

Section 1: Identification

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TRADE NAME: Oberhoffer's reagent (Ethanol, hydrochloric acid, ferric chloride, tin (II) chloride, water)


CHEMICAL FAMILY: FLAMMABLE LIQUIDS, CORROSIVE, n.o.s. (Ethanol, hydrochloric acid mixture), UN 2924

HMIS RATING: HEALTH: 3 FLAMMABILITY: 3 REACTIVITY: 2

HAZARD RATING:

LEAST: 0 SLIGHT: 1 MODERATE: 2 HIGH: 3 EXTREME: 4

Section 2: Hazard(s) Identification

GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)	Flammable liquids (Category 2), H225 Corrosive to metals (Category 1), H290 Acute toxicity, Oral (Category 4), H302 Acute toxicity, Dermal (Category 4), H312 Skin corrosion/irritation, H314 Sensitization, Skin (Category 1), H317 Serious eye damage (Category 1), H318 Acute toxicity inhalation (Category 4), H332 Specific target organ toxicity, single exposure; Respiratory tract irritation (Category 3), H335 Germ cell mutagenicity (Category 2), H341 Reproductive toxicity (Category 2), H361 Specific target organ toxicity - single exposure (Category 1), H370 Toxic to aquatic life (category 2), H401
PICTOGRAM(s):	

Safety Data Sheet

OBERHOFFER'S REAGENT (Ethanol, HCl, FeCl₃, SnCl₂, water)

SIGNAL WORD:	Danger
HAZARD STATEMENTS:	Hazard Statement(s): H225 Highly Flammable liquid and vapor H290 - May be corrosive to metals H302- Harmful if swallowed H312 - Harmful in contact with skin H314- Causes severe skin burns and eye damage H317 - May cause an allergic skin reaction H318 - Causes serious eye damage H332 - Harmful if inhaled H335 - May cause respiratory irritation H341 - Suspected of causing genetic defects H361 - Suspected of damaging fertility or the unborn child H370- Causes damage to organs H401-Acute aquatic toxicity
PRECAUTIONARY STATEMENTS:	Precautionary Statement(s): Preventions: P201- Obtain special instructions before use. P202- Do not handle until all safety precautions have been read and understood. P210-Keep away from heat/sparks/open flames/hot surfaces. — No smoking. P321- Take any precaution to avoid mixing with combustibles P233- Keep container tightly closed. P234- Keep only in original container. P240- Ground/bond container and receiving equipment. P241- Use explosion-proof electrical/ventilating/lighting/equipment. P242- Use only non-sparking tools. P243- Take precautionary measures against static discharge. P260- Do not breathe P261- Avoid breathing dust/fume/gas/mist/vapors/spray. P264- Wash skin thoroughly after handling. P270- Do not eat, drink or smoke when using this product. P271- Use only outdoors or in a well-ventilated area. P273- Avoid release to the environment. P280- Wear protective gloves/protective clothing/eye P281- Use personal protective equipment as required. Response: P301+310- IF SWALLOWED: Immediately call a POISON CENTER or doctor/physician. P302+352- IF ON SKIN: wash with plenty of soap and water. P303+ P361+P353- IF ON SKIN (or hair): Remove/Take off Immediately all contaminated clothing. Rinse SKIN with water/shower. P304-P312- IF INHALED: Call a POISON CENTER or doctor/physician if you feel unwell. P304+P340- IF INHALED: Remove victim to fresh air and Keep at rest in a position comfortable for breathing. P305+P351+P338- IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. P307+P311- IF exposed: call a POISON CENTER or doctor/physician. P308+P313- IF exposed or concerned: Get medical advice/attention. P310- Immediately call a POISON CENTER or doctor/physician.

P312- Call a POISON CENTER or doctor/physician if you feel unwell.
P322- Specific treatment (see first-aid instructions).
P330- Rinse mouth.
P342+P311- IF experiencing respiratory symptoms: call a POISON CENTER or doctor/physician.
P361- Remove/Take off immediately all contaminated clothing.
P363- Wash contaminated clothing before reuse.
P370+P378- In case of fire: Use dry chemical, CO₂ or appropriate foam for extinction.
P390- Absorb spillage to prevent material damage.

Storage:

P403+P235- Store in a well-ventilated place. Keep cool.
P404- Store in a closed container.
P405- Store locked up.

Disposal:

P501- Dispose of contents/container to Federal, State and Local Regulations.

Emergency Overview

POISON! DANGER! CORROSIVE! MAY BE FATAL IF SWALLOWED. HARMFUL IF INHALED OR ABSORBED THROUGH SKIN. VAPOR HARMFUL. FLAMMABLE! AFFECTS CENTRAL NERVOUS SYSTEM. MAY CAUSE BLINDNESS. CANNOT BE MADE NONPOISONOUS. CAUSES IRRITATION TO SKIN, EYES AND RESPIRATORY TRACT. MAY AFFECT LIVER, BLOOD, REPRODUCTIVE SYSTEM.

POISON! DANGER! CORROSIVE. LIQUID AND MIST CAUSE SEVERE BURNS TO ALL BODY TISSUE. MAY BE FATAL IF SWALLOWED OR INHALED.

Potential Health Effects

Inhalation:

Flammable, Corrosive! Inhalation of vapors can cause coughing, choking, inflammation of the nose, throat, and upper respiratory tract, and in severe cases, pulmonary edema, circulatory failure, and death. Exposure may be destructive to the mucous membranes of the upper respiratory tract. Prolonged exposures to high concentrations may cause drowsiness, loss of appetite and inability to concentrate.

Ingestion:

Flammable, Corrosive! Swallowing can cause immediate pain and burns of the mouth, throat, esophagus and gastrointestinal tract. May cause burning in mouth and throat, abdominal pain, reduced blood pressure, stomach bleeding, collapse and convulsions, headaches, gastritis, intoxication, blindness, nausea, vomiting, and diarrhea, and in severe cases, death. Pink urine discoloration is a strong indicator of iron poisoning. Liver damage, coma and death may follow, sometimes delayed as long as three days.

Skin Contact:

Flammable, Corrosive! Can cause skin irritation, cracking or flaking due to dehydration and

defatting action. redness, pain, and severe skin burns. Concentrated solutions cause deep ulcers and discolor skin.

Eye Contact:

Flammable, Corrosive! Vapors are irritating and may cause damage to the eyes. Contact may cause severe burns and permanent eye damage.

Chronic Exposure:

Long-term exposure to concentrated vapors may cause erosion of teeth. Long term exposures seldom occur due to the corrosive properties of the acid. Prolonged skin contact causes drying and cracking of skin. May affect the nervous system. May affect liver, blood, reproductive system. Continued ingestion of small amounts could result in blindness.

Aggravation of Pre-existing Conditions:

Persons with pre-existing skin disorders or eye problems or impaired liver or kidney function may be more susceptible to the effects of the substance.

Section 3: Composition/Information on Ingredients

Ingredient	CAS No	Percent	Hazardous

Ethyl Alcohol	64-17-5	40 - 48%	Yes
Hydrogen Chloride	7647-01-0	2-5%	Yes
Ferric Chloride	7705-08-0	2-4%	Yes
Stannous Chloride	7772-99-8	0.01-0.1%	Yes
Water	7732-18-5	40-48%	No

Section 4: First-Aid Measures

Inhalation:

Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention immediately.

Ingestion:

Induce vomiting immediately as directed by medical personnel. Never give anything by mouth to an unconscious person.

Skin Contact:

Remove any contaminated clothing. Wash skin with soap or mild detergent and water for at least 15 minutes. Get medical attention if irritation develops or persists.

Eye Contact:

Immediately flush eyes with plenty of water for at least 15 minutes, lifting lower and upper eyelids occasionally. Get medical attention immediately.

Section 5: Fire-Fighting Measures

Fire:

Ethanol:

Flash point: 13C (55F) CC

Autoignition temperature: 422C (792F)

Flammable limits in air % by volume:

lel: 3.3; uel: 19

Flammable liquid and vapor!

Dangerous fire hazard when exposed to heat or flame.

Explosion:

Above flash point, vapor-air mixtures are explosive within flammable limits noted above. Vapors can flow along surfaces to distant ignition source and flash back. Sealed containers may rupture when heated. Sensitive to static discharge.

Fire Extinguishing Media:

Water spray, dry chemical, alcohol foam, or carbon dioxide. Water may be ineffective.

Special Information:

In the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full facepiece operated in the pressure demand or other positive pressure mode.

Water spray can be used to extinguish fires and cool fire-exposed containers. Water may be used to flush spills away from exposures and to dilute spills to non-flammable mixtures.

Section 6: Accidental Release Measures

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

Section 7: Handling and Storage

Store in a cool, dry, ventilated storage area with acid resistant floors and good drainage. Protect from physical damage. Keep out of direct sunlight and away from heat, water, and incompatible materials. Do not wash out container and use it for other purposes. When diluting, the acid should always be added slowly to water and in small amounts. Never use hot water and never add water to the acid. Water added to acid can cause uncontrolled boiling and splashing. When opening metal containers, use non-sparking tools because of the possibility of hydrogen gas being present. Containers of this material may be hazardous when empty since they retain

product residues (vapors, liquid); observe all warnings and precautions listed for the product.

Outside or detached storage is preferred. Separate from incompatibles. Containers should be bonded and grounded for transfers to avoid static sparks. Storage and use areas should be No Smoking areas. Use non-sparking type tools and equipment, including explosion proof ventilation. Containers of this material may be hazardous when empty since they retain product residues (vapors, liquid); observe all warnings and precautions listed for the product.

Section 8: Exposure Controls/ Personal Protection

Airborne Exposure Limits:

For Ethanol

- OSHA Permissible Exposure Limit (PEL):

1000 ppm (TWA) for ethyl alcohol

- ACGIH Threshold Limit Value (TLV):

1000 ppm (TWA), A4 - not classifiable as a human carcinogen for ethyl alcohol

For Hydrochloric acid:

- OSHA Permissible Exposure Limit (PEL):

5 ppm (Ceiling)

- ACGIH Threshold Limit Value (TLV):

2 ppm (Ceiling), A4 Not classifiable as a human carcinogen

For Ferric Chloride

-ACGIH Threshold Limit Value (TLV):

1 mg/m³ (TWA) soluble iron salt as Fe

For Inorganic Tin Compounds, as Sn:

-OSHA Permissible Exposure Limit (PEL):2 mg/m³ (TWA)

-ACGIH Threshold Limit Value (TLV): 2 mg/m³ (TWA)

-NIOSH Recommended Exposure Limits (REL): 2 mg/m³ (TWA).

Ventilation System:

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

Personal Respirators (NIOSH Approved):

If the exposure limit is exceeded, wear a supplied air, full-facepiece respirator, airlined hood, or full-facepiece self-contained breathing apparatus.

Skin Protection:

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

Eye Protection:

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

Section 9: Physical and Chemical Properties

Appearance:

Clear, dark orange solution that may become cloudy over time.

Odor:

Pungent whiskey-like odor.

Solubility:

Miscible in water.

Density:

0.79 @ 20C/4C

pH:

No information found.

% Volatiles by volume @ 21C (70F):

100

Boiling Point:

78C (172F) (ethanol)

Melting Point:

-114C (-173F) (ethanol)

Vapor Density (Air=1):

1.6 (ethanol)

Vapor Pressure (mm Hg):

40 @ 19C (66F) (ethanol)

Evaporation Rate (BuAc=1):

ca. 1.4 (CCl₄=1) (ethanol)

Section 10: Stability and Reactivity

Stability:

Stable under ordinary conditions of use and storage.

Hazardous Decomposition Products:

When heated to decomposition, emits toxic hydrogen chloride fumes and will react with water or steam to produce heat and toxic and corrosive fumes. Thermal oxidative decomposition produces toxic chlorine fumes and explosive hydrogen gas.

Hazardous Polymerization:

Will not occur.

Incompatibilities:

Strong oxidants, silver salts, alkali metals, metal hydrides, hydrazine, metals, allyl chloride, sodium, potassium. Strong mineral acid, concentrated hydrochloric acid is highly reactive with strong bases, metals, metal oxides, hydroxides, amines, carbonates and other alkaline materials. Incompatible with materials such as cyanides, sulfides, sulfites, and formaldehyde.

Conditions to Avoid:

Heat, flames, ignition sources, direct sunlight and incompatibles.

Section 11: Toxicological Information

Hydrochloric acid: Inhalation rat LC50: 3124 ppm/1H; Oral rabbit LD50: 900 mg/kg.
Investigated as a tumorigen, mutagen, reproductive effector.

Ethyl alcohol: oral rat LD50: 7060 mg/kg; inhalation rat LC50: 20,000 ppm/10H; Irritation data, eye, rabbit: 500 mg/24H moderate; Investigated as a tumorigen, mutagen, reproductive effector.
Methyl alcohol: oral rat LD50: 5628 mg/kg; inhalation rat LC50: 64000 ppm/4H; skin rabbit LD50: 15800 mg/kg; Irritation data, skin, rabbit: 20 mg/24H, Moderate; Investigated as a tumorigen, mutagen, reproductive effector. Isopropyl alcohol: oral rat LD50: 5045 mg/kg; skin rabbit LD50: 12.8 gm/kg; inhalation, rat: 16,000 ppm 8 hr. Investigated as a mutagen, tumorigen, reproductive effector.

Reproductive Toxicity:

Ethanol has been linked to birth defects in humans.

Carcinogenicity:

Ethanol has been linked to cancer in humans. Chronic ethanol ingestion is associated with liver cancer. Most industrial ethanol contains denaturants that render it undesirable to drink.

-----\Cancer Lists\-----			
Ingredient	---NTP Carcinogen---		IARC Category
	Known	Anticipated	
Ethyl Alcohol (64-17-5)	No	No	None
Hydrogen Chloride (7647-01-0)	No	No	3
Ferric Chloride (7705-08-0)	No	No	None
Stannous Chloride (7772-99-8)	No	No	None
Water (7732-18-5)	No	No	None

Section 12: Ecological Information

Environmental Fate:

Following data for ethanol: When released into the soil, this material is expected to readily biodegrade. When released into the soil, this material is expected to leach into groundwater. When released into the soil, this material is expected to quickly evaporate. When released into water, this material is expected to readily biodegrade. When released into water, this material may evaporate to a moderate extent. This material is not expected to significantly bioaccumulate. When released into the air, this material is expected to be readily degraded by reaction with photochemically produced hydroxyl radicals. When released into the air, this material is expected to be readily removed from the atmosphere by dry and wet deposition. When released into the air, this material is expected to have a half-life between 1 and 10 days. **Environmental**

Toxicity:

This material is expected to be toxic to aquatic life.

Section 13: Disposal Considerations

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

Section 14: Transportation Information

Domestic (Land, D.O.T.)

Proper Shipping Name: FLAMMABLE LIQUIDS, CORROSIVE, N.O.S.

(Ethanol, hydrochloric acid mixture)

Hazard Class: 3,8

UN/NA: UN 2924

Packing Group: II

Label Codes: 3,8

Limited Quantity Shipment < 1 L

NMFC: 45615-11

Shipping Class CL125

International (Air, I.C.A.O.)

Proper Shipping Name: FLAMMABLE LIQUIDS, CORROSIVE, N.O.S.

(Ethanol, hydrochloric acid mixture)

Hazard Class: 3,8

UN/NA: UN 2924

Packing Group: II

Label Codes: 3,8

Section 15: Regulatory Information

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

Ingredient	TSCA	EC	Japan	Australia
Ethyl Alcohol (64-17-5)	Yes	Yes	Yes	Yes
Hydrogen Chloride (7647-01-0)	Yes	Yes	Yes	Yes
Ferric Chloride (7705-08-0)	Yes	Yes	Yes	Yes
Stannous Chloride (7772-99-8)	Yes	Yes	Yes	Yes
Water (7732-18-5)	Yes	Yes	Yes	Yes

Safety Data Sheet

OBERHOFFER'S REAGENT (Ethanol, HCl, FeCl₃, SnCl₂, water)

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

Ingredient	Korea	--Canada--		
		DSL	NDSL	Phil.
Ethyl Alcohol (64-17-5)	Yes	Yes	No	Yes
Hydrogen Chloride (7647-01-0)	Yes	Yes	No	Yes
Ferric Chloride (7705-08-0)	No	No	No	No
Stannous Chloride (7772-99-8)	Yes	Yes	No	Yes
Water (7732-18-5)	Yes	Yes	No	Yes

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

Ingredient	-SARA 302-		-----SARA 313-----	
	RQ	TPQ	List	Chemical Catg.
Ethyl Alcohol (64-17-5)	No	No	No	No
Hydrogen Chloride (7647-01-0)	5000	500*	Yes	No
Ferric Chloride (7705-08-0)	No	No	No	No
Stannous Chloride (7772-99-8)	No	No	No	No
Water (7732-18-5)	No	No	No	No

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

Ingredient	CERCLA	-RCRA-	-TSCA-
		261.33	8 (d)
Ethyl Alcohol (64-17-5)	No	No	No
Hydrogen Chloride (7647-01-0)	5000	No	No
Ferric Chloride (7705-08-0)	1000	No	No
Stannous Chloride (7772-99-8)	No	No	N
Water (7732-18-5)	No	No	No

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

Australian Hazchem Code: 2[S]E,2R

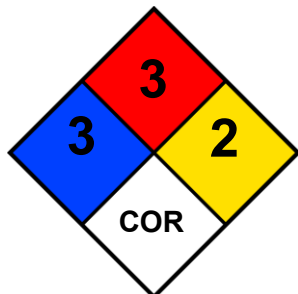
Poison Schedule: S5

WHMIS:

This MSDS has been prepared according to the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all of the information required by the CPR.

Section 16: Other Information

16.1 NFPA 704



Top, Flammability: 3 – Severe Hazard

Left, Health Hazard: 3 – Severe Hazard

Right, Reactivity: 2 – Moderate Hazard

Bottom, Special Notice: COR – Corrosive

Label Hazard Warning:

POISON! DANGER! MAY BE FATAL IF SWALLOWED. HARMFUL IF INHALED OR ABSORBED THROUGH SKIN. VAPOR HARMFUL. FLAMMABLE! AFFECTS CENTRAL NERVOUS SYSTEM. MAY CAUSE BLINDNESS. CANNOT BE MADE NONPOISONOUS. CAUSES IRRITATION TO SKIN, EYES AND RESPIRATORY TRACT. MAY AFFECT LIVER, BLOOD, REPRODUCTIVE SYSTEM.

POISON! DANGER! CORROSIVE. LIQUID AND MIST CAUSE SEVERE BURNS TO ALL BODY TISSUE. MAY BE FATAL IF SWALLOWED OR INHALED.

Label Precautions:

Keep away from heat, sparks and flame.
Do not breathe vapor.
Do not get in eyes, on skin, or on clothing.
Keep container closed.
Use only with adequate ventilation.
Wash thoroughly after handling.

Label First Aid:

If swallowed, induce vomiting immediately as directed by medical personnel. Never give anything by mouth to an unconscious person. If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. In case of contact, immediately flush eyes or skin with plenty of water for at least 15 minutes. In all cases call a physician.

Product Use:

Laboratory Reagent.

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