

SAFETY DATA SHEET

This safety data sheet was created pursuant to the requirements of: GHS Classification in accordance with 29 CFR 1910 (OSHA HCS) and Canadian Workplace Hazardous Material Information System (WHMIS 2015)

Revision date 01-Jul-2024 Revision Number 1

1. Identification

Product identifier

Product Catalog Number:	Product Description:
40-4032-XX	0.02M Iodine in Tetrahydrofuran/ Pyridine/ Water (88:10:2)

Product Code(s)
40-4032-XX
Product Name
Oxidizing Solution

Other means of identification

UN number or ID number UN1993

Synonyms None

Recommended use of the chemical and restrictions on use

Recommended use For research use only

Restrictions on use Not for human diagnostic use

Details of the supplier of the safety data sheet

Manufacturer Address

Glen Research LLC 22825 Davis Drive Sterling, VA 20164 USA

Emergency telephone number

Company Phone Number 1-703-437-6191

Emergency Telephone CHEMTREC Customer Number (CCN): 234802 Glen Research Corporation

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2. Hazard(s) identification

Classification

Acute toxicity - Oral	Category 4
Acute toxicity - Dermal	Category 4
Acute toxicity - Inhalation (Dusts/Mists)	Category 4
Serious eye damage/eye irritation	Category 2A
Carcinogenicity	Category 2
Specific target organ toxicity (single exposure)	Category 3
Flammable liquids	Category 2

Appearance Liquid Physical state Liquid Odor Sweet Ether-like odor

Label elements

Signal word

Danger

Hazard statements

Harmful if swallowed
Harmful in contact with skin
Harmful if inhaled
Causes serious eye irritation
Suspected of causing cancer
May cause respiratory irritation
Highly flammable liquid and vapor



Precautionary Statements - Prevention

Obtain special instructions before use

Do not handle until all safety precautions have been read and understood

Wear protective gloves, protective clothing, eye protection and face protection

Wash face, hands and any exposed skin thoroughly after handling

Do not eat, drink or smoke when using this product

Avoid breathing dust, fume, gas, mist, vapors and spray

Use only outdoors or in a well-ventilated area

Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking

Keep container tightly closed

Ground and bond container and receiving equipment

Use explosion-proof electrical, ventilating, lighting and .? equipment

Use only non-sparking tools

Take action to prevent static discharges

Keep cool

Precautionary Statements - Response

IF exposed or concerned: Get medical advice/attention

Specific treatment (see .? on this label)

Eyes

IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing If eye irritation persists: Get medical advice and attention

Skin

Call a POISON CENTER or doctor if you feel unwell

IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water and then shower

Wash contaminated clothing before reuse

Inhalation

IF INHALED: Remove person to fresh air and keep comfortable for breathing

Ingestion

IF SWALLOWED: Call a POISON CENTER or doctor if you feel unwell

Rinse mouth

Fire

In case of fire: Use CO2, dry chemical, or foam to extinguish

Precautionary Statements - Storage

Store locked up

Store in a well-ventilated place. Keep container tightly closed

Precautionary Statements - Disposal

Dispose of contents and container to an approved waste disposal plant

Other information

Harmful to aquatic life with long lasting effects. Toxic to aquatic life.

Unknown acute toxicity

83 % of the mixture consists of ingredient(s) of unknown acute inhalation toxicity (dust/mist)

3. Composition/information on ingredients

Substance

Not applicable.

Mixture

Chemical name	CAS No.	Weight-%	Information Review	Date HMIRA filed and date exemption granted (if applicable)
Tetrahydrofuran	109-99-9	75-89	-	-
Pyridine	110-86-1	7-13	-	-
Iodine	7553-56-2	0.5-1.5	-	-
Water	7732-18-5	1-5	-	-

If CAS number is "proprietary", the specific chemical identity and percentage of composition has been withheld as a trade secret.

4. First-aid measures

Description of first aid measures

General advice Show this safety data sheet to the doctor in attendance. IF exposed or concerned: Get

medical advice/attention.

Inhalation Remove to fresh air. IF exposed or concerned: Get medical advice/attention. If symptoms

persist, call a physician. If breathing has stopped, give artificial respiration. Get medical

attention immediately.

Eye contact Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes. Keep

eye wide open while rinsing. Do not rub affected area. Remove contact lenses, if present and easy to do. Continue rinsing. Get medical attention if irritation develops and persists.

Skin contact Wash off immediately with soap and plenty of water while removing all contaminated clothes

and shoes. If symptoms persist, call a physician.

Ingestion Do NOT induce vomiting. Rinse mouth. Never give anything by mouth to an unconscious

person. Not an expected route of exposure. IF exposed or if you feel unwell: Call a POISON

CENTER or doctor/physician. Get medical attention.

Self-protection of the first aider Remove all sources of ignition. Ensure that medical personnel are aware of the material(s)

involved, take precautions to protect themselves and prevent spread of contamination. Use personal protective equipment as required. See section 8 for more information. Avoid

contact with skin, eyes or clothing. Avoid breathing vapors or mists.

Most important symptoms and effects, both acute and delayed

Symptoms May cause redness and tearing of the eyes. Burning sensation. Coughing and/ or wheezing.

Difficulty in breathing.

Indication of any immediate medical attention and special treatment needed

5. Fire-fighting measures

Suitable Extinguishing Media Dry chemical. Carbon dioxide (CO2). Water spray. Alcohol resistant foam.

Large Fire CAUTION: Use of water spray when fighting fire may be inefficient.

Unsuitable extinguishing mediaDo not scatter spilled material with high pressure water streams.

Specific hazards arising from the

chemical

Risk of ignition. Keep product and empty container away from heat and sources of ignition. In the event of fire, cool tanks with water spray. Fire residues and contaminated fire extinguishing water must be disposed of in accordance with local regulations.

Hazardous combustion products Nitrogen oxides (NOx). Carbon oxides.

Explosion data

Sensitivity to mechanical impact None. Sensitivity to static discharge Yes.

Special protective equipment and precautions for fire-fighters

Firefighters should wear self-contained breathing apparatus and full firefighting turnout gear. Use personal protection equipment.

6. Accidental release measures

Personal precautions, protective equipment and emergency procedures

Personal precautions Evacuate personnel to safe areas. Use personal protective equipment as required. See

section 8 for more information. Avoid contact with skin, eyes or clothing. Ensure adequate ventilation. Keep people away from and upwind of spill/leak. ELIMINATE all ignition sources (no smoking, flares, sparks or flames in immediate area). Pay attention to flashback. Take precautionary measures against static discharges. All equipment used when handling the product must be grounded. Do not touch or walk through spilled material. Avoid breathing

vapors or mists.

Other information Ventilate the area. Refer to protective measures listed in Sections 7 and 8.

Methods and material for containment and cleaning up

Methods for containment Stop leak if you can do it without risk. Do not touch or walk through spilled material. A vapor

suppressing foam may be used to reduce vapors. Dike far ahead of spill to collect runoff water. Keep out of drains, sewers, ditches and waterways. Absorb with earth, sand or other

non-combustible material and transfer to containers for later disposal.

Methods for cleaning up Take precautionary measures against static discharges. Dam up. Soak up with inert

absorbent material. Pick up and transfer to properly labeled containers.

7. Handling and storage

Precautions for safe handling

Advice on safe handling

Use personal protection equipment. Avoid breathing vapors or mists. Keep away from heat, hot surfaces, sparks, open flames and other ignition sources. No smoking. Use grounding and bonding connection when transferring this material to prevent static discharge, fire or explosion. Use with local exhaust ventilation. Use spark-proof tools and explosion-proof equipment. Keep in an area equipped with sprinklers. Use according to package label instructions. Handle in accordance with good industrial hygiene and safety practice. Avoid contact with skin, eyes or clothing. Do not eat, drink or smoke when using this product. In case of insufficient ventilation, wear suitable respiratory equipment.

Conditions for safe storage, including any incompatibilities

Storage Conditions

Keep containers tightly closed in a dry, cool and well-ventilated place. Keep away from heat, sparks, flame and other sources of ignition (i.e., pilot lights, electric motors and static electricity). Keep in properly labeled containers. Do not store near combustible materials. Keep in an area equipped with sprinklers. Store in accordance with the particular national regulations. Store in accordance with local regulations. Keep out of the reach of children. Store locked up.

Packaging materials

Glass.

8. Exposure controls/personal protection

Control parameters Exposure Limits

Chemical name		ACGIH T	LV	03	SHA PEL	NIOSH
Tetrahydrofuran		STEL: 100 ppm		TWA: 200 ppm		IDLH: 2000 ppm
109-99-9		TWA: 50 ppm			: 590 mg/m ³	TWA: 200 ppm
		S*		(vacated)	TWA: 200 ppm	TWA: 590 mg/m ³
				(vacated)	TWA: 590 mg/m ³	STEL: 250 ppm
				(vacated)	STEL: 250 ppm	STEL: 735 mg/m ³
				(vacated) S	STEL: 735 mg/m ³	
Pyridine		TWA: 1 p	pm	TV	/A: 5 ppm	IDLH: 1000 ppm
110-86-1			-	TWA	: 15 mg/m ³	TWA: 5 ppm
				(vacated	d) TWA: 5 ppm	TWA: 15 mg/m ³
					TWA: 15 mg/m ³	
lodine		TWA: 0.001 ppm	I inhalable	(vacated)	Ceiling: 0.1 ppm	IDLH: 2 ppm
7553-56-2		fraction and	vapor	(vacated)	Ceiling: 1 mg/m ³	Ceiling: 0.1 ppm
		Sk*	•	Ceilir	ng: 0.1 ppm	Ceiling: 1 mg/m ³
					ng: 1 mg/m ³	
Chemical name		Alberta	British C	columbia	Ontario	Quebec
Tetrahydrofuran		TWA: 50 ppm	TWA:	50 ppm	TWA: 50 ppm	n TWA: 50 ppm
109-99-9	T\	NA: 147 mg/m ³	STEL: 1	00 ppm	STEL: 100 ppr	
		STEL: 100 ppm		kin	Skin	Skin
		ΓEL: 295 mg/m ³				
		Skin				
Pyridine		TWA: 1 ppm	TWA:	1 ppm	TWA: 1 ppm	TWA: 5 ppm
110-86-1	Т	WA: 3.2 mg/m ³				TWA: 16 mg/m ³
lodine	С	eiling: 0.1 ppm	Ceiling:	0.1 ppm	TWA: 0.01 ppr	
7553-56-2	С	eiling: 1 mg/m ³			STEL: 0.1 ppr	n Ceiling: 1.0 mg/m ³

Biological occupational exposure limits

Chemical name	ACGIH
Tetrahydrofuran 109-99-9	2 mg/L - urine (Tetrahydrofuran) - end of shift

Appropriate engineering controls

Engineering controls Showers

Eyewash stations Ventilation systems.

Individual protection measures, such as personal protective equipment

Eye/face protection Tight sealing safety goggles.

Hand protection Contact glove manufacturer for recommendations. Wear suitable gloves. Impervious gloves.

Skin and body protection Wear suitable protective clothing. Long sleeved clothing. Chemical resistant apron.

Antistatic boots.

Respiratory protection No protective equipment is needed under normal use conditions. If exposure limits are

exceeded or irritation is experienced, ventilation and evacuation may be required.

Environmental exposure controls Prevent product from entering drains. Local authorities should be advised if significant

spillages cannot be contained.

General hygiene considerations Do not eat, drink or smoke when using this product. Contaminated work clothing should not

be allowed out of the workplace. Regular cleaning of equipment, work area and clothing is recommended. Wash hands before breaks and immediately after handling the product. Avoid contact with skin, eyes or clothing. Wear suitable gloves and eye/face protection. Handle in accordance with good industrial hygiene and safety practice. Take off

contaminated clothing and wash before reuse.

9. Physical and chemical properties

Information on basic physical and chemical properties

Physical stateLiquidAppearanceLiquidColorDark Red

Odor Sweet Ether-like odor
Odor threshold No information available

Property Values Remarks • Method

рΗ No data available None known No data available Melting point / freezing point None known Initial boiling point and boiling rangeNo data available None known Flash point No data available None known **Evaporation rate** No data available None known **Flammability** No data available None known Flammability Limit in Air None known

Upper flammability or explosive No data available

limits

Lower flammability or explosive No data available

limits

Vapor pressure No data available None known Relative vapor density No data available None known Relative density 0.93a/mL None known Water solubility No data available None known Solubility in other solvents No data available None known Partition coefficient No data available None known No data available **Autoignition temperature** None known **Decomposition temperature** No data available None known No data available Kinematic viscosity None known **Dynamic viscosity** No data available None known

Other information

Explosive properties
Oxidizing properties
No information available
VOC content
No information available
Liquid Density
No information available
Bulk density
No information available

10. Stability and reactivity

Reactivity No information available

Chemical stability Stable under normal conditions.

Possibility of hazardous reactions None under normal processing.

Hazardous polymerization Hazardous polymerization does not occur.

Conditions to avoid Heat, flames and sparks. Excessive heat.

Incompatible materialsNone known based on information supplied.

Hazardous decomposition products Nitrogen oxides (NOx). Carbon oxides.

11. Toxicological information

Information on likely routes of exposure

Product Information

Inhalation Specific test data for the substance or mixture is not available. May cause irritation of

respiratory tract. Harmful by inhalation. (based on components).

Eye contact Specific test data for the substance or mixture is not available. Causes serious eye irritation.

(based on components). May cause redness, itching, and pain.

Skin contact Specific test data for the substance or mixture is not available. May cause irritation.

Prolonged contact may cause redness and irritation. May be absorbed through the skin in

harmful amounts. Harmful in contact with skin. (based on components).

Ingestion Specific test data for the substance or mixture is not available. Ingestion may cause

gastrointestinal irritation, nausea, vomiting and diarrhea. Harmful if swallowed. (based on

components).

Symptoms related to the physical, chemical and toxicological characteristics

Symptoms May cause redness and tearing of the eyes. Coughing and/ or wheezing.

Acute toxicity

Numerical measures of toxicity

No information available

The following values are calculated based on chapter 3.1 of the GHS document

ATEmix (oral) 1,607.50 mg/kg
ATEmix (dermal) 1,848.40 mg/kg
ATEmix (inhalation-gas) 99,999.00 ppm
ATEmix (inhalation-dust/mist) 2.19 mg/l

ATEmix (inhalation-vapor) 99,999.00 mg/l

Unknown acute toxicity

83 % of the mixture consists of ingredient(s) of unknown acute inhalation toxicity (dust/mist)

Component Information

Chemical name	Oral LD50	Dermal LD50	Inhalation LC50
Tetrahydrofuran	= 1650 mg/kg (Rat)	> 2000 mg/kg (Rat)	> 14.7 mg/L (Rat) 4 h
109-99-9			
Pyridine 110-86-1	= 866 mg/kg (Rat)	1000 - 2000 mg/kg (Rabbit)	= 12.898 mg/L (Rat) 4 h
lodine 7553-56-2	= 14 g/kg (Rat)	= 1425 mg/kg (Rabbit) > 2000 mg/kg (Rabbit)	> 4.588 mg/L (Rat)4 h
Water 7732-18-5	> 90 mL/kg (Rat)	-	-

Delayed and immediate effects as well as chronic effects from short and long-term exposure

Skin corrosion/irritation May cause skin irritation.

Serious eye damage/eye irritation Classification based on data available for ingredients. Causes serious eye irritation.

Respiratory or skin sensitization No information available.

Germ cell mutagenicity No information available.

Carcinogenicity Contains a known or suspected carcinogen. Classification based on data available for

ingredients. Suspected of causing cancer.

The table below indicates whether each agency has listed any ingredient as a carcinogen.

Chemical name	ACGIH	IARC	NTP	OSHA
Tetrahydrofuran 109-99-9	A3	Group 2B	-	Х
Pyridine 110-86-1	A3	Group 2B	-	Х

Legend

ACGIH (American Conference of Governmental Industrial Hygienists)

A3 - Animal Carcinogen

IARC (International Agency for Research on Cancer)

Group 2B - Possibly Carcinogenic to Humans

Occupational Safety and Health Administration of the US Department of Labor

X - Present

Reproductive toxicity No information available.

STOT - single exposure May cause respiratory irritation.

STOT - repeated exposure No information available.

Target organ effects

No information available.

Aspiration hazard

No information available.

12. Ecological information

Ecotoxicity

Toxic to aquatic life. Harmful to aquatic life with long lasting effects.

Chemical name	Algae/aquatic plants	Fish	Toxicity to	Crustacea
			microorganisms	
Tetrahydrofuran	-	LC50: 1970 - 2360mg/L	-	-
109-99-9		(96h, Pimephales		
		promelas)		
		LC50: 2700 - 3600mg/L		
		(96h, Pimephales		
		promelas)		
Pyridine	-	LC50: 63.4 - 73.6mg/L	-	-
110-86-1		(96h, Pimephales		
		promelas)		
		LC50: =26mg/L (96h,		
		Cyprinus carpio)		
		LC50: =4.6mg/L (96h,		
		Oncorhynchus mykiss)		
Iodine	-	LC50: =1.67mg/L (96h,	-	-
7553-56-2		Oncorhynchus mykiss)		

Persistence and degradability Not Likely.

Bioaccumulation Not likely to bioaccumulate.

Bioconcentration factor (BCF) log Pow <= 4

Component Information

Chemical name	Partition coefficient
Tetrahydrofuran 109-99-9	0.45
Pyridine 110-86-1	0.65

Mobility in soil Not expected to adsorb on soil.

Mobility Soluble in water.

Other adverse effects No information available.

13. Disposal considerations

Disposal methods

Waste from residues/unused Should not be released into the environment. Dispose of in accordance with local regulations. Dispose of waste in accordance with environmental legislation.

Contaminated packaging Empty containers pose a potential fire and explosion hazard. Do not cut, puncture or weld

containers.

California waste information This product contains one or more substances that are listed with the State of California as

a hazardous waste.

14. Transport information

DOT Regulated UN number or ID number UN1993

Proper shipping name Flammable liquids, n.o.s.

Transport hazard class(es) Class 3

Packing group Packing Group II

Reportable quantity - lbs 1000 lbs

IATA Regulated
UN number or ID number UN1993

UN proper shipping name Flammable liquid, n.o.s.

Transport hazard class(es) Class 3

Packing group Packing Group II

IMDG Regulated
UN number or ID number UN1993

UN proper shipping name Flammable liquid, n.o.s.

Transport hazard class(es) Class 3

Packing group Packing Group II

EmS-No. F-E, S-E

15. Regulatory information

Safety, health and environmental regulations/legislation specific for the substance or mixture

International Regulations

The Montreal Protocol on Substances that Deplete the Ozone Layer Not applicable

The Stockholm Convention on Persistent Organic Pollutants Not applicable

The Rotterdam Convention Not applicable

International Inventories

TSCA All of the components of this product are listed in the TSCA Inventory or exempt.

DSL/NDSL

EINECS/ELINCS

Listed or exempt.

Legend:

TSCA - United States Toxic Substances Control Act Section 8(b) Inventory

DSL/NDSL - Canadian Domestic Substances List/Non-Domestic Substances List

EINECS/ELINCS - European Inventory of Existing Chemical Substances/European List of Notified Chemical Substances

ENCS - Japan Existing and New Chemical Substances **IECSC** - China Inventory of Existing Chemical Substances

KECL - Korean Existing and Evaluated Chemical Substances

PICCS - Philippines Inventory of Chemicals and Chemical Substances

AIIC - Australian Inventory of Industrial Chemicals

US Federal Regulations

SARA 313

Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 (SARA). This product contains a chemical or chemicals which are subject to the reporting requirements of the Act and Title 40 of the Code of Federal Regulations, Part 372.

Chemical name	SARA 313 - Threshold Values %
Pyridine - 110-86-1	1.0

SARA 311/312 Hazard Categories

Should this product meet EPCRA 311/312 Tier reporting criteria at 40 CFR 370, refer to Section 2 of this SDS for appropriate classifications.

CWA (Clean Water Act)

This product does not contain any substances regulated as pollutants pursuant to the Clean Water Act (40 CFR 122.21 and 40 CFR 122.42).

CERCLA

This material, as supplied, contains one or more substances regulated as a hazardous substance under the Comprehensive

Environmental Response Compensation and Liability Act (CERCLA) (40 CFR 302).

Environmental response compensation and Elability Not (GERGEN) (40 of 17 502).					
Chemical name	Hazardous Substances RQs	Extremely Hazardous	Reportable Quantity (RQ)		
		Substances RQs			
Tetrahydrofuran	1000 lb	-	RQ 1000 lb final RQ		
109-99-9			RQ 454 kg final RQ		
Pyridine	1000 lb	-	RQ 1000 lb final RQ		
110-86-1			RQ 454 kg final RQ		

US State Regulations

California Proposition 65

This product contains the following Proposition 65 chemicals:.

Chemical name	California Proposition 65	
Tetrahydrofuran - 109-99-9	Carcinogen	
Pyridine - 110-86-1	Carcinogen	

U.S. State Right-to-Know Regulations

Chemical name	New Jersey	Massachusetts	Pennsylvania
Tetrahydrofuran 109-99-9	X	X	X
Pyridine 110-86-1	X	X	X
lodine 7553-56-2	X	X	X

U.S. EPA Label Information

EPA Pesticide Registration Number Not applicable

16. Other information

NFPAHealth hazards2Flammability3Instability0Special hazards-HMISHealth hazards2 *Flammability3Physical hazards0Personal protectionX

Key or legend to abbreviations and acronyms used in the safety data sheet

<u>Legend Section 8: Exposure controls/personal protection</u>

TWA TWA (time-weighted average) STEL STEL (Short Term Exposure Limit)

Ceiling Maximum limit value Sk* Skin designation

Revision date 01-Jul-2024

Revision Note Disclaimer

No information available

The information provided herein is based on sources believed to be reliable as of the issue date of this document, and pertains only to the material designated. Glen Research LLC makes no warranty or representation to its completeness, accuracy or currency. This material is intended for use by persons with the pertinent technical skills an at their discretion and risk. It is responsibility of the user to determine te product's suitability for its intended use, the product's safe use and the product's proper disposal. disposal of hazardous material may be subject to federal. state or local regulations.

End of Safety Data Sheet