

SR664-20 OXIDATION SOLUTION, 20L NS

**000000011429**

Version 1.3

Revision Date 05/13/2014

Print Date 08/10/2016

**SECTION 1. PRODUCT AND COMPANY IDENTIFICATION**

Product name : Oxidation Solution

MSDS Number : 000000011429

Product Use Description : Oxidation Reagent for DNA/RNA Synthesis

Manufacturer or supplier's details : Honeywell International Inc.  
115 Tabor Road  
Morris Plains, NJ 07950-2546

For more information call : 1-800-368-0050  
+1-231-726-3171  
(Monday-Friday, 9:00am-5:00pm)

In case of emergency call : **Medical: 1-800-498-5701 or +1-303-389-1414**  
: **Transportation (CHEMTREC): 1-800-424-9300 or**  
: **+1-703-527-3887**  
:  
: (24 hours/day, 7 days/week)

**SECTION 2. HAZARDS IDENTIFICATION****Emergency Overview**

Form : liquid, clear

Color : colourless to yellowish

Odor : strong pungent

**Classification of the substance or mixture**

Classification of the substance or mixture : Flammable liquids, Category 3  
Acute toxicity, Category 4, Oral  
Acute toxicity, Category 4, Inhalation  
Acute toxicity, Category 4, Dermal  
Eye irritation, Category 2A  
Carcinogenicity, Category 2

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**GHS Label elements, including precautionary statements**

Symbol(s)



Signal word

: Warning

Hazard statements

: Flammable liquid and vapour.  
Harmful if swallowed, in contact with skin or if inhaled  
Causes serious eye irritation.  
Suspected of causing cancer.

Precautionary statements

: **Prevention:**  
Obtain special instructions before use.  
Do not handle until all safety precautions have been read and understood.  
Keep away from heat/sparks/open flames/hot surfaces. - No smoking.  
Keep container tightly closed.  
Ground/bond container and receiving equipment.  
Use explosion-proof electrical/ ventilating/ lighting/ equipment.  
Use only non-sparking tools.  
Take precautionary measures against static discharge.  
Avoid breathing dust/ fume/ gas/ mist/ vapours/ spray.  
Wash skin thoroughly after handling.  
Do not eat, drink or smoke when using this product.  
Use only outdoors or in a well-ventilated area.  
Wear protective gloves/ eye protection/ face protection.**Response:**

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

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

IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing.

IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.

IF exposed or concerned: Get medical advice/ attention. Rinse mouth.

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If eye irritation persists: Get medical advice/ attention.  
 Wash contaminated clothing before reuse.  
 In case of fire: Use dry sand, dry chemical or alcohol-resistant  
 foam for extinction.

**Storage:**

Store in a well-ventilated place. Keep cool.  
 Store locked up.

**Disposal:**

Dispose of contents/ container to an approved waste disposal  
 plant.

**Carcinogenicity**

ACGIH: Pyridine 110-86-1  
 A3: Confirmed animal carcinogen

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

Chemical nature : Mixture

Chemical Name	CAS-No.	Concentration
Pyridine	110-86-1	88.70 %
Water	7732-18-5	10.00 %
Iodine	7553-56-2	1.30 %

**SECTION 4. FIRST AID MEASURES**

Inhalation : Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Use oxygen as required, provided a qualified operator is present. Call a physician.

Skin contact : Wash off immediately with plenty of water for at least 15

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- minutes. Take off contaminated clothing and shoes immediately. Wash contaminated clothing before re-use. Call a physician.
- Eye contact : Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes. Call a physician.
- Ingestion : Do not induce vomiting without medical advice. Never give anything by mouth to an unconscious person. Call a physician.

**Notes to physician**

- Treatment : Treat symptomatically.

**SECTION 5. FIREFIGHTING MEASURES**

- Suitable extinguishing media : Carbon dioxide (CO<sub>2</sub>)  
Dry chemical  
Alcohol-resistant foam  
Cool closed containers exposed to fire with water spray.
- Unsuitable extinguishing media : Do not use a solid water stream as it may scatter and spread fire.
- Specific hazards during firefighting : Flammable.  
Vapours may form explosive mixtures with air.  
Vapours are heavier than air and may spread along floors.  
Vapors may travel to areas away from work site before igniting/flashing back to vapor source.  
In case of fire hazardous decomposition products may be produced such as:  
Hydrogen cyanide (hydrocyanic acid)  
Ammonia  
Carbon dioxide (CO<sub>2</sub>), carbon monoxide (CO), oxides of nitrogen (NO<sub>x</sub>), dense black smoke.
- Special protective equipment for firefighters : Wear self-contained breathing apparatus and protective suit.

**SECTION 6. ACCIDENTAL RELEASE MEASURES**

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- Personal precautions : Wear personal protective equipment.  
Immediately evacuate personnel to safe areas.  
Keep people away from and upwind of spill/leak.  
Ensure adequate ventilation.  
Remove all sources of ignition.  
Do not swallow.  
Avoid breathing vapours, mist or gas.  
Avoid contact with skin, eyes and clothing.
- Environmental precautions : Prevent further leakage or spillage if safe to do so.  
Prevent product from entering drains.  
Discharge into the environment must be avoided.  
Do not flush into surface water or sanitary sewer system.  
Do not allow run-off from fire fighting to enter drains or water courses.
- Methods for cleaning up : Ventilate the area.  
No sparking tools should be used.  
Use explosion-proof equipment.  
Contain and collect spillage with non-combustible absorbent materials, e.g. sand, earth, vermiculite, diatomaceous earth and place in container for disposal according to local regulations (see section 13).

**SECTION 7. HANDLING AND STORAGE****Handling**

- Handling : Wear personal protective equipment.  
Use only in well-ventilated areas.  
Keep container tightly closed.  
Do not smoke.  
Do not swallow.  
Avoid breathing vapours, mist or gas.  
Avoid contact with skin, eyes and clothing.
- Advice on protection against fire and explosion : Keep away from fire, sparks and heated surfaces.  
Take precautionary measures against static discharges.  
Ensure all equipment is electrically grounded before beginning transfer operations.  
Keep product and empty container away from heat and sources of ignition.  
No sparking tools should be used.  
Use explosion-proof equipment.

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No smoking.

**Storage**

Requirements for storage areas and containers : Store in area designed for storage of flammable liquids. Protect from physical damage.  
 Keep containers tightly closed in a dry, cool and well-ventilated place.  
 Containers which are opened must be carefully resealed and kept upright to prevent leakage.  
 Keep away from heat and sources of ignition.  
 Keep away from direct sunlight.  
 Store away from incompatible substances.  
 Container hazardous when empty.  
 Do not pressurize, cut, weld, braze, solder, drill, grind or expose containers to heat or sources of ignition.

**SECTION 8. EXPOSURE CONTROLS/PERSONAL PROTECTION**

Protective measures : Ensure that eyewash stations and safety showers are close to the workstation location.

Engineering measures : Use with local exhaust ventilation.  
 Prevent vapour buildup by providing adequate ventilation during and after use.

Eye protection : Do not wear contact lenses.  
 Wear as appropriate:  
 Safety glasses with side-shields  
 If splashes are likely to occur, wear:  
 Goggles or face shield, giving complete protection to eyes

Hand protection : Solvent-resistant gloves  
 Gloves must be inspected prior to use.  
 Replace when worn.

Skin and body protection : Wear as appropriate:  
 Solvent-resistant apron  
 Flame retardant antistatic protective clothing  
 If splashes are likely to occur, wear:  
 Protective suit

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- Respiratory protection : In case of insufficient ventilation wear suitable respiratory equipment.  
For rescue and maintenance work in storage tanks use self-contained breathing apparatus.  
Use NIOSH approved respiratory protection.
- Hygiene measures : When using, do not eat, drink or smoke.  
Wash hands before breaks and immediately after handling the product.  
Keep working clothes separately.  
Remove and wash contaminated clothing before re-use.  
Do not swallow.  
Avoid breathing vapours, mist or gas.  
Avoid contact with skin, eyes and clothing.

**Exposure Guidelines**

Components	CAS-No.	Value	Control parameters	Update	Basis
Pyridine	110-86-1	TWA : time weighted average	(1 ppm)	2008	ACGIH:US. ACGIH Threshold Limit Values
Pyridine	110-86-1	REL : Recomm ended exposure limit (REL):	15 mg/m3 (5 ppm)	2005	NIOSH/GUIDE:US. NIOSH: Pocket Guide to Chemical Hazards
Pyridine	110-86-1	PEL : Permissi ble exposure limit	15 mg/m3 (5 ppm)	02 2006	OSHA_TRANS:US. OSHA Table Z-1 Limits for Air Contaminants (29 CFR 1910.1000)
Pyridine	110-86-1	TWA : time weighted average	15 mg/m3 (5 ppm)	1989	Z1A:US. OSHA Table Z-1-A (29 CFR 1910.1000)

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Iodine	7553-56-2	TWA : time weighted average	(0.01 ppm)	2008	ACGIH:US. ACGIH Threshold Limit Values
Further information	:	Form of exposure : Inhalable fraction and vapor.			
Iodine	7553-56-2	STEL : Short term exposure limit	(0.1 ppm)	2008	ACGIH:US. ACGIH Threshold Limit Values
Further information	:	Form of exposure : Vapor and aerosol.			
Iodine	7553-56-2	Ceil_Tim e: Ceiling Limit Value and Time Period (if specified) :	1 mg/m3 (0.1 ppm)	2005	NIOSH/GUIDE:US. NIOSH: Pocket Guide to Chemical Hazards
Iodine	7553-56-2	Ceiling : Ceiling Limit Value:	1 mg/m3 (0.1 ppm)	02 2006	OSHA_TRANS:US. OSHA Table Z-1 Limits for Air Contaminants (29 CFR 1910.1000)
Iodine	7553-56-2	Ceiling : Ceiling Limit Value:	1 mg/m3 (0.1 ppm)	1989	Z1A:US. OSHA Table Z-1-A (29 CFR 1910.1000)

## SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

Physical state : liquid, clear

Color : colourless to yellowish



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Odor : strong pungent

pH : Note: not applicable

Melting point/freezing point : -42.2 °C  
Note: The physical data is that of the main component.

Boiling point/boiling range : 115.25 °C at 1,013 hPa  
Note: The physical data is that of the main component.

Flash point : 81 °F (27 °C)  
Method: closed cup

Lower explosion limit : 1 %(V)  
Note: The physical data is that of the main component.

Upper explosion limit : 12.4 %(V)  
Note: The physical data is that of the main component.

Vapor pressure : 21.3 hPa  
at 20 °C(68 °F)Note: The physical data is that of the main component.

Vapor density : 2.7 Note: (Air = 1.0), The physical data is that of the main component.

Density : 0.983 g/cm<sup>3</sup> at 20 °C  
Note: The physical data is that of the main component.

Water solubility : Note: completely soluble

Ignition temperature : 482 °C

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Method: The physical data is that of the main component.

**SECTION 10. STABILITY AND REACTIVITY**

Chemical stability	: Stable under recommended storage conditions.
Possibility of hazardous reactions	: Hazardous polymerisation does not occur. Forms highly explosive by-product with Trifluoromethyl hypofluorite in reactions where used as an acid receptor.
Conditions to avoid	: Heat, flames and sparks. Keep away from direct sunlight.
Incompatible materials to avoid	: Strong oxidizing agents Strong acids Acid chlorides Chloroformates Fluorine May attack many plastics, rubbers and coatings.
Hazardous decomposition products	: In case of fire hazardous decomposition products may be produced such as: Carbon dioxide (CO <sub>2</sub> ), carbon monoxide (CO), oxides of nitrogen (NO <sub>x</sub> ), dense black smoke. Hydrogen cyanide (hydrocyanic acid) Ammonia

**SECTION 11. TOXICOLOGICAL INFORMATION**

Acute oral toxicity Pyridine	: LD50: 891 mg/kg Species: rat
Iodine	: LD50: 14,000 mg/kg Species: rat
Acute inhalation toxicity	

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Pyridine : LC50: 8796 ppm  
Exposure time: 1 h  
Species: rat

Iodine : LC50: > 4.588 mg/l , dust/mist  
Exposure time: 4 h  
Species: rat

Acute dermal toxicity  
Pyridine : LD50: 1,121 mg/kg  
Species: rabbit

Iodine : LD50: 1,425 mg/kg  
Species: rabbit, male

Skin irritation  
Iodine : Species: reconstructed human epidermis (RhE)  
Result: Irritating to skin.

Eye irritation  
Pyridine : Species: rabbit  
Result: Severe eye irritation  
Note: Corneal opacity

Repeated dose toxicity  
Pyridine : Species: rat  
Application Route: Inhalation  
Target Organs: Liver  
(10 or 50 ppm; 7 hours/day, 5 days/week for 6 months)  
Based on experimental results, may cause adverse health effects on the following:  
Liver  
  
Species: rat  
Application Route: Oral  
NOEL: 1 mg/kg  
Target Organs: Liver, Kidney  
Causes damage to the following organs: liver, kidneys.

Iodine : Species: human  
Chronic toxicity

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Chronic absorption can cause iodism, resulting in metallic taste, burning in the mouth and throat, and soreness of teeth and gums.

Other symptoms include rapid heartbeat, tremor, weight loss, diarrhea, insomnia, eye irritation, bronchitis, gastric irritation, and skin rash.

Pyridine

- : Test Method: Ames test  
Result: negative
- : Test Method: Chromosome aberration test in vitro  
Cell type: Chinese Hamster Ovary Cells  
Result: negative
- : Test Method: Cell Transformation Test  
Result: negative

Teratogenicity  
Iodine

- : Species: rat  
Application Route: Oral  
Dose: TDLo value of 1100 mg/kg for effects on newborn viability index  
Number of exposures: females dosed during days 1 to 22 of pregnancy
- Species: rabbit  
Application Route: Oral  
Dose: TDLo value of 15 mg/kg for effects on newborn viability index and for effects on newborn growth statistics (e.g., reduced weight gain)  
Number of exposures: females dosed during days 30 to 31 of pregnancy

Further information  
Pyridine

- : Note:  
Confirmed animal carcinogen with unknown relevance to humans.

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**SECTION 12. ECOLOGICAL INFORMATION**

Toxicity to fish  
Pyridine : flow-through test  
LC50: 106 mg/l  
Exposure time: 96 h  
Species: Pimephales promelas (fathead minnow)

Iodine : LC50: 1.67 mg/l  
Exposure time: 96 h  
Species: Oncorhynchus mykiss (rainbow trout)

Toxicity to daphnia and other aquatic invertebrates  
Iodine : LC50: 0.55 mg/l  
Exposure time: 48 h  
Species: Daphnia magna (Water flea)

Toxicity to algae  
Iodine : Growth inhibition  
EC50: 0.13 mg/l  
Exposure time: 72 h  
Species: Desmodesmus subspicatus (green algae)  
Method: OECD Test Guideline 201

**Further information on ecology**

Additional ecological information  
Pyridine : Harmful to aquatic organisms.

Iodine : Harmful to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

**SECTION 13. DISPOSAL CONSIDERATIONS**

Disposal methods : Observe all Federal, State, and Local Environmental regulations.

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**SECTION 14. TRANSPORT INFORMATION**

**DOT** UN/ID No. : UN 1993  
 Proper shipping name : Flammable liquids, n.o.s.  
 (Pyridine)  
 Class : 3  
 Packing group : III  
 Hazard Labels : 3

**IATA** UN/ID No. : UN 1993  
 Description of the goods : Flammable liquids, n.o.s.  
 (Pyridine)  
 Class : 3  
 Packaging group : III  
 Hazard Labels : 3  
 Packing instruction (cargo aircraft) : 366  
 Packing instruction (passenger aircraft) : 355  
 Packing instruction (passenger aircraft) : Y344

**IMDG** UN/ID No. : UN 1993  
 Description of the goods : Flammable liquids, n.o.s.  
 (PYRIDINE)  
 Class : 3  
 Packaging group : III  
 Hazard Labels : 3  
 EmS Number : F-E, S-E  
 Marine pollutant : no

**SECTION 15. REGULATORY INFORMATION****Inventories**

US. Toxic Substances : On TSCA Inventory  
 Control Act

Australia. Industrial : On the inventory, or in compliance with the inventory  
 Chemical (Notification and  
 Assessment) Act

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Canada. Canadian Environmental Protection Act (CEPA). Domestic Substances List (DSL) : All components of this product are on the Canadian DSL.

Japan. Kashin-Hou Law List : On the inventory, or in compliance with the inventory

Korea. Toxic Chemical Control Law (TCCL) List : On the inventory, or in compliance with the inventory

Philippines. The Toxic Substances and Hazardous and Nuclear Waste Control Act : On the inventory, or in compliance with the inventory

China. Inventory of Existing Chemical Substances : On the inventory, or in compliance with the inventory

New Zealand. Inventory of Chemicals (NZIoC), as published by ERMA New Zealand : On the inventory, or in compliance with the inventory

#### National regulatory information

US. Drug Enforcement Administration (DEA) Listed Precursor and Essential Chemicals (21 CFR 1310) : On the United States Drug Enforcement Authority (DEA) List of Precursors and Essential Chemicals

US. EPA CERCLA Hazardous Substances (40 CFR 302) : Iodine 7553-56-2  
: The following component(s) of this product is/are subject to release reporting under 40 CFR 302 when release exceeds the Reportable Quantity (RQ):

Reportable quantity: 1000 lbs  
: Pyridine 110-86-1

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

**SARA 313 Components** : The following components are subject to reporting levels established by SARA Title III, Section 313:

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	: Pyridine	110-86-1
<b>SARA 311/312 Hazards</b>	: Fire Hazard Acute Health Hazard Chronic Health Hazard	
<b>CERCLA Reportable Quantity</b>	: 1127 lbs	
<b>California Prop. 65</b>	: WARNING! This product contains a chemical known to the State of California to cause cancer. Pyridine	110-86-1
<b>Massachusetts RTK</b>	: Pyridine : Iodine	110-86-1 7553-56-2
<b>New Jersey RTK</b>	: Pyridine : Iodine	110-86-1 7553-56-2
<b>Pennsylvania RTK</b>	: Pyridine : Iodine	110-86-1 7553-56-2
<b>WHMIS Classification</b>	: B2: Flammable liquid D2A: Very Toxic Material Causing Other Toxic Effects D2B: Toxic Material Causing Other Toxic Effects 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.	

**SECTION 16. OTHER INFORMATION**

	<b>HMIS III</b>	<b>NFPA</b>
Health hazard	: 2*	2
Flammability	: 3	3
Physical Hazard	: 0	
Instability	:	0



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\* - Chronic health hazard

Hazard rating and rating systems (e.g. HMIS® III, NFPA): This information is intended solely for the use of individuals trained in the particular system.

**Further information**

The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its 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. Final determination of suitability of any material is the sole responsibility of the user. This information should not constitute a guarantee for any specific product properties.

Changes since the last version are highlighted in the margin. This version replaces all previous versions.

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Prepared by Honeywell Performance Materials and Technologies Product Stewardship Group