Corporation and its Affiliales shall no or from contact with the above product. See www.sigma-add stip for additional terms and conditions of sale.	Pre-paration Information Sigma-Adrich Corporation Product Safety – Americas Region	1-BUL-521-8956 Monitor: £.3							Adhch = 339741
		5	al waste um in a															Page 7 of 5
			fession f and b							8		3: Date	-	uate 1	-	uate 11	Date	
not conducted			ct a licensed profession nbustible solvent and b					S-No: F-A, S-B		le III, Section 302: Bandeiro Dolo	2007-07-01	le III, Section 313: Revision Date 2007-01-01	Desidenter Date	2007-07-01	ate Constatue C	revision Uate 2007-07-01	Revision Date 2007-07-01	
ent not required/not conducted			company. Contact a licensed profession aterial with a combustible solvent and b			=		II EMS-No: F.A. S-B	_	hed by SARA Title III, Section 302: CAS.No.	7664-93-9 2007-07-01	hed by SARA Tits III, Section 313: CAS-No. Revision Date 7554.03.0	CAE No.	CAS-No. Newsion Late 7664-93-9 2007-07-01	CAS No. 000 Data	CAS-NO. REWISION UARE 7664-93-9 2007-07-01	CAS-No. Revision Date 7664-93-9 2007-01-01	
safety assessment not required/not conducted			snsed disposal company. Contact a ficensed profession ive or mix the material with a combustible solvent and bi and scrubber.			Packing group: II		Packing group: II EMS-No: F-A, S-B	Packing group: II	g levels established by SARA Title III, Section 302: DAS.No. Date	7664-93-9 2007-07-01	g levels established by SARA Title III, Section 313: CASANo. Revision Date 7864.02.0	CAS No. Development	CAS-No. Newtenin Late 7664-93-9 2007-07-01	ald SAC	CAS-140. Revision Uale 7664-93-9 2007-07-01	CAS-No. Revision Date 7684-83-9 2007-07-01	

Eye Contact: Flush thoroughly with water. Remove contact lenses if p continue flushing for several more minutes. Get medical attention if init static states with scep and water. If influence develops and per fluctuation is experienced, move to fresh air. C severation and neests	6 – Eine Materiana	a - rise registing measures Extinguishing Media: Use water (og, dry chem/cal, carbon dioxide or amounts of water. Burning product will foat on the surface and spread	Special Fire Fighting Procedures: Firalighters should always wear public breathing apparatus and full protective clothing. Cool fire-exposed cont	Unusual Fire and Explosion Hazards: Combustible liquid and vapor, travel along surfaces to remote ignition sources and flash back.	6 - Accidental Rejease Messures	wear appropriate protective coorang (see section a). Eximinate all Contain and collect liquid with an inert absorbent and place in a c thoroughly. Report splits to authorities as required.	7 – Handling and Storage Handling: Avoid contact with eyes. Avoid prolonged contact with skin. Use with adequate veritiation. Keep every from heat, sparks, hot surfa- use with adequate veritiation.	wro scap and water aner nandang. Keep containers closed when not i children. Storsge: Store in a cool, well-ventilated area, away from incompatible	8 – Exposure Controls/Personal Protection	Chemical   Occupational Exposure Limi
Data Sheet		Chemical Name: Organic Mixture	Trade Name: WD-40 Bulk Liquid	Product Use: Lubricant, Penatrant, Drives Out Molisture, Removes and Protects Surfrees	From Carrosien	MSDS Date Of Preparation: 3/11/10	uid. If swallowed, may be aspirated and cause lung I with adequate ventilation. Keep away from heat,	phatory initiation and cantral nervous system effects	se may be narmrut or rater. odvce mild irritation and defatting with possible	
Material Safety	1 - Chemical Product and Company Identification	Manufacturer: WD-40 Company Address: 1081 Cudahy Place (92110) B-0 B-0 acany	san Diego California, USA 83131 – 0607	Telephone: Emergency only: 1-888-324-7596 (PROSAR)	Information: 1-888-324-7596 Chemical Spills: 1-500-424-9300 (Chemirec)	1-703-527-3887 (International Calls) 2 - Hazards Identification	Emergency Overview: DANGER! Harmful or fatal if swallowed. Combustible Liq damage. May cause eye imitation. Avoid eye contact. Use sparks and all other sources of ignition.	Symptoms of Overaxposure: Inhalation: High concentrations may cause nasal and rea	such as needache, dizziness and neusea, internomat abu Skin Contact: Proionged and/or repeated contact may pr	dermatitis.

Ingestion: This product has low oral toxichy. Swallowing may cause gestrointestinal irritation, nausea, vomiting and diarrines. This product is an aspiration hazard. If swallowed, can enter the lungs and may cause chemical pneumonitis, seare hung damage and death. Chronic Effects: None exported. Medical Conditions Aggravated by Exposure: Preexisting eye, skin and respiratory conditions may be

aggravated by exposure.

**Suspected Cancer Agent:** No X Yes

3 - Composition/Information on Ingredient		
Ingredient	CAS#	Weight Percent
Alphatic Hydrocarbon	64742-47-8	45-50
Petroleum Base Ol	64742-58-1 64742-53-6 64742-56-9 64742-65-0	-25
LVP Aliphatic Hydrocarbon	64742-47-8	12-18
Surfactant	Proprietary	8
Non-Hazardous Ingredients	Mixture	¢10
See Section 8 for Exposure Limits		

# 4 – First Aid Measures

Ingestion (8 wallowed): Aspiration Hazard. DO NOT induce vomiting. Call physician, poison control center or the WD-40 Safety Holline at 1-888-324-7596 immediately.

Page 1 of 4

ists, get medical attention. Ist medical attention if irritation or other sent after the first 5 minutes and tion persists.

am. Do not use water jet or flooding lapors are heavier than air and may sitive pressure self-contained iners with water. é

vurces of ignition and ventilate area. Itainer for disposal. Clean spill area

wold breathing vapors or aerosols. as and open flames. Wash thoroughly use. Keep out of the reach of

laterials. NFPA 30 Class II Liquid.

SUPERSONAL PRODUCTION	Occupational Exposure Limits	1200 mg/m3 TWA (manufacture	
posure Control	ical	ttic Hydrocarbon	

Aliphatic Hydrocarbon	1200 mg/m3 TWA (manufacturer recommended)
Petroteum Base Oil	5 mg/m3 (inhalable) TWA 5 mg/m3 TWA OSHA PEL
LVP Aliphatic Hydrocarbon	1200 mg/m3 TWA (manufacturer recommended)
Surfactant	None Established
Non-Hazardous Ingredients	None Established

The Following Controls are Recommended for Normal Consumer Use of this Product Engineering Controls: Use in a well-ventilated area. Personal Protection:

Eye Protection: Avoid eye contact. Safety glasses or goggles recommended. With Protection: Avoid prolonged skin contact. Chemical resistant gloves recommended for operations where skin contact is likely. Respiratory Protection: None needed for normal use with adequate ventilation.

For Bulk Processing or Workplace Use the Following Controls are Recommended Engineering Controls: Use adequate general and local exhaust ventilation to maintain exposure levels personal Protection: Eye Protection: Seley goggles recommended whene eye contact is possible. Skin Protection: Wear chemical resistant glowes. Skin Protection: Woer chemical resistant glowes. Were are allOSH approved respirator Respirators resection and use should be based on contaminant pype, form and concentration. Flore OSHA 1910.134, ANSI 288.2 and good industrial Hyglene practice. WorkHyglene Practices: Wash with scap and waler after handling.

Page 2 of 4

EPA Toxic Substances Control Act (TSCA) Status: All of the components of this product are lister	361 - 369 F (183 - Specific Gravity: 0.8 - 0.82 @ 60 F California Safe Prinking Water and Toxic Enforcement Act (Proposition 65): This product does in the second s	VOC Regulations: This product complex with the consumer product VOC limits of CARB, the US El asia 2010 (100-F) Vapor Density: Greater than 1 states adopting the OTC VOC rules.	ille: 70-75% VOC: 412 grams/filer ingredient Environmental Protection Act: One of the components is listed on the NDSL. All of the components is listed on the NDSL. All of the components is listed on the Canadian Domesic Substances List or exempt from notification.	Water/Oil Not Determined Appearance/Odor Light amber Equid/mild This MSDS has been prepared according to the Controlled Products Regulation (CPR)	122 F (49°C) Tag Open Flammable Limits: LEL: 0.6% UEL: 8.0% Contains an or the information required by the Urr. Cub Contains an or the information required by the Urr.	-63-C (-81.4 F ) ASTM Kinematic Viscosity: 2.79-2.96CSt @ 100-F Handle Mission Halling:		ble olymertzetion: Will not occur. A solid a void hares and other sources of ignition. A solid and agents. Rames and other sources of ignition.	SIGNATURE: 0 TITLE: Director of Globel Quelity Assurence	ly of this product is estimated to be greater than 5,000 mg/kg based on an assessment of the his product is estimated to be greater than 5,000 mg/kg based on an assessment of the nis product is not classified as toxic by established criteria. It is an aspiration hazard. August 2009 mponents of this product is listed as a carcinogen or suspected carcinogen or is considered a azard.	al Information routy available.	Considerations	becomes a waste, it would be expected to meet the criteria of a RCRA ignitiable hazardous However, it is the responsibility of the generator to determine at the time of disposal the proper and method of disposal. Dispose in accordance with federal, state, and local regulations.	rtation Information. Shinoing Description: Escented from Harmet 149CER 373-150 (FU in non-built nacionalmos Built	da 1993, Combustione Lawyord market Performent Distriction Performent Performent Performent Distriction (1993, Combustione UN1268, Petroheum Districtione), PG III g Description: UN1268, Petroheum Districtiones, n.o.s. 3, PG III	ory Information	Regulations: Reportable Quantity: This product is not subject to CERCLA reporting requirements, Reportable to the Matkonal Response Center under the Clean Water Act and many ore stringent release reporting requirements. Report spils required under federal, state and not. In: Sory For Section 31/312: Acute Health, Fire Hazard for Chemicals: This product contains the following chemicals subject to SARA Title III	Image: Second state         Activity         Activity </th <th>This product does         regulated under Caffornia Proposition 65.         This product complies with the consumer product VOC timits of CAR8, the US E         This product complies with the consumer product VOC timits of CAR8, the US E         member and Preaction Act: One of the components is listed on the NDSL. All of the use on the Consultances List or exempt from notification.         ad on the Canadian Domestic Substances List or exempt from notification.         ad on the Canadian Domestic Substances List or exempt from notification.         ad on the Canadian Domestic Substances List or exempt from notification.         ad on the Canadian Domestic Substances List or exempt from notification.         ad on the Canadian Domestic Substances List or exempt from notification.         ad on the Canadian Domestic Substances List or exempt from notification.         ad on the Information required by the CPR.         Restrict       Restrict a free Controlled Products Regutation (CPR)         not:       Restrict a free Controlled Products Regutation (CPR)         not:       Restrict a free Controlled Products Regutation (CPR)         Match 2010       Supercedes: Jannu         March 2010       Supercedes: Jannu</th>	This product does         regulated under Caffornia Proposition 65.         This product complies with the consumer product VOC timits of CAR8, the US E         This product complies with the consumer product VOC timits of CAR8, the US E         member and Preaction Act: One of the components is listed on the NDSL. 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	minimum       minim       minimum       minimum	main         District method         District method <thdistrict method<="" th="">         District method</thdistrict>	Waterol         Indication         Apparation         Apparation	<ul> <li></li></ul>	<sup>375</sup> C (11 x F) A STM	and fractifying	Bit internation: Will not correr. <ul> <li>A second statistic will not correr.</li> <li>A second statistic will not correr and statistic will not correct and statisti will not correct and statistic will not correct and statis</li></ul>	We district information       The Entractor of Global Construction         We district module in organization       The entractor of Global Construction         Information       The magnetion         The magnetic in the product is setting and a struction product is setting and a struction fractor.       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Bulk application UN1266, Petroleum Distilatas, no. s. 3, FG II application UN1266, Petroleum Distilatas, no. s. 3, FG II application constrained from National Response Content under the Cara many or stringent release reporting requirements. Regulations in a stringent release exporting requirements. Regulations: This product is not subject to CERCLA reporting requirements, one stringent release reporting requirements. Report spils required under federal, state and in a	I becomes a waste, it would be expected to meet the criteria of a RCRA lignitable hazardous information and method in the generator to determine at the time of disposal the proper infation Information. Excepted from Hazmati (49CFR 173.150 (F)) in non-bulk packagings. Bulk Stileping Description: Excepted from Hazmati (49CFR 173.150 (F)) in non-bulk packagings. Bulk (41983, Combustible Liquid, n.o.a. 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Rescription 311312: Acute Health, Fine Hazard         Corr Formicalis: This product contains the following chemicals subject to SARA Tate III         Resortable Quantify: None	Ar (193), Combustible Liquid, n.o.a. (contains Petroleum Distiliates), PG III g Description: Regulations: Regulations: Regulations: Reportable to the National Response Center under the Clean Water Act and many pils are reportable to the National Response Center under the Clean Water Act and many pils are reportable to the National Response Center under the Clean Water Act and many pils are reportable to the National Response Center under the Clean Water Act and many pils are reportable to the National Response Center under the Clean Water Act and many pils are reportable to the National Response Center under the Clean Water Act and many pils are reportable to the National Response Center under the Clean Water Act and many pils are reportable to the National Response Center under the Clean Water Act and many constringent release reporting requirements. 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