COMMONWEALTH of VIRGINIA

DEPARTMENT OF ENVIRONMENTAL QUALITY
PIEDMONT REGIONAL OFFICE
4949A Cox Road, Glen Allen, Virginia 23060
(804) 527-5020 Fax (804) 527-5106
www.deq.virginia.gov

Molly Joseph Ward
Secretary of Natural Resources

David K. Paylor
Director

Michael P. Murphy
Regional Director

November 17, 2016

Paula A. Hamel
Director, Generation Environmental Services
Dominion Virginia Power
Chesterfield Power Station
Transmitted via email: Paula.A.Hamel@dom.com

Re: Lower Ash Pond Pilot Study – Chesterfield Power Station
VPDES Permit VA0004146

Ms. Hamel,

The DEQ received your Chemical Notification Letter dated November 3, 2016, regarding the proposed use of five (5) chemicals in a Water Treatment Pilot Study to be conducted at the Lower Ash Pond in preparation for dewatering. We are also in receipt of the letter you provided from Ground/Water Treatment Technology, LLC, detailing the usage of these chemicals including the expected chemical dosages, percent removals, and estimated pilot system effluent concentrations. It is understood that the effluent from the pilot study will be redirected to the Lower Ash Pond for additional treatment before discharging through Outfall 004.

We have no objection to the proposed use of these chemicals in this pilot study and concur that the effluent from the study can be redirected to the Lower Ash Pond under the existing VPDES permit. It is understood that the use of these proposed chemicals will not significantly alter the effluent characteristics at Outfall 004. Please be advised that effluent limitations and monitoring, including quarterly whole effluent toxicity testing will continue per the current VPDES permit requirements.

Nothing in this letter relieves Dominion from the responsibility to comply with the requirements set forth in VPDES Permit No. VA0004146 or from adhering to the Virginia Water Quality Standards (9VAC25-260).

Sincerely,

Emilee C. Adamson

Emilee C. Adamson
Planning and Water Permit Manager

CC: Jason E. Williams
Ian Whitlock
Heather Deihls
Azra Bilalagic

Dominion Resources Services, Inc.
5000 Dominion Boulevard, Glen Allen, VA 23060

dom.com

Certified Mail
Return Receipt Requested

November 3, 2016

Mr. Joseph B. Bryan
DEQ – Piedmont Regional Office
4949-A Cox Road
Glen Allen, VA 23060

RE: Dominion - Chesterfield Power Station – Chemical Notification Letter – VPDES Permit No. VA0004146

Dear Mr. Bryan:

The Lower Ash Pond will be dewatered as part of pond closure activities. As such, the following information is provided as a formal chemical notification request letter for use of five chemicals as part of a Water Treatment Pilot Study to be conducted at the Lower Ash Pond. The pilot study will be conducted by Ground/Water Treatment Technology, LLC (GWTT), and will consist of a treatment system with an effective flow rate of 25 gallons per minute. GWTT has provided their list of proposed chemicals, chemical dosage concentrations, and the estimated pilot system effluent concentrations. The effluent produced during the pilot tests will be discharged back to the Lower Ash Pond for further treatment prior to discharge through VPDES permitted Outfall 004. Therefore, the estimated outfall concentrations of the chemicals in the Lower Ash Pond have been calculated and are provided with the chemical vendor's information (see attached). In addition, copies of the Safety Data Sheets (SDS) for the five chemicals are attached for your review.

Based on the information provided herein, use of the proposed chemicals will not significantly alter the effluent characteristics at Outfall 004. It should be noted that quarterly toxicity sampling will continue at Outfall 004 as required by the VPDES Permit. In order to stay in compliance with some of the time constraints outlined in the station's VPDES Permit, personnel would like to start discharging water from the pilot study during the week of November 14, 2016.

If you have any questions or desire additional information, please contact Ian Whitlock of Dominion's Generation Environmental Services at 804-273-2991.

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Sincerely

Jason E. Williams
Manager, Generation Environmental Services

Enclosures

GWTT
Ground/Water Treatment & Technology, LLC

627 Mt. Hope Road
Wharton, New Jersey 07885
Tel: (800) 770-0901
(973) 983-0901
Fax: (973) 983-0903

October 25, 2016

Dominion Power – Chesterfield Power Station
Remedial Construction Services

RE: Dominion Power – Chesterfield Pilot Testing Chemical Usage Information (REV. 1)

To whom it may concern:

Ground/Water Treatment and Technology, LLC (GWTT) has proposed using five different chemicals during its' pilot test system at Dominion Power's Chesterfield Power Station. These five chemicals will be introduced to the waste stream at various points in the treatment system in order to treat the waste stream for contaminants of concern below their respective discharge criteria. Below is a summary of the chemicals used in the proposed pilot system. The proposed pilot system will treat a maximum of 15,000 gallons per day (GPD) over the course of 10 hours, with an effective flow rate of 25 gallons per minute (GPM).

Chemical Precipitation Chemicals

GWTT has proposed using two chemicals for the precipitation process during their onsite pilot:

- Ferric Chloride Solution (37%)
- AP-210 Solution (0.2%)

Based upon prior experience with this type of waste stream, the average mass dosage for Ferric Chloride was 2.31 lbs/day, and for the AP-210 the average mass dosage was 0.25 lbs/day. The mass loadings were based upon the average flow rate of 0.015 MGD for the proposed pilot test system. The maximum suggested dosages are 4.63 and 0.5 lbs/day for the Ferric Chloride, and the AP-210, respectively. Confirmation jar testing was performed prior to the commencement of the pilot system to verify the accuracy of these numbers.

Based upon our experience with the chemicals being used, GWTT estimates that greater than 99.99% of the Ferric Chloride and 99% of the AP-210 will be precipitated and no longer dissolved in the treated process water. The precipitated and coagulated/flocculated suspended solids will then be removed from the treated process water through clarification/settling and subsequent filtration units prior to discharge from the treatment system. A primary objective of the use of these chemicals is to bind to the solids in the waste stream and enhance the settling of these solids out of solution as flocculated sludge. Unit processes subsequent to the chemical precipitation (mechanical filtration using filter bags and cartridges) provide an additional layer of protection from discharging chemical-precipitated suspended

solids. The Ferric Chloride coagulant completely precipitates to form iron hydroxide particulate the moment it is introduced to the wastewater. This assists in forming metal complexes which aid in dropping the target compounds (suspended solids, metal particulates, etc.) from the wastewater stream. The Ferric Chloride toxicity is based upon the dissolved portion that is bio-available to the aquatic invertebrate testing species (e.g., C Dubia). Since the Ferric Chloride does not remain in solution once it precipitates to form iron hydroxide, it is not bio-available to aquatic species and therefore the toxicity of the Ferric Chloride is significantly reduced. The subsequent settling/filtration will reduce suspended solids in the effluent. Therefore, the treatment process operations effectively reduce the dissolved and suspended solids iron concentration in the Effluent water of the Pilot System.

The table below summarizes the Dosage and Pilot System Effluent Concentration calculations for these two chemicals on this project site based upon this estimation:

Chemical	Maximum Daily Mass Dosage (lbs/day)	Estimated Percent Removal (%)	Estimated Pilot System Effluent Concentration (mg/L)
Ferric Chloride	4.63	99.99	0.0037
AP-210	0.5	99	0.040

- Anionic Polymer AP-210 is manufactured as a dry product and all information provided (daily mass dosage, toxicity data) is based upon the dry product. Dilution of the dry product during pilot testing was not taken into account with respect to the toxicity or dosage information to stay consistent with the MSDS sheets.
- Ferric Chloride coagulant is manufactured as a 37% solution. In order to be accurate, the dosage and toxicity information is based upon the active solution percentage.

Oxidation and pH Adjustment Chemicals

In addition to the chemical precipitation chemicals shown in the above paragraphs, GWTT has proposed using three other chemicals to perform their onsite pilot:

- Sodium Hypochlorite Solution (15%)
- Sodium Hydroxide Solution (25%)
- Hydrochloric Acid (31%)

Sodium Hypochlorite solution is added to the influent stream prior to the chemical precipitation chemicals (Ferric Chloride and AP-210) to oxidize any dissolved metals in the waste stream. Based upon prior experience with this type of waste stream, the average mass dosage for Sodium Hypochlorite was 4.82 lbs/day. The mass loadings were based upon the average flow rate of 0.015 MGD for the proposed pilot test system. The maximum suggested dosage is 8.03 lbs/day. Confirmation jar testing were performed prior to the commencement of the pilot system to verify the accuracy of these numbers.

Based upon our experience with the chemicals being used, GWTT estimates that greater than 99.99% of the Sodium Hypochlorite will be reduced and no longer in the treated process water. The subsequent adsorption media filtration will be used to dechlorinate any remaining residual chlorine in the waste stream prior to discharge. There are also process controls in place in the proposed pilot system to limit the amount of chemical residual remaining in the waste stream after chemical precipitation. Since the Sodium Hypochlorite will not remain in solution, it is not bio-available to aquatic species and therefore the toxicity is significantly reduced. Therefore, the treatment process operations effectively reduce the total residual chlorine concentration in the Effluent water of the Pilot System.

Sodium Hydroxide and Hydrochloric Acid are pH neutralization chemicals that will be introduced to the proposed pilot system. The average mass dosages for Hydrochloric Acid and Sodium Hydroxide are 10.16 and 11.24 lbs/day, respectively. The mass loadings were based upon the average flow rate of 0.015 MGD for the proposed pilot test system. The maximum suggested dosages are 14.51 and 16.05 lbs/day for the Hydrochloric Acid and the Sodium Hydroxide, respectively.

Based upon our experience with the chemicals being used, GWTT estimates that greater than 99.9% of the Hydrochloric Acid and Sodium Hypochlorite will be reduced and no longer in the treated process water. Hydrochloric Acid is introduced into the system to reduce the pH of the waste stream prior to the adsorptive media process. Following the adsorptive media process, Sodium Hydroxide introduction will cause an increase in the pH of the waste stream to a pH set point, which is proposed to be near neutral pH (7.0 s.u.). The addition of sodium hydroxide to the low pH water will neutralize the acidity and therefore reduce the concentration of both the Hydrochloric Acid and the Sodium Hydroxide in the effluent stream. Therefore, the treatment process operations effectively reduce the Hydrochloric Acid and Sodium Hydroxide concentrations in the Effluent water of the Pilot System.

The table below summarizes the Dosage and Pilot System Effluent Concentration calculations for these three chemicals on this project site based upon this estimation:

Chemical	Maximum Daily Mass Dosage (lbs/day)	Estimated Percent Removal (%)	Estimated Pilot System Effluent Concentration (mg/L)
Sodium Hypochlorite	8.03	99.99	0.0064
Hydrochloric Acid	14.51	99.9	0.1160
Sodium Hydroxide	16.05	99.9	0.1283

- Sodium Hypochlorite is manufactured as a 15% solution. In order to be accurate, the dosage and toxicity information is based upon the active solution percentage.
- Hydrochloric Acid is manufactured as a 31% solution. In order to be accurate, the dosage and toxicity information is based upon the active solution percentage.
- Sodium Hydroxide is manufactured as a 25% solution. In order to be accurate, the dosage and toxicity information is based upon the active solution percentage.

Estimated Outfall Concentrations

The following table calculated the estimated concentrations of the chemicals used during GWTT's Pilot System based upon an estimated volume of water in the Ash Pond. These calculations were based upon an estimated volume of 167,000,000 gallons (167 MGal) for the Ash Pond.

Chemical	Estimated Pilot System Eff. Conc. (mg/L)	Maximum Daily Pilot System Flow Rate (gallons/day)	Maximum Daily Pilot System Mass (mg)	Ash Pond Volume (gallons)	Estimated Outfall Conc. (mg/L)
Ferric Chloride	0.0037	15,000	210	167,000,000	0.000000332
AP-210	0.040	15,000	2,271	167,000,000	0.000003593
Sodium Hypochlorite	0.0064	15,000	363	167,000,000	0.000000575
Hydrochloric Acid	0.1160	15,000	6,586	167,000,000	0.0000104
Sodium Hydroxide	0.1283	15,000	7,284	167,000,000	0.0000115

Based upon the above information, the treatment chemicals being proposed for use in GWTT's pilot system will not significantly alter the effluent characteristics of the treatment system or the Outfall.

Please do not hesitate to contact me with any questions you may have.

Best Regards,

Rob Orlando
Chief Engineer
Ground/Water Treatment and Technologies, LLC
Office: (973)983-0901
Cell: (973)800-3531
Email: rorlando@gwttllc.com

Table #1: Calculation of Estimated Chemical Concentrations in Effluent to Discharge
Dominion Power – Chesterfield Power Station Pilot Testing

AP-210 Anionic Polymer		
Daily Flow Rate	15,000	Gallons
Target Maximum Polymer Dosage	4.00	mg/L
Daily Mass Polymer Loading	0.500	lbs/day
Polymer Removed through System	99	%
Effluent Mass Polymer Loading	0.00500	lbs/day
Effluent Maximum Polymer Residual	0.040	mg/L
Ferric Chloride Inorganic Coagulant		
Daily Flow Rate	15,000	Gallons
Target Maximum Coagulant Dosage	37.00	mg/L
Daily Mass Coagulant Loading	4.629	lbs/day
Coagulant Removed through System	99.99	%
Effluent Mass Coagulant Loading	0.000463	lbs/day
Effluent Maximum Coagulant Residual	0.0037	mg/L
Sodium Hypochlorite		
Daily Flow Rate	15,000	Gallons
Target Maximum Hypochlorite Dosage	64.20	mg/L
Daily Mass Hypochlorite Loading	8.031	lbs/day
Hypochlorite Removed through System	99.99	%
Effluent Mass Hypochlorite Loading	0.00080	lbs/day
Effluent Maximum Hypochlorite Residual	0.0064	mg/L
Hydrochloric Acid		
Daily Flow Rate	15,000	Gallons
Target Maximum Acid Dosage	116.00	mg/L
Daily Mass Acid Loading	14.512	lbs/day
Acid Removed through System	99.9	%
Effluent Mass Acid Loading	0.014512	lbs/day
Effluent Maximum Acid Residual	0.1160	mg/L
Sodium Hydroxide		
Daily Flow Rate	15,000	gallons
Target Maximum Hydroxide Dosage	128.30	mg/L
Daily Mass Hydroxide Loading	16.050	lbs/day
Hydroxide Removed through System	99.9	%
Effluent Mass Hydroxide Loading	0.016050	lbs/day
Effluent Maximum Hydroxide Residual	0.1283	mg/L

ADEGA CHEMICAL COMPANY

MATERIAL SAFETY DATA SHEET

Material Name: AP-210

SECTION 1 – GENERAL INFORMATION

Manufacturer/Supplier's Name:

ADEGA CHEMICAL
25411 NE 53rd Street
Vancouver, Wa 98682

PRODUCT AND TECHNICAL INFORMATION NUMBER: (949) 275-7208

SECTION 2 – COMPOSITION / INFORMATION ON INGREDIENTS

IDENTIFICATION OF THE PREPARATION: Anionic Water-Soluble Polymer (polyacrylamide; CAS No. 9003-05-8)

SECTION 3 – HAZARDS IDENTIFICATION

Aqueous solutions or powders that become wet render surfaces extremely slippery

SECTION 4 – FIRST AID MEASURES

INHALATION: Move to fresh air.

SKIN CONTACT: Wash with water and soap as a precaution. In case of persistent skin irritation, consult physician.

EYE CONTACT: Rinse thoroughly with plenty of water, also under the eyelids. In case of persistent eye irritation, consult a physician.

INGESTION: The product is not considered toxic based on studies on laboratory animals.

SECTION 5 – FIRE-FIGHTING MEASURES

SUITABLE EXTINGUISHING MEDIA: Water, water spray, foam, carbon dioxide (C02), dry powder.

SPECIAL FIRE-FIGHTING PRECAUTIONS: Aqueous solutions or powders that become wet render surfaces extremely slippery.

PROTECTIVE EQUIPMENT FOR FIREFIGHTERS: No special protective equipment required.

SECTION 6 – ACCIDENTAL RELEASE MEASURES

PERSONAL PRECAUTIONS: No special precautions required.

ENVIRONMENTAL PRECAUTIONS: Do not contaminate water

METHODS FOR CLEANING UP: Do not flush with water. Clean Up promptly by sweeping or vacuum. Keep in suitable and closed containers for disposal. After cleaning, flush away traces with water.

SECTION 7 – HANDLING AND STORAGE

HANDLING: Avoid contact with skin and eyes. Avoid dust formation. Do not breathe dust. Wash hands before breaks and at the end of workday.

STORAGE: Keep in a dry, cool place (0-35°C).

SECTION 8 – EXPOSURE CONTROLS / PERSONAL PROTECTION

ENGINEERING CONTROLS: Use local exhaust if dusting occurs. Natural ventilation is adequate in absence of dusts.

PERSONAL PROTECTION EQUIPMENT

RESPIRATORY PROTECTION: Dust safety masks are recommended where concentration of total dust is more than 10 mg/m'

HAND PROTECTION: Rubber gloves

EYE PROTECTION: Safety glasses with side-shields. Do not wear contact lenses

SKIN PROTECTION: Chemical resistant apron or protective suit if splashing or contact with solution is likely.

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

SECTION 9 – PHYSICAL AND CHEMICAL PROPERTIES

FORM:	Granular solid
COLOR:	White
ODOR:	None
PH:	5-9@5g/l
MELTING POINT (C):	Not Applicable
FLASH POINT(C):	Not Applicable
AUTOIGNITION TEMPERATURE (C):	Not Applicable
VAPOUR PRESSURE (MM HG):	Not Applicable
BULK DENSITY:	0.6 to 0.9
MAX CONCENTRATION:	10 g/L
VISCOSITY (MPA S):	@ 20 °C; 1 g/L ≈ 170 cps; 5 g/L ≈ 1200 cps

SECTION 10 – STABILITY AND REACTIVITY

STABILITY: Product is stable. No hazardous polymerization will occur

CONDITIONS TO AVOID: Oxidizing agents may cause exothermic reactions.

HAZARDOUS DECOMPOSITION PRODUCTS: Thermal decomposition may produce nitrogen oxides (NOx), carbon oxides C(Ox)

SECTION 11 – TOXICOLOGICAL INFORMATION

ACUTE TOXICITY

ORAL:	LD50/Oral/Rat>5000mg/kg
DERMAL:	LD50/Oral/Rat>5000mg/kg
INHALATION:	The product is not expected to be toxic by inhalation.

IRRITATION

SKIN:	Not irritating
EYES:	Not irritating
RESPIRATORY SYSTEM:	Not a respiratory irritant
SENSITIZATION:	No sensitizing
CARCINOGENICITY:	Not carcinogenic
CHRONIC TOXICITY:	No Chronic effects

SECTION 12 – ECOLOGICAL INFORMATION

FISH: LC50/Fathead minnow/96 hr>100 mg/L (OECD 203)

ALGAE: LC50/Scenedesmus subspicatus/72hr>100 mg/L (OECD 201)

DAPHNIDS: EC50/C. Dubia/48 hr>100 mg/L (OECD 202)

BIOACCUMULATION: Does not bioaccumulate.

PERSISTENCE / DEGRADABILITY: Not readily biodegradable.

SECTION 13 – DISPOSAL CONSIDERATIONS

WASTE FROM RESIDUES / UNUSED PRODUCTS: In accordance with Federal, State, and Local Regulations.

CONTAMINATED PACKAGING: Rinse empty containers with water and use the rinse water to prepare the working solution. Can be landfilled or incinerated, when in compliance with local regulations.

SECTION 14 – TRANSPORT INFORMATION

NOT REGULATED BY D.O.T.

SECTION 15 – REGULATORY INFORMATION

ALL COMPONENTS OF THIS PRODUCT ARE ON THE TSCA AND DSL INVENTORIES

RCRA STATUS: Not a hazardous waste.

HAZARDOUS WASTE NUMBER: Not Applicable

REPORTABLE QUANTITY (40 CFR 302): Not Applicable

THRESHOLD PLANNING QUANTITY (40 CFR 355): Not Applicable

CALIFORNIA PROPOSITION 65 INFORMATION:
The following statement is made in order to comply with the ca safe drinking water and toxic enforcement act of 1986: this product contains a chemical known to the state of california to cause cancer: residual acrylamide

HMIS & NFPA RATINGS:

	HMIS	NFPA
HEALTH	1	1
FLAMMABILITY:	1	1
REACTIVITY:	0	0

SECTION 16 – OTHER INFORMATION

PERSON TO CONTACT: Regulatory Affairs Manager

The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of it's publication. The information given is designed only as a guidance for safe handling, use, processing, storage, transportation, disposal and release, and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process unless specified in the text.

Univar USA Inc.
6100 Carillon Point
Kirkland, WA 98033
(425) 889-3400

For Emergency Assistance involving chemicals call - CHEMTREC (800) 424-9300

==========

The Version Date for this MSDS is : 03/06/2003

****
PRODUCT IDENTIFICATION
****

PRODUCT NAME: FERRIC CHLORIDE SOLUTION

MSDS NUMBER: P21925VS

DATE ISSUED: 01/02/03

SUPERCEDES: 10/22/01

ISSUED BY: 000099

MATERIAL SAFETY DATA SHEET

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product Name: Ferric Chloride - Drinking Water Grade
Chemical Name/Synonyms: Iron (III) Chloride Solution
Chemical Formula: FeCl3
Cas Number: 7705-08-0
HS Tariff Classification Number: data not available
Tax ID Number: data not available

Distributed by:
Univar USA
6100 Carillon Pt.
Kirkland, WA 98033

FOR TRANSPORTATION EMERGENCY ONLY, 24 HOURS EVERYDAY, CALL **CHEMTREC, 1-800-424-9300**

2. COMPOSITION/INFORMATION ON INGREDIENTS

Component	CAS Registry #	% by weight
Ferric Chloride	7705-08-0	37 - 45
Water	7732-18-5	Balance

Hazardous Ingredients: Ferric Chloride
Exposure Limits (ppm):

Component	OSHA TLV	ACGIH TLV	NIOSH
Ferric Chloride (as soluble iron salts)	1 mg/m3, 8-hr TWA	1 mg/m3, 8-hr TWA	1 mg/m3, 8-hr TWA

3. HAZARDS IDENTIFICATION

Emergency Overview

A reddish brown liquid with a slight odor of iron/acid. Avoid inhaling concentrated vapor or mist, may cause irritation of respiratory tract. May result in severe liver and/or kidney damage, if swallowed, and can be fatal. Do not induce vomiting. Avoid contact with skin. Liquid, mist, or vapor can cause irritation to all human tissue. Contact with eyes can result in visual loss unless removed quickly by thorough irrigation with water. Caution: May release irritating and toxic gases of hydrogen chloride during fire. Contain spills and keep liquid out of water sources. See Sections 3, 4, 5, and 6.

Potential Health Effects (Acute and Chronic)

INHALATION: Inhalation of concentrated mist or vapor may cause irritation of the respiratory tract.

INGESTION: Ingestion may cause severe liver and/or kidney damage, and may be fatal.
DIRECT CONTACT: The product is an irritant. Contact may include irritation with dryness, discomfort or rash. Ferric chloride has been infrequently associated with skin sensitization in humans. Extensive exposure could lead to skin sensitation

DIRECT EYE CONTACT: Contact with eyes may cause irritation and tearing and eye tissue discoloration, and may result in permanent visual loss unless removed quickly by thorough irrigation with water.

MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE: None known.

CARCINOGENS (NTP, IARC, or OSHA): No

4. FIRST AID MEASURES:

INHALATION: Remove victim to fresh air. If not breathing, perform artificial respiration. If breathing is difficult, give oxygen. Get immediate medical attention.

INGESTION: If swallowed, do NOT induce vomiting. Give victim water or milk. Call a physician or poison control center immediately. Never give anything by mouth to an unconscious person.

DIRECT CONTACT: Flush with water until material is removed.
Remove contaminated clothing. Wash clothing before reuse.

DIRECT EYE CONTACT: Immediately flush with water for at least 15 minutes. Hold eyelids apart to ensure complete irrigation of eye/lid tissue. Get immediate medical attention.

5. FIRE FIGHTING MEASURES

FLAMMABLE PROPERTIES:
Flammability: Product not flammable.
Flash Point: not applicable
Method used: TCC

OXIDIZING PROPERTIES: data not available

AUTOFLAMMABILITY: not applicable

AUTOIGNITION TEMPERATURE: not applicable

FLAMMABLE LIMITS, % BY VOLUME:

Lower flammable limit: not applicable
Upper flammable limit: not applicable

EXTINGUISHING MEDIA: Use water spray, fog, foam, dry chemical, CO2 or other agents as appropriate for surrounding fire.

FIRE FIGHTING INSTRUCTIONS: As in any fire, wear self-contained breathing apparatus pressure-demand, MSHA/NIOSH (approved or equivalent) and full protective gear. Keep unnecessary people away; isolate hazard area and deny entry. Stay upwind; keep out of low areas. During fire, irritating and toxic gases of hydrogen chloride may be generated by thermal decomposition. Cool exterior of storage tanks.

FIRE AND EXPLOSION HAZARDS: None

SENSITIVITY TO MECHANICAL IMPACT/STATIC DISCHARGE: not applicable

6. ACCIDENTAL RELEASE MEASURES

Contain spill in order to prevent contamination of water way; neutralize with lime or soda ash. Flush with water in accordance with applicable regulations to waste treatment system. Avoid runoff into storm sewers and ditches which lead to waterways. Spills of 1000 pounds (454 kilograms) or more must be reported to the National Response Center, (800) 424-8802. If water pollution occurs, notify the appropriate authorities.

7. HANDLING AND STORAGE

Store away from heat, strong alkalis (such as caustic soda and alkali metals. Keep containers closed and dry. Protect container from physical damage. Use handling equipment (pumps, hoses, etc.) compatible with product, i.e., polyethylene, polypropylene, PVC, Teflon, rubber, FRP, and titanium. See Section 10 for types of packaging materials to avoid. Avoid contact with bare metals other than titanium. Avoid breathing vapors and/or mist. Avoid contact with eyes and skin. Wash thoroughly after handling. Follow all MSDS/ label precautions even after container is emptied because they may retain vapor and product residues.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

VENTILATION: Good general ventilation should be sufficient to control airborne levels of vapor and mist.

RESPIRATORY PROTECTION: If airborne concentrations exceed the published exposure limits use NIOSH/MSHA approved, full face respirator as appropriate. Consult respirator manufacturer to determine appropriate equipment.

PROTECTIVE GLOVES: Wear impervious rubber gloves.

EYE PROTECTION: Wear splash proof chemical safety goggles. Do not wear contact lenses.

OTHER PROTECTIVE EQUIPMENT: Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower.

WORK/HYGIENIC PRACTICES: Avoid ingestion and breathing mist. Ferric Chloride will permanently stain clothing and temporarily stain skin. Avoid contact with skin and clothing. Wash thoroughly after handling.

OTHER PRECAUTIONS: None.

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance:	reddish brown
Odor:	slightly iron/acid
Odor Threshold:	data not available
Physical State:	liquid
Vapor Pressure (REID):	negligible
Specific Gravity:	40% solution = 1.432 at 17.50 C (water = 1)
Solubility in Water:	complete
pH:	<2.0
Boiling Point:	230 0 F or 1100 C
Vapor Density:	not applicable (Air = 1)
Evaporation Rate:	1 (Butyl Acetate = 1)
Freezing Point:	(-58)0 F or (-500)C
Coefficient of Water/Oil	Distribution: not applicable
Viscosity:	data not available
% Solids:	not applicable
% VOC:	not applicable

For information on FLASH POINT, FLAMMABILITY, OXIDIZING PROPERTIES AUTOFLAMMABILITY, and EXPLOSIVE PROPERTIES, please see Section 5.

10. STABILITY AND REACTIVITY

GENERAL: This product is stable and hazardous polymerization will not occur.

INCOMPATIBLE MATERIALS AND CONDITIONS TO AVOID: Material is stable when properly handled. Material is acidic and corrodes all common metals except titanium. Avoid contact with strong alkalis and alkali metals.

HAZARDOUS DECOMPOSITION PRODUCTS: May release hydrogen chloride gas at elevated temperatures.

11. TOXICOLOGICAL INFORMATION

Immediate Effects: Can cause severe liver and/or kidney damage if swallowed, and may even be fatal. See Section 3 for other immediate health hazards.

12. ECOLOGICAL INFORMATION

Fat Head Minnows LC50 > 1000 ppm ; Daphnia Magna LC50 > 1000 ppm

13. DISPOSAL CONSIDERATIONS

Dispose of spilled, neutralized, or waste product, contaminated soil and other contaminated materials in accordance with all local, state and federal regulations.

14. TRANSPORT INFORMATION

DOT (Department of Transportation)
- Proper Shipping Name: Ferric Chloride, Solution
- Hazard Class: 8
- Identification Number: UN2582
- Packing Group: III
- Label: Corrosive
- Emergency Response Guide Book Number: 154
- Corrosive: To metals only (not to skin)

15. REGULATORY INFORMATION

U.S. Federal Regulations:

OSHA:

This product is hazardous by definition of Hazard Communication Standard (29CFR1910.1200).

SARA TITLE III (Superfund Amendments and Reauthorization Act of 1986)
Section 311/312 Hazard and Physical Hazards:

Immediate	yes
Delayed	yes
Fire:	no
Pressure:	no
Reactivity:	no

CERCLA/SUPERFUND (40 CFR 117, 302)

Ingredient	RQ (Reportable Quantity)
ferric chloride, solution	1000 pounds, anhydrous basis

RCRA:
If discarded in its purchased form, this product would be a hazardous waste by characteristic. Under RCRA, it is the responsibility of the product user to determine at the time of disposal, whether a material containing the product or derived from the product should be classified as a hazardous waste.

This product contains no Class I or Class II Ozone Depleting Chemicals

TSCA:
All compounds contained in this product are in the TSCA inventory
DOT:
Please see Section 14.
This product has been classified in accordance with the hazard criteria of the CPR and the MSDS contains all the information required by the CPR.

16. OTHER INFORMATION

The following label hazard ratings are recommended for containers of Ferric Chloride, Solution:
(Hazard Index Key: 4 = severe; 3 = serious; 2 = moderate; 1 = slight; 0 = minimal)

NFPA		HMIS	
Health	not rated	Health	3
Flammability	not rated	Flammability	0
Reactivity	not rated	Reactivity	0

For Additional Information:
Contact: MSDS Coordinator - Univar USA
During business hours, Pacific Time - (425) 889-3400

NOTICE
Univar USA expressly disclaims all express or implied warranties of merchantibility and fitness for a particular purpose with respect to the product or information provided herein, and shall under no circumstances be liable for incidental or consequential damages.

Do not use ingredient information and/or ingredient percentages in this MSDS as a product specification. For product specification information refer to a Product Specification Sheet and/or a Certificate of Analysis. These can be obtained from your local Univar USA Sales Office.

All information appearing herein is based upon data obtained from the manufacturer and/or recognized technical sources. While the information is believed to be accurate, Univar USA

makes no representations as to its accuracy or sufficiency. Conditions of use are beyond Univar USA's control. Therefore, users are responsible to verify this data under their own operating conditions to determine whether the product is suitable for their particular purposes, and they assume all risks of their use, handling, and disposal of the product or from the publication or use of, or reliance upon, information contained herein. This information relates only to the product designated herein and does not relate to its use in combination with any other material or in any other process.

END OF MSDS

Univar USA Inc Material Safety Data Sheet

For Additional Information contact MSDS Coordinator during business hours, Pacific time: (425) 889-3400

Notice

Univar USA Inc. ("Univar") expressly disclaims all express or implied warranties of merchantability and fitness for a particular purpose, with respect to the product or information provided herein, and shall under no circumstances be liable for incidental or consequential damages.

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This information relates only to the product designated herein, and does not relate to its use in combination with any other material or in any other process

Univar USA Inc Material Safety Data Sheet

MSDS No:	OZ34514
Version No:	009 2009-09-24
Order No:	

Univar USA Inc., 17425 NE Union Hill Rd., Redmond WA 98052
(425) 889 3400

Emergency Assistance

For emergency assistance involving chemicals call
Chemtrec - (800) 424-9300

The Version Date and Number for this MSDS is : 09/24/2009 - #009

PRODUCT NAME:	HYDROCHLORIC ACID (HCl) (ALL GRADES)
MSDS NUMBER:	OZ34514
DATE ISSUED:	07/30/2008
SUPERSEDES:	01/26/2006
ISSUED BY:	008730

****
****

MATERIAL SAFETY DATA SHEET

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Distributed by:
Univar USA Inc.
17425 NE Union Hill Road
Redmond, WA 98052
425-889-3400

Trade Name: HYDROCHLORIC ACID (HCl) (ALL GRADES)

Synonyms:
Muriatic Acid
HCl Solution
Aqueous hydrogen chloride

Product Use: Process chemical, Metal cleaning, Water purification, Petroleum Industry

2. HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW:

Color:	Colorless
Physical State:	Liquid
Appearance:	Clear
Odor:	Irritating, Pungent, Sharp
Signal Word:	Danger

MAJOR HEALTH HAZARDS: CAUSES BURNS TO THE RESPIRATORY TRACT, SKIN AND EYES. CAUSES PERMANENT EYE DAMAGE. DO NOT GET IN EYES, ON SKIN, OR ON CLOTHING.

PHYSICAL HAZARDS: May spatter or generate heat when mixed with water. Contact

with metals may evolve flammable hydrogen gas.

PRECAUTIONARY STATEMENTS: Do not breathe vapor or mist. Do not get in eyes, on skin, or on clothing. Do not taste or swallow. Wash thoroughly after handling. Use only with adequate ventilation.

2. HAZARDS IDENTIFICATION

POTENTIAL HEALTH EFFECTS:

Inhalation: May cause irritation (possibly severe), chemical burns, and pulmonary edema.

Skin contact: May cause irritation (possibly severe) and chemical burns.

Eye contact: May cause irritation (possibly severe), chemical burns, eye damage, and blindness. Ingestion: Not a likely route of exposure.

Target Organs Effected: Respiratory System, Skin, Eye

Chronic Effects: Repeated or prolonged exposure to dilute solutions may result in dermatitis. Discoloration of the teeth may occur as a result of long term exposure.

Interaction with Other Chemicals Which Enhance Toxicity: None known

Medical Conditions Aggravated by Exposure: None known

See Section 11: TOXICOLOGICAL INFORMATION

3. COMPOSITION/INFORMATION ON INGREDIENTS

Hazardous Component	Concentration (by weight %)	CAS - No.
Water	63 - 91	7732-18-5
Hydrogen chloride	9 - 36	7647-01-0

4. FIRST AID MEASURES

INHALATION: If adverse effects occur, remove to uncontaminated area. Give artificial respiration if not breathing. If breathing is difficult, oxygen should be administered by qualified personnel. If respiration or pulse has stopped, have a trained person administer basic life support (Cardio-Pulmonary Resuscitation and/or Automatic External Defibrillator) and CALL FOR EMERGENCY SERVICES IMMEDIATELY.

SKIN CONTACT: Immediately flush contaminated areas with water. Remove contaminated clothing, jewelry, and shoes immediately. Wash contaminated areas with soap and water. Thoroughly clean and dry contaminated clothing and shoes before reuse. GET MEDICAL ATTENTION IMMEDIATELY.

EYE CONTACT: Immediately flush eyes with a directed stream of water for at

least 15 minutes, forcibly holding eyelids apart to ensure complete irrigation of all eye and lid tissues. Washing eyes within several seconds is essential to achieve maximum effectiveness. GET MEDICAL ATTENTION IMMEDIATELY.

INGESTION: Not a likely route of exposure.

5. FIRE-FIGHTING MEASURES

Fire Hazard: Negligible fire hazard.

Extinguishing Media: Use media appropriate for surrounding fire

Fire Fighting: Keep unnecessary people away, isolate hazard area and deny entry. Wear NIOSH approved positive-pressure self-contained breathing apparatus operated in pressure demand mode. Move container from fire area if it can be done without risk. Cool non-leaking containers with water. Avoid inhalation of material or combustion by-products. Stay upwind and keep out of low areas.

Sensitivity to Mechanical Impact: Not sensitive.

Sensitivity to Static Discharge: Not sensitive.

Flash point: Not flammable

Hazardous Combustion Products: Hydrogen chloride, Chlorine, Hydrogen gas

6. ACCIDENTAL RELEASE MEASURES

Occupational Release:
Remove sources of ignition. Wear appropriate personal protective equipment recommended in Section 8 of the MSDS. Stop leak if possible without personal risk. Consider evacuation of personnel located downwind if material is leaking. Shut off ventilation system if needed. Completely contain spilled material with dikes, sandbags, etc. Neutralize with soda ash or dilute caustic soda. Collect with appropriate absorbent and place into suitable container. Liquid material may be removed with a properly rated vacuum truck. Keep out of water supplies and sewers. This material is acidic and may lower the pH of the surface waters with low buffering capacity. Releases should be reported, if required, to appropriate agencies.

7. HANDLING AND STORAGE

Storage Conditions: Store and handle in accordance with all current regulations and standards. Store in rubber-lined steel, acid-resistant plastic or glass containers. Keep container tightly closed. Store in a cool, dry area. Store in a well-ventilated area. Keep away from heat, sparks and open flames. Keep separated from incompatible substances. Do not store in aluminum container or use aluminum fittings or transfer lines. Protect from physical damage. Dike and vent storage tanks.

Handling Procedures: Avoid breathing vapor or mist. Do not get in eyes, on skin, or on clothing. Wash thoroughly after handling. When mixing, slowly add to water to minimize heat generation and spattering.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

OSHA Regulatory Exposure limit(s):

Hazardous Component	CAS-No.	OSHA Final PEL TWA	OSHA Final PEL STEL	OSHA Final PEL Ceiling
Hydrogen chloride	7647-01-0			5 ppm 7 mg/m3

Non-Regulatory Exposure Limit(s):
The Non-Regulatory OSHA limits shown in the table are the Vacated 1989 PEL's (vacated by 58 FR 35338, June 30, 1993).

Hazardous Component	CAS-No.	ACGIH TWA	ACGIH STEL	ACGIH Ceiling	OSHA TWA (Vacated)	OSHA STEL (Vacated)	OSHA Ceiling (Vacated)
Hydrogen chloride	7647-01-0			2 ppm			5 ppm 7 mg/m3

ENGINEERING CONTROLS: Use closed systems when possible. Provide local exhaust ventilation where vapor or mist may be generated. Ensure compliance with applicable exposure limits.

PERSONAL PROTECTIVE EQUIPMENT:

Eye Protection: Wear chemical safety goggles with a faceshield to protect against eye and skin contact when appropriate. Provide an emergency eye wash fountain and quick drench shower in the immediate work area.

Skin and Body Protection: Wear chemical resistant clothing and rubber boots when potential for contact with the material exists. Always place pants legs over boots.

Hand Protection: Wear appropriate chemical resistant gloves

Protective Material Types: Nitrile, Neoprene, Butyl rubber, Polyvinyl chloride (PVC), Responder, Trellchem, Tychem

Hazardous Component	Immediately Dangerous to Life/ Health (IDLH)
Hydrogen chloride	50 ppm IDLH

Respiratory Protection: A NIOSH approved full-face respirator equipped with acid gas cartridges (appropriate for hydrogen chloride) may be permissible under certain circumstances where airborne concentrations of hydrogen chloride are expected to exceed exposure limits, or when symptoms have been observed that are indicative of overexposure. When the level may be above the

Annotation:

IDLH, use an SCBA or pressure-demand supplied air with an auxiliary self-contained escape pack. Pressure-demand SCBA (self-contained breathing apparatus) must be used when there is a potential for uncontrolled release or unknown concentrations. A respiratory protection program that meets 29 CFR 1910.134 must be followed whenever workplace conditions warrant use of a respirator.

9. PHYSICAL AND CHEMICAL PROPERTIES

Physical State:	Liquid
Appearance:	Clear
Color:	Colorless
Odor:	Irritating, Pungent, Sharp
Odor Threshold	0.3 ppm (causes olfactory fatigue)
Molecular Weight:	36.46
Molecular Formula:	HCI
Flash point:	Not flammable
Boiling Point/Range:	140 - 221 deg F (60 105 deg C)
Freezing Point/Range:	-29 to 5 deg F (-34 to -15 deg C)
Vapor Pressure:	14.6 - 80 mmHg @ 20 deg C
Vapor Density (air=1):	1.3 @ 20 deg C
Specific Gravity (water=1):	1.05 1.18
Density:	8.75 9.83 lbs/gal
Water Solubility:	100%
pH:	2 (0.2% solution)
Volatility:	9 - 36% by volume
Evaporation Rate (ether=1):	< 1.00 (butyl acetate=1)

10. STABILITY AND REACTIVITY

Reactivity/ Stability: Stable at normal temperatures and pressures.

Conditions to Avoid: Avoid heat, flames, sparks and other sources of ignition. Avoid contact with water. Will react with some metals forming flammable hydrogen gas. Hydrogen chloride may react with cyanide, forming lethal concentrations of hydrocyanic acid. Avoid contact with incompatible materials.

Incompatibilities/Materials to Avoid: Metals, Alkalis, Oxidizing agents, Mercuric sulfate, Perchloric acid, Carbides of calcium, cesium, rubidium, Acetylides of cesium and rubidium, Phosphides of calcium and uranium, Lithium Silicide

Hazardous Decomposition Products: Chlorine, Hydrogen chloride, Hydrogen gas

Hazardous Polymerization: Will not occur

11. TOXICOLOGICAL INFORMATION

Standard Draize (Eye):	rabbit-eye mild
Standard Draize (Skin):	human-skin mild

TOXICITY DATA:

Hazardous Component	LD50 Oral	LC50 Inhalation	LD50 Dermal
Hydrogen chloride	700 mg/kg (Rat) 900 mg/kg (Rabbit)	3124 ppm (1 hr-Rat)	5010 mg/kg (Rabbit)

TOXICITY:
Inhalation will cause severe irritation and possible burns with coughing and choking. If inhaled deeply, edema and hemorrhage of the lungs may occur. Prolonged exposure may cause discoloration and/or erosion of teeth. Contact with eyes causes immediate severe irritation with possible burns, permanent visual impairment, or total loss of sight. Skin contact with this material may cause severe irritation and corrosion of tissue. Ingestion may cause immediate burns of the mouth, esophagus, and stomach. Ingestion may cause intense pain, nausea, vomiting, bleeding, circulating collapse, shock and death.

CARCINOGENICITY: This product is not classified as a carcinogen by NTP, IARC or OSHA.

12. ECOLOGICAL INFORMATION

ECOTOXICITY DATA:

LC50 Gambusia affinis: 282 mg/L 96 h
LC50 goldfish: 178 mg/L (1 to 2 hour survival time)
LC50 bluegill: 3.6 mg/L 48 h
LC50 shrimp: 100 330 mg/L

FATE AND TRANSPORT:
BIODEGRADATION: This material is inorganic and not subject to biodegradation.

PERSISTENCE: This material is believed not to persist in the environment. This material is believed to exist in the disassociated state in the environment. If released to soil, hydrogen chloride will sink into the soil. The acid will dissolve some soil material (in particular, anything with a carbonate base) and will be somewhat neutralized. The remaining portion is thought to transport downward to the water table. If released to water, it dissociates almost completely and will be neutralized by natural alkalinity and carbon dioxide.

BIOCONCENTRATION: This material is not expected to bioconcentrate in organisms.

ADDITIONAL ECOLOGICAL INFORMATION: This material has exhibited toxicity to terrestrial organisms. May decrease pH of waterways and adversely affect aquatic life.

13. DISPOSAL CONSIDERATIONS

Reuse or reprocess, if possible. Dispose in accordance with all applicable regulations. May be subject to disposal regulations: U.S. EPA 40 CFR 261. Hazardous Waste Number(s): D002

14. TRANSPORT INFORMATION

U.S. DOT 49 CFR 172.101:

PROPER SHIPPING NAME:	Hydrochloric acid solution
DOT UN NUMBER:	UN1789
HAZARD CLASS/ DIVISION:	8
PACKING GROUP:	II
LABELING REQUIREMENTS:	8
DOT RQ (lbs):	RQ 5,000 Lbs. (Hydrochloric acid)

CANADIAN TRANSPORTATION OF DANGEROUS GOODS:

SHIPPING NAME:	Hydrochloric acid solution
UN NUMBER:	UN1789
CLASS:	8
PACKING/RISK GROUP:	II

15. REGULATORY INFORMATION

U.S. REGULATIONS

OSHA REGULATORY STATUS:
This material is considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200) (US).

CERCLA SECTIONS 102a/103 HAZARDOUS SUBSTANCES (40 CFR 302.4):
If a release is reportable under CERCLA section 103, notify the state emergency response commission and local emergency planning committee. In addition, notify the National Response Center at (800) 424-8802 or (202) 4262675.

Hazardous Component	CERCLA Reportable Quantities:
Hydrogen chloride	5000 lb (final RQ)

EPCRA EXTREMELY HAZARDOUS SUBSTANCES (40 CFR 355.30):
If a release is reportable under EPCRA, notify the state emergency response commission and local emergency planning committee. If the TPQ is met, facilities are subject to reporting requirements under EPCRA Sections 311 and 312.

Hazardous Component	EPCRA RQs	Threshold Planning Quantity (TPQs)
Hydrogen chloride	5000 lb (EPCRA RQ)	500 lb (TPQ)

EPCRA SECTIONS 311/312 HAZARD CATEGORIES (40 CFR 370.21):
Sudden Release of Pressure, Extremely Hazardous, Acute Health Hazard

EPCRA SECTION 313 (40 CFR 372.65):
The following chemicals are listed in 40 CFR 372.65 and may be subject to Community Right-to Know Reporting requirements.

Hazardous Component	Status:
Hydrogen chloride	Listed

DEPARTMENT OF HOMELAND SECURITY (DHS)- Chemical Facility Anti-Terrorism Standards (6 CFR 27):
Hydrogen chloride is regulated under DHS as follows:
- DHS - Release Min. Concentration
- DHS - Release Screening Threshold Quantity
- DHS - Security Issue
- DHS - Theft Screening Threshold Quantity

OSHA PROCESS SAFETY (PSM) (29 CFR 1910.119):
Not regulated

NATIONAL INVENTORY STATUS

U.S. INVENTORY STATUS (TSCA): All components are listed or exempt

TSCA 12(b): This product is not subject to export notification

CANADIAN DOMESTIC SUBSTANCE LIST (DSL/NDSL): All components are listed.

STATE REGULATIONS

Hazardous Component	Hydrogen chloride
California Proposition 65 Cancer WARNING:	Not Listed
California Proposition 65 CRT List - Male reproductive toxin:	Not Listed
California Proposition 65 CRT List - Female reproductive toxin:	Not Listed.
Massachusetts Right to Know Hazardous Substance List	Listed
New Jersey Right to Know Hazardous Substance List	sn 1012; sn 2909 (gas only)
New Jersey Special Health Hazards Substance List	corrosive
New Jersey - Environmental Hazardous Substance List	Listed
Pennsylvania Right to Know Hazardous Substance List	Listed
Pennsylvania Right to Know Special Hazardous Substances	Not Listed
Pennsylvania Right to Know Environmental Hazard List	Listed
Rhode Island Right to Know Hazardous Substance List	Listed

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

Hazardous Component	Hydrogen chloride
Canada - CEPA Schedule I - Toxic Substance list	Not Listed
WHMIS Classification:	E

16. OTHER INFORMATION

Disclaimer:
This information is intended solely for the use of individuals trained in the NFPA and/or HMIS systems. HMIS: (SCALE 0-4) (Rated using National Paint & Coatings Association
HMIS: Rating Instructions, 2nd Edition)
Health: 3 Flammability: 0 Reactivity: 1
NFPA 704 - Hazard Identification Ratings (SCALE 0-4)
Health: 3 Flammability: 0 Reactivity: 1

Univar USA Inc Material Safety Data Sheet

MSDS No:	CDS1962
Version No:	002 2013-04-09
Order No:	

Univar USA Inc., 17425 NE Union Hill Rd., Redmond WA 98052
(425) 889 3400

Emergency Assistance

For emergency assistance involving chemicals call
Chemtrec - (800) 424-9300

COMPANY IDENTITY: Univar
PRODUCT IDENTITY: CAUSTIC SODA 50%

SDS DATE: 04/08/2013
REPLACES: 09/21/2012

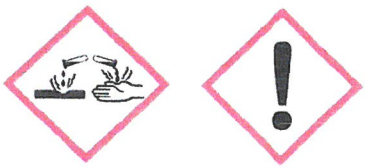
SAFETY DATA SHEET

This Safety Data Sheet conforms to ANSI Z400.5, and to the format requirements and the International Chemical Safety Cards of the Global Harmonizing System.
THIS SDS COMPLIES WITH 29 CFR 1910.1200 (HAZARD COMMUNICATION STANDARD)
IMPORTANT: Read this SDS before handling & disposing of this product.
Pass this information on to employees, customers, & users of this product.

SECTION 1. IDENTIFICATION OF THE SUBSTANCE OR MIXTURE AND OF THE SUPPLIER

PRODUCT IDENTITY: CAUSTIC SODA 50%
SDS NUMBER: CDS1962
COMPANY IDENTITY: Univar
COMPANY ADDRESS: 17425 NE Union Hill Road
COMPANY CITY: Redmond, WA 98052
COMPANY PHONE: 1-425-889-3400
EMERGENCY PHONES: CHEMTREC: 1-800-424-9300 (USA)
CANUTEC: 1-613-996-6666 (CANADA)

SECTION 2. HAZARDS IDENTIFICATION



DANGER!!

EXPOSURE PREVENTION: AVOID ALL CONTACT!

HAZARD STATEMENTS:
H100s = General, H200s = Physical, H300s = Health, H400s = Environmental

H290	May be corrosive to metals.
H314	Causes severe skin burns and eye damage.

PRECAUTIONARY STATEMENTS:
P100s = General, P200s = Prevention, P300s = Response, P400s = Storage, P500s = Disposal

P262	Do not get in eyes, on skin, or on clothing.
P280	Wear protective gloves/protective clothing/eye protection/face protection.
P305+351+338	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses if present & easy to do - Continue rinsing.
P309+311	If exposed or you feel unwell: Call a POISON CENTER or doctor/physician.
P405+102	Store locked up. Keep out of reach of children.

SECTION 3. COMPOSITION/INFORMATION ON INGREDIENTS

MATERIAL	CAS#	EINECS#	WT %
Sodium Hydroxide	1310-73-2	215-185-5	48-52
Water	7732-18-5	231-791-2	48-52
Sodium Chloride	7647-14-5	-	0- 5

Trace components: Trace ingredients (if any) are present in < 1% concentration, (< 0.1% for potential carcinogens, reproductive toxins, respiratory tract mutagens, and sensitizers). None of the trace ingredients contribute significant additional hazards at the concentrations that may be present in this product. All pertinent hazard information has been provided in this document, per the requirements of the Federal Occupational Safety and Health Administration Standard (29 CFR 1910.1200), U.S. State equivalents, and Canadian Hazardous Materials Identification System Standard (CPR 4).

SEE SECTIONS 8, 11 & 12 FOR TOXICOLOGICAL INFORMATION.

COMPANY IDENTITY: Univar
PRODUCT IDENTITY: CAUSTIC SODA 50%

SDS DATE: 04/08/2013
REPLACES: 09/21/2012

SECTION 4. FIRST AID MEASURES

EYE CONTACT:
If this product enters the eyes, open eyes while under gently running water. Use sufficient force to open eyelids. "Roll" eyes to expose more surface. Minimum flushing is for 15 minutes. Seek immediate medical attention.

SKIN CONTACT:
If the product contaminates the skin, immediately begin decontamination with running water. Minimum flushing is for 15 minutes. Remove contaminated clothing, taking care not to contaminate eyes. If skin becomes irritated and irritation persists, medical attention may be necessary. Wash contaminated clothing before reuse, discard contaminated shoes.

INHALATION:
After high vapor exposure, remove to fresh air. If it is suspected that fumes are still present, the rescuer should wear an appropriate mask or self-contained breathing apparatus. Keep person warm and at rest. breathing is difficult, give oxygen. If breathing has stopped, trained personnel should immediately begin artificial respiration. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband. If the heart has stopped, trained personnel should immediately begin cardiopulmonary resuscitation (CPR). Seek immediate medical attention. In case of inhalation of decomposition products in a fire, symptoms may be delayed.The exposed person may need to be kept under medical surveillance for 48 hours.

SWALLOWING:
If swallowed, CALL PHYSICIAN OR POISON CONTROL CENTER FOR MOST CURRENT INFORMATION. If professional advice is not available, give two glasses of water to drink. DO NOT INDUCE VOMITING. Never induce vomiting or give liquids to someone who is unconscious, having convulsions, or unable to swallow. Seek immediate medical attention.

NOTES TO PHYSICIAN:
There is no specific antidote. Treatment of overexposure should be directed at the control of symptoms and the clinical condition of the patient. Any material aspirated during vomiting may cause lung injury. Therefore, emesis should not be induced mechanically or pharmacologically. If it is considered necessary to evacuate the stomach contents, this should be done by means least likely to cause aspiration (such as: Gastric lavage after endotracheal intubation).

Victims of chemical exposure must be taken for medical attention. Rescuers should be taken for medical attention, if necessary. Take a copy of label and SDS to physician or health professional with victim.

SECTION 5. FIRE FIGHTING MEASURES

FIRE & EXPLOSION PREVENTIVE MEASURES
Isolate from extreme heat and open flame.

EXTINGUISHING MEDIA
In case of fire in surroundings, all extinguishing agents allowed.

SPECIAL FIRE FIGHTING PROCEDURES
Water spray may be ineffective on fire but can protect fire-fighters & cool closed containers. Use fog nozzles if water is used.
Do not enter confined fire-space without full bunker gear.
(Helmet with face shield, bunker coats, gloves & rubber boots).
Use NIOSH approved positive-pressure self-contained breathing apparatus.

UNUSUAL EXPLOSION AND FIRE PROCEDURES
Noncombustible.
Isolate from acids.
Closed containers may explode if exposed to extreme heat.
Applying to hot surfaces requires special precautions.

COMPANY IDENTITY: Univar
PRODUCT IDENTITY: CAUSTIC SODA 50%

SDS DATE: 04/08/2013
REPLACES: 09/21/2012

SECTION 6. ACCIDENTAL RELEASE MEASURES

SPILL AND LEAK RESPONSE AND ENVIRONMENTAL PRECAUTIONS:
Uncontrolled releases should be responded to by trained personnel using pre-planned procedures. Proper protective equipment should be used. In case of a spill, clear the affected area, protect people, and respond with trained personnel.

PERSONAL PROTECTIVE EQUIPMENT
The proper personal protective equipment for incidental releases (such as: 1 Liter of the product released in a well-ventilated area), use impermeable gloves (triple-gloves (rubber gloves and nitrile gloves, over latex gloves), goggles, face shield, and appropriate body protection. In the event of a large release, use impermeable gloves, specific for the material handled, chemically resistant suit and boots, and hard hat. Self-Contained Breathing Apparatus or respirator may be required where engineering controls are not adequate or conditions for potential exposure exist. When respirators are required, select NIOSH/MSHA approved based on actual or potential airborne concentrations in accordance with latest OSHA and/or ANSI recommendations.

ENVIRONMENTAL PRECAUTIONS:
Stop spill at source. Construct temporary dikes of dirt, sand, or any appropriate readily available material to prevent spreading of the material. Close or cap valves and/or block or plug hole in leaking container and transfer to another container. Keep from entering storm sewers and ditches which lead to waterways, and if necessary, call the local fire or police department for immediate emergency assistance.

CONTAINMENT AND CLEAN-UP MEASURES:
Absorb spilled liquid with polypads or other suitable absorbent materials. If necessary, neutralize using suitable buffering material, (acid with soda ash or base with phosphoric acid), and test area with litmus paper to confirm neutralization. Clean up with non-combustible absorbent (such as: sand, soil, and so on). Shovel up and place all spill residue in suitable containers. dispose of at an appropriate waste disposal facility according to current applicable laws and regulations and product characteristics at time of disposal (see Section 13 - Disposal Considerations).

SECTION 7. HANDLING AND STORAGE

HANDLING
Use only with adequate ventilation. Do not get in eyes, on skin or clothing. Wear OSHA Standard full face shield. Consult Safety Equipment Supplier. Wear goggles, face shield, gloves, apron & footwear impervious to material. Wash clothing before reuse.
NEVER pour water into this substance. When dissolving or diluting,
always add it slowly to the water.

STORAGE
Keep separated from strong oxidants, strong acids, metals, food & feedstuffs. Keep dry. Do not store above 49 C/120 F. Keep container tightly closed & upright when not in use to prevent leakage. Wear full face shield, gloves & full protective clothing when opening or handling. When empty, drain completely, replace bungs securely.

NONBULK: CONTAINERS:
Store containers in a cool, dry location, away from direct sunlight, sources of intense heat, or where freezing is possible. Material should be stored in secondary containers or in a diked area, as appropriate. Store containers away from incompatible chemicals (see Section 10, Stability and Reactivity). Post warning and "NO SMOKING" signs in storage and use areas, as appropriate. Empty containers should be handled with care. Never store food, feed, or drinking water in containers which held this product.

BULK CONTAINERS:
All tanks and pipelines which contain this material must be labeled. Perform routine maintenance on tanks or pipelines which contain this product. Report all leaks immediately to the proper personnel.

COMPANY IDENTITY: Univar
PRODUCT IDENTITY: CAUSTIC SODA 50%

SDS DATE: 04/08/2013
REPLACES: 09/21/2012

SECTION 7. HANDLING AND STORAGE (CONTINUED)

TANK CAR SHIPMENTS:
Tank cars carrying this product should be loaded and unloaded in strict accordance with tank-car manufacturer's recommendation and all established on-site safety procedures. Appropriate personal protective equipment must be used (see Section 8, Engineering Controls and Personal Protective Equipment.). All loading and unloading equipment must be inspected, prior to each use. Loading and unloading operations must be attended, at all times. Tank cars must be level, brakes must be set or wheels must be locked or blocked prior to loading or unloading. Tank car (for loading) or storage tanks (for unloading) must be verified to be correct for receiving this product and be properly prepared, prior to starting the transfer operations. Hoses must be verified to be in the correct positions, before starting transfer operations. A sample (if required) must be taken and verified (if required) prior to starting transfer operations. All lines must be blown-down and purged before disconnecting them from the tank car or vessel.

PROTECTIVE PRACTICES DURING MAINTENANCE OF CONTAMINATED EQUIPMENT:
Follow practices indicated in Section 6 (Accidental Release Measures). Make certain application equipment is locked and tagged-out safely. Always use this product in areas where adequate ventilation is provided. Collect all rinsates and dispose of according to applicable Federal, State, Provincial, or local procedures.

SECTION 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

MATERIAL	CAS#	EINECS#	TWA (OSHA)	TLV (ACGIH)
Sodium Hydroxide	1310-73-2	215-185-5	None Known	None Known
Water	7732-18-5	231-791-2	None Known	None Known
Sodium Chloride	7647-14-5	-	None Known	None Known

MATERIAL	CAS#	EINECS#	CEILING	STEL(OSHA/ACGIH)	HAP
Sodium Hydroxide	1310-73-2	215-185-5	2 ppm	None Known	No

This product contains no EPA Hazardous Air Pollutants (HAP) in amounts > 0.1%.

RESPIRATORY EXPOSURE CONTROLS
A respiratory protection program that meets OSHA 29 CFR 1910.134 and ANSI Z86.2 requirements or European Standard EN 149 must be followed whenever workplace conditions warrant a respirator's use.

VENTILATION
LOCAL EXHAUST: Necessary MECHANICAL (GENERAL): Necessary
SPECIAL: None OTHER: None
Please refer to ACGIH document, "Industrial Ventilation, A Manual of Recommended Practices", most recent edition, for details.

PERSONAL PROTECTIONS:
Wear OSHA Standard full face shield. Consult Safety Equipment Supplier. Wear goggles, face shield, gloves, apron & footwear impervious to material. Wash clothing before reuse.

WORK & HYGIENIC PRACTICES:
Provide readily accessible eye wash stations & safety showers.
Wash at end of each workshift & before eating, smoking or using the toilet.
Promptly remove clothing that becomes contaminated. Destroy contaminated leather articles. Launder or discard contaminated clothing.

COMPANY IDENTITY: Univar
PRODUCT IDENTITY: CAUSTIC SODA 50%

SDS DATE: 04/08/2013
REPLACES: 09/21/2012

SECTION 9. PHYSICAL & CHEMICAL PROPERTIES

APPEARANCE:	Liquid, Water-White
ODOR:	None
ODOR THRESHOLD:	Not Available
pH (Neutrality):	14.0
MELTING POINT/FREEZING POINT:	Not Available
BOILING RANGE (IBP,50%,Dry Point):	Not Applicable
FLASH POINT (TEST METHOD):	Not Applicable
EVAPORATION RATE (n-BUTYL ACETATE=1):	Not Applicable
FLAMMABILITY CLASSIFICATION:	Non-Combustible
LOWER FLAMMABLE LIMIT IN AIR (% by vol):	Not Applicable
UPPER FLAMMABLE LIMIT IN AIR (% by vol):	Not Available
VAPOR PRESSURE (mm of Hg)@20 C	17.5
VAPOR DENSITY (air=1):	0.670
GRAVITY @ 68/68F / 20/20C:	
SPECIFIC GRAVITY (Water=1):	1.525
POUNDS/GALLON:	12.71
WATER SOLUBILITY:	Complete
PARTITION COEFFICIENT (n-Octane/Water):	Not Available
AUTO IGNITION TEMPERATURE:	Not Applicable
DECOMPOSITION TEMPERATURE:	Not Available

SECTION 10. STABILITY & REACTIVITY

STABILITY
Stable under normal conditions.

CONDITIONS TO AVOID
Isolate from extreme heat, and open flame..

MATERIALS TO AVOID
Reacts violently with fire extinguishers containing water.
The substance is a strong base, reacts violently with acids and is corrosive.
Reacts with water generating sufficient heat to ignite combustible materials.
Reacts violently with strong acids, causing fire & explosion hazard. Attacks many plastics, rubber, coatings, many metals, such as aluminum, zinc, tin, & lead, forming flammable/explosive gas (hydrogen).
Reacts with ammonium salts to produce ammonia & causing fire hazard.
Rapidly absorbs carbon dioxide & water from the air.
Contact with moisture will generate heat.

HAZARDOUS DECOMPOSITION PRODUCTS
Hydrogen Chloride, Phosgene, Sodium Oxide & Hydroxide from heating.

HAZARDOUS POLYMERIZATION
Will not occur.

COMPANY IDENTITY: Univar
PRODUCT IDENTITY: CAUSTIC SODA 50%

SDS DATE: 04/08/2013
REPLACES: 09/21/2012

SECTION 11. TOXICOLOGICAL INFORMATION

ACUTE HAZARDS

EYE & SKIN CONTACT:
Severe burns to skin, defatting, dermatitis.
Severe burns to eyes, redness, tearing, blurred vision.
Liquid can cause severe skin & eye burns. Wash thoroughly after handling.

INHALATION:
Severe respiratory tract irritation may occur. Vapor harmful.
The applicable occupational exposure limit value should not be exceeded during any part of the working exposure.

SWALLOWING:
Harmful or fatal if swallowed.

SUBCHRONIC HAZARDS/CONDITIONS AGGRAVATED

CONDITIONS AGGRAVATED:
None Known.

CHRONIC HAZARDS

CANCER, REPRODUCTIVE & OTHER CHRONIC HAZARDS:
This product has no carcinogens listed by IARC, NTP, NIOSH, OSHA or ACGIH, as of this date, greater or equal to 0.1%.

IRRITANCY OF PRODUCT: This product is irritating to contaminated tissue.

SENSITIZATION TO THE PRODUCT: No component of this product is known to be a sensitizer.

MUTAGENICITY: This product is not reported to produce mutagenic effects in humans.

EMBRYOTOXICITY: This product is not reported to produce embryotoxic effects in humans.

TERATOGENICITY: This product is not reported to produce teratogenic effects in humans.

REPRODUCTIVE TOXICITY: This product is not reported to cause reproductive effects in humans.

A mutagen is a chemical which causes permanent changes to genetic material (DNA) such that the changes will propagate through generational lines. An embryotoxin is a chemical which causes damage to a developing embryo (such as: within the eight weeks of pregnancy in humans), but the damage does not propagate across generational lines. A teratogen is a chemical which causes damage to a developing fetus, but the damage does not propagate across generational lines. A reproductive toxin is any substance which interferes in any way with the reproductive process.

MAMMALIAN TOXICITY INFORMATION

TOXICITY DATA: Toxicology information for components > 1% concentration is given below:
SODIUM HYDROXIDE:

Eye irritancy (monkey):	1%, 24 hours (severe)
Eye irritancy (rabbit):	500 ml, 24 hours (severe)
Eye irritancy (rabbit):	1% solution (severe)
Eye irritancy (rabbit):	1 mg, 24 hours (severe)
Cytogenic analysis system (grasshopper parenteral):	20 mg
LD50 (interperoneal, mouse):	40 mg/kg
LDLo (oral, rabbit):	500 mg/kg

LD50 - Dose that is lethal to 50% of a given species by a given route of exposure.
LC50 - Air concentration that is lethal to 50% of a given species in a given period of time.
LDLO - Lowest lethal dose in a given species by a given route of exposure.

COMPANY IDENTITY: Univar
PRODUCT IDENTITY: CAUSTIC SODA 50%

SDS DATE: 04/08/2013
REPLACES: 09/21/2012

SECTION 12. ECOLOGICAL INFORMATION

ALL WORK PRACTICES MUST BE AIMED AT ELIMINATING ENVIRONMENTAL CONTAMINATION.

EFFECT OF MATERIAL ON PLANTS AND ANIMALS:
This product may be harmful or fatal to plant and animal life if released into the environment. Refer to Section 11 (Toxicological Information) for further data on the effects of this product's components on test animals.

EFFECT OF MATERIAL ON AQUATIC LIFE:
SODIUM HYDROXIDE:

LC100 (Cyprimus carpio):	180 ppm/24 hours/25 C
TLm (mosquito fish):	125 ppm/96 hour (fresh water)
TLm (bluegill):	99 mg/L/48 hour (tap water)

MOBILITY IN SOIL
Mobility of this material has not been determined.

DEGRADABILITY
This product is completely biodegradable.

ACCUMULATION
Bioaccumulation of this product has not been determined.

SECTION 13. DISPOSAL CONSIDERATIONS

Processing, use or contamination may change the waste management options. Recycle / dispose of observing national, regional, state, provincial and local health, safety & pollution laws. If in doubt, contact appropriate agencies.

SECTION 14. TRANSPORT INFORMATION

IF > 1923 LB / 874 KG OF THIS PRODUCT IS IN 1 CONTAINER, IT EXCEEDS THE RQ OF SODIUM HYDROXIDE. "RQ" MUST BE PUT BEFORE THE DOT SHIPPING NAME.

DOT/TDG SHIP NAME:	UN1824, Sodium hydroxide solution, 8, PG-II
DRUM LABEL:	(CORROSIVE)
IATA / ICAO:	UN1824, Sodium hydroxide solution, 8, PG-II
IMO / IMDG:	UN1824, Sodium hydroxide solution, 8, PG-II
EMERGENCY RESPONSE GUIDEBOOK NUMBER:	154

SECTION 15. REGULATORY INFORMATION

EPA REGULATION:
SARA SECTION 311/312 HAZARDS: Acute Health

All components of this product are on the TSCA list.
SARA Title III Section 313 Supplier Notification
This product contains the indicated <*> toxic chemicals subject to the reporting requirements of Section 313 of the Emergency Planning & Community Right-To-Know Act of 1986 & of 40 CFR 372. This information must be included in all MSDSs that are copied and distributed for this material.

SARA TITLE III INGREDIENTS	CAS#	EINECS#	WT%	(REG.SECTION)	RQ(LBS)
Sodium Hydroxide	1310-73-2	215-185-5	48-52	(311,312)	1000

COMPANY IDENTITY: Univar
PRODUCT IDENTITY: CAUSTIC SODA 50%

SDS DATE: 04/08/2013
REPLACES: 09/21/2012

SECTION 15. REGULATORY INFORMATION (CONTINUED)

Any release equal to or exceeding the RQ must be reported to the National Response Center (800-424-8802) and appropriate state and local regulatory agencies as described in 40 CFR 302.6 and 40 CFR 355.40 respectively. Failure to report may result in substantial civil and criminal penalties. State & local regulations may be more restrictive than federal regulations.

STATE REGULATIONS:
CALIFORNIA SAFE DRINKING WATER & TOXIC ENFORCEMENT ACT (PROPOSITION 65):
This product contains no chemicals known to the State of California to cause cancer or reproductive toxicity.

INTERNATIONAL REGULATIONS
The components of this product are listed on the chemical inventories of the following countries:
Australia (AICS), Canada (DSL, NDSL), China (IECSC), Europe (EINECS, ELINCS), Japan (METI/CSCL, MHLW/ISHL), South Korea (KECI), New Zealand (NZIoC), Philippines (PICCS), Switzerland (SWISS), Taiwan (NECSI), USA (TSCA).

CANADA: WORKPLACE HAZARDOUS MATERIALS INFORMATION SYSTEM (WHMIS)
D2B: Irritating to skin / eyes.
E: Corrosive Material.

SECTION 16. OTHER INFORMATION

HAZARD RATINGS:
HEALTH (NFPA): 3, HEALTH (HMIS): 3, FLAMMABILITY: 0, PHYSICAL HAZARD: 1
(Personal Protection Rating to be supplied by user based on use conditions.)
This information is intended solely for the use of individuals trained in the NFPA & HMIS hazard rating systems.

EMPLOYEE TRAINING
See Section 2 for Risk & Safety Statements. Employees should be made aware of all hazards of this material (as stated in this SDS) before handling it.

Univar USA Inc Material Safety Data Sheet

For Additional Information contact MSDS Coordinator during business hours, Pacific time: (425) 889-3400

Notice

Univar USA Inc. ("Univar") expressly disclaims all express or implied warranties of merchantability and fitness for a particular purpose, with respect to the product or information provided herein, and shall under no circumstances be liable for incidental or consequential damages.

Do not use ingredient information and/or ingredient percentages in this MSDS as a product specification. For product specification information refer to a product specification sheet and/or a certificate of analysis. These can be obtained from your local Univar sales office.

All information appearing herein is based upon data obtained from the manufacturer and/or recognized technical sources. While the information is believed to be accurate, Univar makes no representations as to its accuracy or sufficiency. Conditions of use are beyond Univar's control and therefore users are responsible to verify this data under their own operating conditions to determine whether the product is suitable for their particular purposes and they assume all risks of their use, handling, and disposal of the product, or from the publication or use of, or reliance upon, information contained herein.

This information relates only to the product designated herein, and does not relate to its use in combination with any other material or in any other process

Univar USA Inc Material Safety Data Sheet

MSDS No:	OX76685
Version No:	001 2009-12-21
Order No:	

Univar USA Inc., 17425 NE Union Hill Rd., Redmond WA 98052
(425) 889 3400

Emergency Assistance

For emergency assistance involving chemicals call
Chemtrec - (800) 424-9300

Material Safety Data Sheet
Sodium Hypochlorite, 10-20% - Liquichlor
Revision Date 10/09/2009

SECTION 1. PRODUCT AND COMPANY IDENTIFICATION
Product name : Sodium Hypochlorite, 10-20% - LIQUICHLOR
Synonyms : Sodium Hypochlorite - 18, Hypo, Liquid Bleach, Bleach, Hypochlorite, Liquid Chlorine Solution, Javel Water
Chemical Family : Hypochlorite
Molecular formula : NaOCl
Product Use Description : Swimming pool chlorinator, hard surface cleaner, mildecide, Water treatment chemical, Biocides, bleach solutions and bleach fixer solutions

Distributed By:
Univar USA Inc.
17425 NE Union Hill Road
Redmond, WA 98085
425-889-3400

Emergency Phone Number : US: 1-800-424-9300 - CHEMTREC
CANADA: 1-800-567-7455

SECTION 2. HAZARDS IDENTIFICATION
/
HMIS Classification :
Health Hazard: 3
Flammability: 0
Physical hazards: 2

NFPA Classification :
Health Hazard: 3
Fire Hazard: 0
Reactivity Hazard: 1

Emergency Overview
OSHA Hazards : OXIDIZER, UNSTABLE (REACTIVE), CORROSIVE
Immediately Dangerous to Life or Health: Not established for the product.

Potential Health Effects
Primary Routes of Entry : Ingestion, Eyes, Inhalation, Skin Absorption
Aggravated Medical Condition : Asthma, Heart disease, Respiratory disorder
Inhalation : Inhalation of vapours is irritating to the respiratory system, may cause throat pain and cough.
Inhalation of aerosol may cause irritation to the upper respiratory tract.
Higher exposure may cause lung oedema, circulatory collapse and unconsciousness.

Skin : May cause skin irritation and/or dermatitis.
Prolonged skin exposure may cause destruction of the dermis with impairment of the skin to regenerate at site of contact.

Eyes : Causes serious eye irritation.
Blurred vision
May cause impairment of vision and corneal damage

Ingestion : Ingestion or inhalation of high concentrations may cause injuries to gastrointestinal tract, liver, kidneys and central nervous system. Ingestion may cause gastrointestinal irritation, nausea, vomiting and diarrhoea.

Chronic Exposure : Repeated inhalation exposure may cause impairment of lung function and permanent lung damage.
Effects from chronic skin exposure would be similar to those from single exposure except for effects secondary to tissue destruction.

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.
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.
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.
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.

SECTION 3. COMPOSITION/INFORMATION ON INGREDIENTS

Hazardous components

Component	CAS-No.	Weight %
sodium hypochlorite	7681-52-9	10.00 - 20.00
sodium hydroxide	1310-73-2	1.00 - 5.00

SECTION 4. FIRST AID MEASURES

First aid procedures

Eye contact :
- IMMEDIATELY flush eyes with plenty of water holding eyelids apart for at least 15 minutes
- Get medical attention IMMEDIATELY.

Skin contact :
- Take off contaminated clothing.
- Rinse skin immediately with plenty of water for 15-20 minutes.
- Call a poison control center or doctor for treatment advice.

Ingestion :
- Call a poison control center or doctor immediately for treatment advice.
- Have person sip a glass of water if able to swallow.
- Do not induce vomiting unless told to do so by the poison control center or doctor.
- Do not give anything by mouth to an unconscious person.

Inhalation :
- Move person to fresh air.
- If breathing is difficult oxygen may be beneficial if administered by trained personnel.
- If breathing has stopped, apply artificial respiration.
- Call a physician or poison control center IMMEDIATELY.

General advice : • Have the product container or label with you when calling a poison control center or doctor or going for treatment.
• Show this safety data sheet to the doctor in attendance.

Notes to physician
Comments : • Probable mucosal damage may contraindicate the use of gastric lavage.

SECTION 5. FIRE-FIGHTING MEASURES
Flammable properties
Flash point : not applicable
Lower explosion limit : not applicable
Upper explosion limit : not applicable

Fire fighting
Suitable extinguishing media : Use extinguishing measures that are appropriate to local circumstances and the surrounding environment.
On small fire, use dry chemical, carbon dioxide or water spray.
On large fires, use water in flooding quantities as fog.

Unsuitable extinguishing media : Do not use Mono Ammonium Phosphate (MAP) type extinguishers directly on this product

Further information : Cool containers / tanks with water spray.
Protective equipment and precautions for firefighters

Specific hazards during fire fighting : Corrosive

Special protective equipment for fire-fighters : Additional protective clothing must be worn to prevent personal contact with this material. Those items include but are not limited to: boots gloves, hard hat, splash-proof goggles, full face shield and impervious clothing, i.e. chemically impermeable suit.
Compatible materials for response to this material are neoprene and butyl rubber.

SECTION 6. ACCIDENTAL RELEASE MEASURES
Personal precautions : Restrict access to affected area.
Use personal protective equipment.
Use NIOSH approved respiratory protection. Keep people away from and upwind of spill/leak.
Methods for containment / : Try to prevent the material from entering drains or water courses.

Methods for cleaning up Prevent further leakage or spillage if safe to do so.
Inform the responsible authorities in case of gas leakage, or of entry into waterways, soil or drains.
Will form hazardous reaction products
Suppress (knock down) gases/vapours/mists with a water spray jet. Contain spillage, soak up with non-combustible absorbent material, (e.g. sand, earth, diatomaceous earth, vermiculite) and transfer to a suitable container for disposal according to local / state / province/national regulations (see section 13).

Additional advice : Dispose of as hazardous waste in compliance with local, province, state and federal regulations.
You are requested to contact the emergency numbers listed below before beginning any such operation.

FOR ALL ACCIDENTS, CALL CHEMTREC AT 800-424-9300 OR CANADA AT 1-800-567-7455.

SECTION 7. HANDLING AND STORAGE

Handling

Handling : Personnel working with this chemical should be trained on its hazards.
Avoid contact with skin and eyes.
Do not ingest.
Avoid inhalation of vapour or mist.
Wear personal protective equipment.
For personal protection see section 8.

Advice on protection against fire : Normal measures for preventive fire protection. and explosion

Storage

Requirements for storage areas and containers : Do not freeze.
Store in a cool and shaded area.
Keep in a well-ventilated place.
To maintain product quality, do not store in heat or direct sunlight.
Decomposition rate increases as it is heated.
Keep in properly labeled containers.
Keep container closed when not in use.

Store at temperatures not exceeding : 86 F (30 C)

SECTION 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Exposure Guidelines

Components with workplace control parameters

Components	CAS-No.	Value	Control parameters	Update	Basis
sodium hydroxide	1310-73-2	CEIL	2 mg/m3	1994-09-01	ACGIH
		TWA	2 mg/m3	1993-06-30	OSHA P1

Engineering measures

Engineering measures : Use local exhaust ventilation to maintain levels to below the PEL.

Personal protective equipment

Eye protection : Ensure that eyewash stations and safety showers are close to the workstation location. Chemical resistant goggles must be worn.

Skin and body protection : Boots. Full protective suit Wear protective gloves.

Respiratory protection : Sudden release of chlorine hazard. If air concentrations above the PEL are possible, wear a NIOSH approved respirator. Wear respiratory equipment when entering the spray area.

Hygiene measures : • General industrial hygiene practice.

Suitable material	Boots.	Gloves	Protective suit
	Neoprene	Neoprene	Neoprene
	butyl-rubber	butyl-rubber	butyl-rubber
	PVC	PVC	PVC
	Viton ®•	Viton ®	Viton
	Saranex®	Saranex®	Saranex®

The listed materials are guidelines only and there are numerous PPE alternatives depending on the site specifics of where the chemical is used. You should always consult with your PPE supplier for the correct tested material.
Before using this chemical you should be aware of its hazards and be knowledgeable of emergency procedures in the event of a spill.

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES Appearance
Form : liquid
Color : yellow to yellowish green
Odor : pungent

Safety data
Flash point : not applicable
Lower explosion limit : not applicable
Upper explosion limit : not applicable
Autoignition temperature : not applicable
Molecular Weight : 74.5 g/mol
pH : 12 - 14 at 77 F (25 C)
Freezing point : -17 F (-27 C) 16% Solution
Boiling point/boiling range : Decomposes on heating.
Vapor pressure : 12 mmHg at 68 F (20 C) 12.5% Solution
Bulk density : not applicable
Water solubility : completely miscible
Evaporation rate : no data available

SECTION 10. STABILITY AND REACTIVITY
Conditions to avoid : High heat, sunlight and ultra-violet light

Materials to avoid : Oxidizing agents, Acids, Nitrogen containing organics, Metals, Iron, Copper, Nickel, Cobalt, Organic materials, Ammonia

Hazardous decomposition products : Decomposition will result in the formation of oxygen from contact with copper, nickel, cobalt and iron solids such as rust.
Decomposition rate increases as it is heated.
May develop chlorine if mixed with acidic solutions.

Thermal decomposition : Decomposition rate increases as it is heated.
Hazardous polymerization : Does not occur.

SECTION 11. TOXICOLOGICAL INFORMATION
Human Threshold Response
Odor threshold : approximately 0.9 mg/m3 (0.3 ppm) pungent
Irritation Threshold : no data available
Immediately Dangerous to Life or Health: Not established for the product.

Animal Toxicology
Acute oral toxicity : LD50 rat
Dose: 3 - 5 g/kg
Acute dermal toxicity : LD50 rabbit
Dose: > 2 g/kg
Acute inhalation toxicity : LC50
no data available

SECTION 12. ECOLOGICAL INFORMATION
Acute Fish toxicity : LC50 Bluegill sunfish: 2.90 mg/L
Exposure time: 96 Hour
LC50 Pimephales promelas (fathead minnow): 1.40 mg/L
Exposure time: 96 Hour
LC50 Oncorhynchus mykiss (rainbow trout): 0.90 mg/L
Exposure time: 0.5 Hour

SECTION 13. DISPOSAL CONSIDERATIONS
Waste Classification : If this product becomes a waste, it meets the criteria of a hazardous waste as defined under 40 CFR 261 and would have the following: D002
Further information : If this product becomes a hazardous waste, it will be a hazardous waste which is subject to the Land Disposal Restrictions under 40 CFR 268 and must be managed accordingly.
Dispose of as hazardous waste in compliance with local, province, state and federal regulations.

CARE MUST BE TAKEN TO PREVENT ENVIRONMENTAL CONTAMINATION FROM THE USE OF THIS MATERIAL. THE USER OF THIS MATERIAL HAS THE RESPONSIBILITY TO DISPOSE OF UNUSED MATERIAL, RESIDUES AND CONTAINERS IN COMPLIANCE WITH ALL RELEVANT LOCAL, PROVINCE, STATE AND FEDERAL LAWS AND REGULATIONS REGARDING TREATMENT, STORAGE AND DISPOSAL FOR HAZARDOUS AND NON HAZARDOUS WASTES.

SECTION 14. TRANSPORT INFORMATION

DOT Proper shipping name:	Hypochlorite Solutions
UN-Number:	UN1791
Class:	8
Packing group:	III
Hazard Labels/Placard:	8
Emergency Response:	154
Guidebook Number	
Reportable Quantity:	100 LB
	(Per 49 CFR 172.101, Appendix)

TDG CLR

Proper shipping name:	Hypochlorite Solutions
UN-Number:	UN1791
Class:	8
Packing group:	III
Hazard Labels/Placard:	8

IATA

UN-Number:	UN1791
Description of the goods:	Hypochlorite Solutions
Class:	8
Packaging group:	III
ICAO-Labels:	8

IMDG

UN-Number:	UN1791
Description of the goods:	Hypochlorite Solutions
Class:	8
Packaging group:	III
IMDG-Labels:	8
Marine pollutant:	no

See regulations for further information.

FOR ALL ACCIDENTS, CALL CHEMTREC AT 800-424-9300 OR CANADA AT 1-800-567-7455.

SECTION 15. REGULATORY INFORMATION
CANADIAN CLASSIFICATION
WHMIS Classification : E Corrosive Material

NPRI Components : Hypochlorous acid, sodium salt 7681-52-9
Sodium hydroxide (Na(OH)) 1310-73-2
Canadian National Pollutant Release Inventory (NPRI): No component is listed on NPRI.

This product has been classified according to the hazard criteria of the CPR and the MSDS contains all of the information required by the CPR.

US CLASSIFICATION
OSHA Hazards: Oxidizer, Unstable (reactive), Corrosive

CERCLA: 100 lbs

SARA 311/312 Hazards: Acute Health Hazard
Chronic Health Hazard
Reactivity Hazard

ECPRA - Emergency Community Planning Right-to-Know
SARA 302: No chemicals in this material are subject to the reporting requirements of SARA Title Ill, Section 302.

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

US STATE REGULATIONS

Massachusetts Right To: Know Components	Hypochlorous acid, sodium salt 7681-52-9 1991-07-01 Sodium hydroxide (Na(OH)) 1310-73-2 1991-07-01
Pennsylvania Right To Know : Components	Hypochlorous acid, sodium salt 7681-52-9 1991-07-01 Sodium hydroxide (Na(OH)) 1310-73-2 1991-07-01 Sodium chloride (NaCl) 7647-14-5 Water 7732-18-5 Carbonic acid disodium salt 497-19-8

New Jersey Right To Know: Components

Water 7732-18-5

Hypochlorous acid, sodium salt 7681-52-9
1991-07-01
Sodium chloride (NaCl) 7647-14-5
Sodium hydroxide (Na(OH)) 1310-73-2
1991-07-01

California Prop 65 Components: This product is not listed, but it may contain elements known to the State of California to cause cancer or reproductive toxicity as listed under Proposition 65 State Drinking Water and Toxic Enforcement Act.

GLOBAL INVENTORIES
The components of this product are reported in the following inventories:
EINECS On the inventory, or in compliance with the inventory
TSCA On TSCA Inventory
AICS On the inventory, or in compliance with the inventory
DSL All components of this product are on the Canadian DSL list.
ENCS On the inventory, or in compliance with the inventory
KECI On the inventory, or in compliance with the inventory
PICCS On the inventory, or in compliance with the inventory
IECSC On the inventory, or in compliance with the inventory
NZIoC On the inventory, or in compliance with the inventory

SECTION 16. OTHER INFORMATION

Univar USA Inc Material Safety Data Sheet

For Additional Information contact MSDS Coordinator during business hours, Pacific time: (425) 889-3400

Notice

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This information relates only to the product designated herein, and does not relate to its use in combination with any other material or in any other process