American International Chemical, Inc.

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MATERIAL SAFETY DATA SHEET

OXIDIZER SOLUTION 0.1M IODINE
(0.1M Iodine in THF/Pyridine/Water, 78:20:2)

SECTION 1 - CHEMICAL PRODUCT AND COMPANY INFORMATION

American International Chemical, Inc.	**Emergency Number: Chemtrec**	**800-424-9300**
135 Newbury Street		**703-527-3887**
Framingham, MA 01701	**Information Number:**	**800-238-0001**

Date: August 2007

Synonyms: Oxidation Solution, Oxidizing Solution

CAS #: Not Applicable

DOT Hazard Class: Flammable Liquid, N.O.S. (Contains Tetrahydrofuran & Pyridine)
UN1993
Hazard Class 3
Packing Group II

SECTION 2 - COMPOSITION AND INFORMATION ON INGREDIENTS

Ingredient(s)	**CAS#**	**% (by weight)**
Tetrahydrofuran	109-99-9	70-90
Pyridine	110-86-1	10-20
Water	7732-18-5	0-10
Iodine	7553-56-2	< 2.5

SECTION 3 - HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW: Dark, iodine colored solution that is an extremely flammable liquid and vapor. Vapor may cause flash fire. Causes skin, eye, and respiratory tract irritation. Over exposure may cause dizziness, nausea, and central nervous system depression.

POTENTIAL HEALTH EFFECTS:
Skin: Causes skin irritation.
Eyes: Causes irritation, redness and pain. Contact may cause permanent damage.
Inhalation: May cause irritation to the respiratory tract, dizziness, nausea, and central nervous system depression.
Ingestion: Causes irritation to the gastrointestinal tract.
CARCINOGENICITY: Not Identifiable

SECTION 4 - FIRST AID MEASURES

Skin: Immediately wash skin with soap and water for at least 15 minutes.
Eyes: Immediately flush with plenty of water for at least 15 minutes, holding eyelids apart.
Inhalation: Remove to the fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen.
Ingestion: Wash out mouth with water. Do not induce vomiting unless instructed by medical professional.
On All Of The Above: Seek immediate medical attention.

SECTION 5 - FIRE FIGHTING MEASURES

Flash Point: -14 °C (CC)- Based on 100% Tetrahydrofuran

Flammable Limits: Not Available

Extinguishing Media: Carbon dioxide, dry chemical.

Hazardous Products of Combustion may form: Hydrogen Cyanide

Special Fire Fighting Procedures:
Use fire-fighting procedure that is appropriate to treat surrounding fire. All firefighters should use self-contained breathing apparatus and full fire-fighting turnout gear.

Unusual Fire Explosion Hazard: Flammable liquid and vapor. Vapors are heavier than air and may travel along the ground or may be moved by ventilation and ignited by pilot lights, other flames, sparks, heaters, smoking, electric motors, static discharge, or other ignition sources at locations distant from material handling point. May form explosive organic peroxides when exposed to air or light or with age. Vapors may form explosive mixtures with air. Vapors may travel to a source of ignition and flash back. Sealed containers may rupture when heated.

Auto Ignition Temperature: Not Available

SECTION 6 - ACCIDENTAL RELEASE MEASURES

Isolate hazard area and deny entry to unnecessary or unprotected personnel.

Small Spill: Isolate the spill area. Absorb liquid on vermiculite, floor absorbent, or other absorbent material and transfer to hood. Eliminate all sources of ignition such as flares, flames (including pilot lights), and electrical sparks.

Large Spill: Isolate the spill area. Stop spill at source. Eliminate all ignition sources (flares, flames including pilot lights, electrical sparks). Use non-sparking tools and equipment. Persons not wearing protective equipment should be excluded from area of spill until clean-up has been completed. Stop leak in a safe and practical manner. Prevent from entering drains, sewers, streams or other bodies of water. Prevent from spreading. If runoff occurs, notify authorities as required. Contain and recover liquid when possible. Absorb small spills with inert, non-combustible material and place in an approved chemical waste container. Dike large spills with inert material and transfer liquid into same container. Do not allow to enter into sewers or waterways.

SECTION 7 - HANDLING AND STORAGE

Handling : Use with adequate explosion proof ventilation. Ground containers for transfer of contents. Keep away from heat, sparks, open flames and sources of ignition. Avoid contact with skin, eyes and clothing. Do not eat, drink or smoke in the work area. Keep containers closed when not in use. Wash thoroughly after handling. Containers of this material may be hazardous when emptied. Since emptied containers retain product residues (vapor, liquid, and/or solid), all hazard precautions given in the data sheet must be observed.

Storage: Store in an area designed for storage of flammable liquids. (OSHA 29 CFR 1910.106) Protect from temperature extremes and sunlight and store away from incompatible substances. Keep containers upright and closed. Protect containers from physical damage. Separate from oxidizing materials. 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. Do not use compressed air for filling, discharging, or handling. Peroxides can be removed by treatment with strong ferrous sulfate solution made slightly acidic with sodium bisulfite. 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. Do Not attempt to clean empty containers since residue is difficult to remove. Do not pressurize, cut, weld, braze, solder, drill, grind or expose such containers to heat, sparks, flame, static electricity or other sources of ignition: they may explode and cause injury or death. Do not allow to evaporate to near dryness unless absence of peroxides has been shown. Addition of appropriate reducing agents will lessen peroxide formation.

SECTION 8 - EXPOSURE CONTROLS, PERSONAL PROTECTION

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, a half-face organic vapor respirator may be worn for up to ten times the exposure limit or the maximum use concentration specified by the appropriate regulatory agency or respirator supplier, whichever is lowest. A full-face piece organic vapor respirator may be worn up to 50 times the exposure limit or the maximum use concentration specified by the appropriate regulatory agency or respirator supplier, whichever is lowest. For emergencies or instances where the exposure levels are not known, use a full-face piece positive-pressure, air-supplied respirator. WARNING: Air-purifying respirators do not protect workers in oxygen-deficient atmospheres.

Respiratory Protections: If workplace exposure limit(s) of product or any component is exceeded (see exposure guidelines), a NIOSH/MSHA approved air supplied respirator is advised in absence of proper environmental control. OSHA regulations also permit other NIOSH/MSHA respirators (negative pressure type) under specified conditions (see your industrial hygienist). Engineering or administrative controls should be implemented to reduce exposure.

Engineering Controls: Provide sufficient mechanical (general and/or local exhaust) ventilation to maintain exposure below TLV(s). Local exhaust ventilation is preferred because it prevents contaminant dispersion into the work area by controlling it at its source.

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.

Skin Protection: Rubber or neoprene gloves and additional protection including impervious boots, apron, or coveralls, as needed in areas of unusual exposure.

Other Control Measures: Odor threshold: 2 - 50 ppm

EXPOSURE LIMITS:
Component(s):
Tetrahydrofuran (109-99-9)
OSHA PEL 200 ppm - TWA
ACGIH TLV 200 ppm – TWA, 250 ppm - STEL

Pyridine (110-86-1)
OSHA VPEL 5.000 ppm - TWA
ACGIH TLV 5.000 ppm – TWA
NIOSH: REL: 5 ppm 10 hr/40 hr week; IDLH: 1000 ppm

Iodine (7553-56-2)
OSHA: 0.1 ppm ceiling
ACGIH: 0.1 ppm ceiling
NIOSH: REL: 0.1 ppm ceiling; IDLH: 2 ppm

SECTION 9 - PHYSICAL AND CHEMICAL PROPERTIES

Boiling Point: 66 °C @ 760 mmHg (based on 100% Tetrahydrofuran)

Vapor Pressure (MM Hg): 129 mmHg (based on 100% Tetrahydrofuran)

Vapor Density (AIR=1): Not Available

Specific Gravity (H_20=1): 0.88 @ 20 °C (based on 100% Tetrahydrofuran)

Percent Volatile by Volume (%): Not Available

Melting/Freezing Point: -108 °C (based on 100% Tetrahydrofuran)

Evaporation Rate (Butyl Acetate=1): Not Available

Solubility in Water: Miscible in water.

pH: Not Available

SECTION 10 - STABILITY AND REACTIVITY

CHEMICAL STABILITY: Stable under normal temperatures and pressures.

HAZARDOUS POLYMERIZATION: May occur.

HAZARDOUS DECOMPOSITION PRODUCTS: Hydrogen Cyanide, Nitrogen Oxide, Ammonia and other vapors.

KEEP AWAY FROM: Heat, ignition sources, flame, incompatibilities, oxidizing agents, strong acids, light and air.

SECTION 11 - TOXICOLOGICAL INFORMATION

Tetrahydrofuran:

Oral rat LD_{50}: 1650 mg/kg. Inhalation rat LC_{50}: 21,000 ppm/3H. Investigated as a tumorigen, mutagen, reproductive effector.

Reproductive Toxicity: Animal data show developmental effects only at exposures levels producing other toxic effects in the adult animal. Animal testing for reproductive effects show no change in reproductive performance.

Carcinogenicity: Under the National Toxicology Program (NTP), the U.S. Public Health Service completed a 2-year (lifetime) inhalation study in rats and mice on Tetrahydrofuran (THF) which suggests that THF is a carcinogen in laboratory animals. There is no data linking THF exposure to cancer in humans. The data shows carcinogenic activity in the liver and kidneys of laboratory animals.

Pyridine:

Oral LD_{50} (rat): 891 mg - 1580 mg/Kg; Oral LD_{50} (mouse): 1500 mg/Kg; Inhalation LC_{50} (rat): 9000 ppm/1 hr; 4000 ppm/4 hr; Skin LD_{50} (rabbit): 1121 mg/Kg; Skin (rabbit): mild irritant (10 mg/24h open); Eye (rabbit): severe irritant causing corneal opacity.
Inhalation (rats): repeated exposure to pyridine vapor for 7 hr/day, 5d/wk for 6 months to either 10 or 50 ppm caused liver effects. Oral (rats): 0.1% (50 mg/kg) in the diet caused death with liver and kidney injury; 1 mg/kg/day was NOEL.
Genetic Toxicology:
Ames Assay - negative.
Cell Transformation Test - negative.
Chinese Hamster Ovary Cell Test for Chromosomal Aberrations - negative.

Iodine:

Oral LD_{50} (rat): 14 gm/kg; Oral LD_{50} (mouse): 22 gm/kg; Oral LD_{50} (rabbit): 10 gm/kg.
Inhalation: Animal studies demonstrated that iodine vapor is intensely irritating to mucous membranes and adversely affects both upper and lower portions of the pulmonary tract. In dogs, large (but unspecified) concentrations of vapor caused pulmonary edema.

Chronic Exposure (humans): Iodine concentrates in thyroid, and can cause metabolic disturbances. Chronic iodine poisoning (iodism) can result in rapid heartbeat, tremor, weight loss, diarrhea, insomnia, eye irritation, bronchitis, gastric irritation, and skin rash. Persons hypersensitive to iodine can develop allergic skin rashes or occupational asthma.

Developmental Toxicity:
Oral Developmental Toxicity (rat): TD_{Lo} value of 1100 mg/kg for effects on newborn viability index and TD_{Lo} value of 2750 mg/kg for effects on newborn growth statistics (e.g., reduced weight gain); females dosed during days 1 to 22 of pregnancy. Oral Developmental Toxicity (rabbit): TD_{Lo} value of 15 mg/kg for effects on newborn viability index and for effects on newborn growth statistics (e.g., reduced weight gain); females dosed during days 30 to 31 of pregnancy.

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

	-----NTP Carcinogen----------		
Ingredient	Known	Anticipated	IARC Category
Pyridine (110-86-1)	No	No	None
Tetrahydrofuran (109-99-9)	No	No	None

SECTION 12 - ECOLOGICAL INFORMATION

Environmental Fate: When released into the soil, this material may leach into groundwater and is expected to quickly evaporate. When released into water, this material may biodegrade to a moderate extent, is expected to quickly evaporate. This material is not expected to significantly bioaccumulate. When released into the air, this material may be removed from the atmosphere to a moderate extent by wet deposition.

Tetrahydrofuran:
LC_{50} (Fathead minnow): 2160 mg/L/96 hr. (flow-through)

Pyridine:
LC_{50} (Fathead minnow): 106 mg/L/96 hr. (flow-through)
EC_{50} (Fathead minnow): 85.6 mg/L/96 hr. (flow-through) - loss of equilibrium

SECTION 13 - DISPOSAL CONSIDERATIONS

Dispose of in accordance with all federal, state and local regulations.

RCRA WASTE #: Not listed

SECTION 14 - TRANSPORTATION INFORMATION

D.O.T. SHIPPING NAME: Flammable Liquid, N.O.S. (Contains Tetrahydrofuran & Pyridine)
TECHNICAL SHIPPING NAME: Same

UN/NA: UN1993
D.O.T. HAZARD CLASS AND GROUP NUMBER: Hazard Class 3, PG II
D.O.T. PLACARD: Flammable Liquid
PRODUCT LABEL: Oxidizer Solution

SECTION 15 - REGULATORY INFORMATION

OSHA STATUS: Not listed

TSCA STATUS: This product is a mixture. The CAS numbers of all components are listed on the TSCA inventory.

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

Ingredient	TSCA	EC	Japan	Australia
Tetrahydrofuran (109-99-9)	Yes	Yes	Yes	Yes
Pyridine (110-86-1)	Yes	Yes	Yes	Yes
Iodine (7553-56-2)	Yes	Yes	No	Yes

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

		--Canada--		
Ingredient	Korea	DSL	NDSL	Phil.
Tetrahydrofuran (109-99-9)	Yes	Yes	No	Yes
Pyridine (110-86-1)	Yes	Yes	No	Yes
Iodine (7553-56-2)	Yes	Yes	No	Yes

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

	-SARA 302-		--------SARA 313---------	
Ingredient	RQ	TPQ	List	Chemical Catg.
Tetrahydrofuran (109-99-9)	No	No	No	No
Pyridine (110-86-1)	No	No	Yes	No
Iodine (7553-56-2)	No	No	No	No

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

	-RCRA-	-TSCA-	
Ingredient	CERCLA	261.33	8(d)
Tetrahydrofuran (109-99-9)	1000	U213	Yes
Pyridine (110-86-1)	1000	U196	No
Iodine (7553-56-2)	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)

WARNING: THIS PRODUCT CONTAINS A CHEMICAL(S) KNOWN TO THE STATE OF CALIFORNIA TO CAUSE BIRTH DEFECTS OR OTHER REPRODUCTIVE HARM.

SECTION 16 - OTHER INFORMATION

NFPA Hazard Ratings: Health - 2
Flammability - 3
Reactivity - 1

Reason for Issue: Changed Date

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