

Oxidation-A**SR666-4**

Version 2.0

Revision Date 08/20/2018

Print Date 07/31/2019

SECTION 1. IDENTIFICATION

Product name : Oxidation-A

Number : 000000011426

Product Use Description : Laboratory chemicals, Oxidation Reagent for DNA/RNA Synthesis

Manufacturer or supplier's details : Honeywell International Inc.
1953 South Harvey Street
Muskegon, MI 49442

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 : red

Odor : ether-like

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Classification of the substance or mixture

Classification of the substance or mixture : Flammable liquids, Category 2
Acute toxicity, Category 4, Oral
Eye irritation, Category 2A
Carcinogenicity, Category 2
Specific target organ toxicity - single exposure, Category 3,
Respiratory system

GHS Label elements, including precautionary statements

Symbol(s)

:



Signal word

: Danger

Hazard statements

: Highly flammable liquid and vapour.
Harmful if swallowed.
Causes serious eye irritation.
May cause respiratory 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.

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Use only outdoors or in a well-ventilated area.
Wear protective gloves/ eye protection/ face protection.

Response:

IF SWALLOWED: Call a POISON CENTER/doctor 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.

If eye irritation persists: Get medical advice/ attention.

In case of fire: Use dry sand, dry chemical or alcohol-resistant foam for extinction.

Storage:

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

Store locked up.

Disposal:

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

Carcinogenicity

ACGIH: Tetrahydrofuran 109-99-9

A3: Confirmed animal carcinogen

Pyridine 110-86-1

A3: Confirmed animal carcinogen

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SECTION 3. COMPOSITION/INFORMATION ON INGREDIENTS

Chemical nature : Mixture

| Chemical name | CAS-No. | Concentration |
|-----------------|-----------|---------------|
| Tetrahydrofuran | 109-99-9 | 67.20 % |
| Pyridine | 110-86-1 | 21.40 % |
| Water | 7732-18-5 | 10.90 % |
| Iodine | 7553-56-2 | 0.50 % |

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 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

Indication of immediate : Treat symptomatically.

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medical attention and
special treatment needed, if
necessary

SECTION 5. FIREFIGHTING MEASURES

- Suitable extinguishing media : Carbon dioxide (CO₂)
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 : Extremely 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/flashback to vapor source.
In case of fire hazardous decomposition products may be produced such as:
Hydrogen cyanide (hydrocyanic acid)
Ammonia
Carbon dioxide (CO₂), carbon monoxide (CO), oxides of nitrogen (NO_x), dense black smoke.
- Special protective equipment for firefighters : Wear self-contained breathing apparatus and protective suit.

SECTION 6. ACCIDENTAL RELEASE MEASURES

- Personal precautions, protective equipment and emergency procedures : 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.

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- 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 and materials for containment and 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**

- Precautions for safe 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.
No smoking.

Storage

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Conditions for safe storage, including any incompatibilities : 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

Respiratory protection : In case of insufficient ventilation wear suitable respiratory equipment.

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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 |
|-----------------|----------|---|-----------------------------------|--------|---|
| Tetrahydrofuran | 109-99-9 | SKIN_DES : Skin designation: | Can be absorbed through the skin. | 2008 | ACGIH:US. ACGIH Threshold Limit Values |
| Tetrahydrofuran | 109-99-9 | TWA : Time weighted average | (50 ppm) | 2008 | ACGIH:US. ACGIH Threshold Limit Values |
| Tetrahydrofuran | 109-99-9 | STEL : Short term exposure limit | (100 ppm) | 2008 | ACGIH:US. ACGIH Threshold Limit Values |
| Tetrahydrofuran | 109-99-9 | REL : Recommended exposure limit (REL): | 590 mg/m3 (200 ppm) | 2005 | NIOSH/GUIDE:US. NIOSH: Pocket Guide to Chemical Hazards |

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| | | | | | |
|-----------------|----------|---|------------------------|------------|--|
| Tetrahydrofuran | 109-99-9 | STEL : Short term exposure limit | 735 mg/m3 (250 ppm) | 2005 | NIOSH/GUIDE:US. NIOSH: Pocket Guide to Chemical Hazards |
| Tetrahydrofuran | 109-99-9 | PEL : Permissi ble exposure limit | 590 mg/m3 (200 ppm) | 02 2006 | OSHA_TRANS:US. OSHA Table Z-1 Limits for Air Contaminants (29 CFR 1910.1000) |
| Tetrahydrofuran | 109-99-9 | STEL : Short term exposure limit | 735 mg/m3 (250 ppm) | 1989 | Z1A:US. OSHA Table Z-1-A (29 CFR 1910.1000) |
| Tetrahydrofuran | 109-99-9 | TWA : Time weighted average | 590 mg/m3 (200 ppm) | 1989 | Z1A:US. OSHA Table Z-1-A (29 CFR 1910.1000) |
| 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 |

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| | | | | | |
|----------|----------|---|---------------------|------------|--|
| Pyridine | 110-86-1 | PEL : Permissible 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) |

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

| | |
|-----------------------------|---------------------------------------|
| Physical state | : liquid, clear |
| Color | : red |
| Odor | : ether-like |
| pH | : Note: Not applicable |
| Melting point/range | : -108.5 °C |
| Boiling point/boiling range | : 66 °C |
| Flash point | : 5 °F (-15 °C) Method: closed cup |
| Lower explosion limit | : 2 %(V) |
| Upper explosion limit | : 11.8 %(V) |

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| | |
|----------------------|--|
| Vapor pressure | : 189.32 hPa |
| Vapor density | : 2.5 Note: (Air = 1.0) |
| Density | : 0.935 g/cm ³ at 20 °C 0.929 g/cm ³ at 25 °C |
| Water solubility | : Note: completely soluble |
| Ignition temperature | : 321 °C |

SECTION 10. STABILITY AND REACTIVITY

| | |
|------------------------------------|--|
| Chemical stability | : Stable under recommended storage conditions. |
| Possibility of hazardous reactions | : Reacts with air to form peroxides. Hazardous polymerisation does not occur. |
| Conditions to avoid | : Heat, flames and sparks. Keep away from direct sunlight. Protect from exposure to air/oxygen (peroxide formation). Protect against light. |
| Incompatible materials | : Strong acids and strong bases Strong oxidizing agents May form explosive peroxides. May attack many plastics, rubbers and coatings. |
| Hazardous decomposition products | : Peroxides In case of fire hazardous decomposition products may be |

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produced such as:
Hydrogen iodide (HI)
Ammonia
Hydrogen cyanide (hydrocyanic acid)
Carbon dioxide (CO₂), carbon monoxide (CO), oxides of
nitrogen (NO_x), dense black smoke.

SECTION 11. TOXICOLOGICAL INFORMATION

| | |
|--|---|
| Acute oral toxicity | : Acute toxicity estimate: 1,197 mg/kg Method: Calculation method |
| Acute inhalation toxicity Tetrahydrofuran | : LC50: ca. 61.9 mg/l 21000 ppm Exposure time: 3 h Species: Rat |
| Pyridine | : LC50: 5400 ppm, vapour Exposure time: 4 h Species: Rat, male |
| Iodine | : LC50: > 4.588 mg/l , dust/mist Exposure time: 4 h Species: Rat |
| Acute dermal toxicity | : Acute toxicity estimate: > 5,000 mg/kg Method: Calculation method |
| Skin irritation Tetrahydrofuran | : Species: Rabbit Result: Irritating to skin. |
| Iodine | : Species: reconstructed human epidermis (RhE) Result: Irritating to skin. |

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Eye irritation
Tetrahydrofuran: Species: Rabbit
Result: Irritating to eyes.

Pyridine

: Species: Rabbit
Result: Irritating to eyes.

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: negativeFurther information
Tetrahydrofuran: Note:
Confirmed animal carcinogen with unknown relevance to humans.

Pyridine

: Note:
Confirmed animal carcinogen with unknown relevance to humans.**SECTION 12. ECOLOGICAL INFORMATION**Toxicity to fish
Tetrahydrofuran: LC50: 2,160 mg/l
Exposure time: 96 h
Species: Pimephales promelas (fathead minnow)

LC50: 2,820 mg/l

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Species: *Leuciscus idus* (Golden orfe)

Pyridine : flow-through test
LC50: 99 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

Pyridine : EC50: 320 mg/l
Exposure time: 48 h
Species: *Daphnia magna* (Water flea)
Method: OECD Test Guideline 202

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

Toxicity to bacteria

Tetrahydrofuran : LC50: > 580 mg/l
Exposure time: 16 h
Species: Bacteria

Further information on ecology

Additional ecological information

Pyridine : Harmful to aquatic organisms.

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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.

SECTION 14. TRANSPORT INFORMATION

| | | |
|-------------|--|--|
| DOT | UN/ID No. | : UN 1993 |
| | Proper shipping name | : Flammable liquids, n.o.s. (Tetrahydrofuran, Pyridine) |
| | Class | : 3 |
| | Packing group | : II |
| | Hazard Labels | : 3 |
| IATA | UN/ID No. | : UN 1993 |
| | Description of the goods | : Flammable liquids, n.o.s. (Tetrahydrofuran, Pyridine) |
| | Class | : 3 |
| | Packaging group | : II |
| | Hazard Labels | : 3 |
| | Packing instruction (cargo aircraft) | : 364 |
| | Packing instruction (passenger aircraft) | : 353 |
| | Packing instruction (passenger aircraft) | : Y341 |
| IMDG | UN/ID No. | : UN 1993 |
| | Description of the goods | : Flammable liquids, n.o.s. (TETRAHYDROFURAN, PYRIDINE) |
| | Class | : 3 |
| | Packaging group | : II |
| | Hazard Labels | : 3 |
| | EmS Number | : F-E, S-E |

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Marine pollutant : no

SECTION 15. REGULATORY INFORMATION**Inventories**US. Toxic Substances : On TSCA Inventory
Control ActAustralia. Industrial : On the inventory, or in compliance with the inventory
Chemical (Notification and
Assessment) ActCanada. Canadian : All components of this product are on the Canadian DSL
Environmental Protection
Act (CEPA). Domestic
Substances List (DSL)

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

Korea. Existing Chemicals : On the inventory, or in compliance with the inventory
Inventory (KECI)Philippines. The Toxic : On the inventory, or in compliance with the inventory
Substances and Hazardous
and Nuclear Waste Control
ActChina. Inventory of Existing : On the inventory, or in compliance with the inventory
Chemical SubstancesNew Zealand. Inventory of : On the inventory, or in compliance with the inventory
Chemicals (NZIoC), as
published by ERMA New
Zealand**National regulatory information**US. Drug Enforcement : On the United States Drug Enforcement Authority (DEA) List of
Administration (DEA) Listed Precursors and Essential Chemicals

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Precursor and Essential
Chemicals (21 CFR 1310)

:

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

: Tetrahydrofuran 109-99-9
: Pyridine 110-86-1**SARA 302 Components**: 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:
: Pyridine 110-86-1**SARA 311/312 Hazards**: Fire Hazard
Acute Health Hazard
Reactivity Hazard
Chronic Health HazardCERCLA Reportable
Quantity

: 1488 lbs

California Prop. 65

:

**WARNING:** This product can expose you to chemicals,
listed below, known to the State of California to cause cancer.
For more information go to www.P65Warnings.ca.gov.

Pyridine 110-86-1

Massachusetts RTK: Tetrahydrofuran 109-99-9
: Pyridine 110-86-1
: Iodine 7553-56-2**New Jersey RTK**

: Tetrahydrofuran 109-99-9

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| | | |
|-------------------------|-------------------|-----------|
| | : Pyridine | 110-86-1 |
| | : Iodine | 7553-56-2 |
| Pennsylvania RTK | : Tetrahydrofuran | 109-99-9 |
| | : Pyridine | 110-86-1 |
| | : Iodine | 7553-56-2 |

SECTION 16. OTHER INFORMATION

| | HMIS III | NFPA |
|-----------------|-----------------|-------------|
| Health hazard | : 2* | 2 |
| Flammability | : 3 | 3 |
| Physical Hazard | : 1 | |
| Instability | : | 1 |

* - 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