SECTION 1. PRODUCT AND COMPANY IDENTIFICATION

Product name: Tetrahydrofuran (BDH1149-19L, BDH1149-204L, BDH1149-4LG)

MSDS Number: 000000011708

Product Use Description: Solvent

Manufacturer: Honeywell
1953 South Harvey Street
Muskegon, MI 49442

Manufactured for: VWR International LLC
Radnor Corporate Center
Building One
Suite 200
100 Matsonford Road
Radnor PA 19087

For more information call: (Monday-Friday,8.00am-5:00pm)
1-800-932-5000

In case of emergency call: (24 hours/day, 7 days/week)
1-800-424-9300(USA Only)
For Transportation Emergencies:
1-800-424-9300 (CHEMTREC - Domestic)
1-613-966-6666 (CANUTEC - Canada)

SECTION 2. HAZARDS IDENTIFICATION

Emergency Overview

Form: liquid, clear
Color: colourless
Odor: ether-like

Hazard Summary: Extremely flammable. In use, may form flammable/explosive vapour-air mixture. May form explosive peroxides. Harmful by inhalation. May be harmful if swallowed. Irritating to eyes, respiratory system and skin. May cause irritation of the gastrointestinal tract. Repeated exposure may cause skin dryness or cracking. Confirmed animal carcinogen with
Potential Health Effects

Skin: Irritating to skin.
- Prolonged or repeated skin contact with liquid may cause defatting resulting in drying, redness and possible blistering.

Eyes: Irritating to eyes.
- Causes itching, burning, redness and tearing.

Ingestion: May cause irritation of the gastrointestinal tract.
- May cause nausea, vomiting, diarrhea, and abdominal discomfort.
- May cause systemic poisoning with symptoms paralleling those of inhalation.

Inhalation: Causes respiratory tract irritation.
- Causes headache, drowsiness or other effects to the central nervous system.
- Vapours may cause drowsiness and dizziness.
- Inhalation of high vapour concentrations can cause CNS-depression and narcosis.
- Causes damage to the following organs: liver, kidneys.

Chronic Exposure: Repeated or prolonged exposure to the substance can produce liver damage.
- Repeated or prolonged exposure to the substance can produce kidney damage.
- Repeated and prolonged exposure to solvents may cause brain and nervous system damage.
- Prolonged or repeated skin contact with liquid may cause defatting resulting in drying, redness and possible blistering.
- Confirmed animal carcinogen with unknown relevance to humans.

Aggravated Medical Condition: Liver disorders
- Kidney disorders
- Respiratory disorders
- Skin disorders

Target Organs: Eyes
- Skin
- Respiratory system
- Central nervous system
Carcinogenicity

ACGIH: Tetrahydrofuran 109-99-9
   A3: Confirmed animal carcinogen

SECTION 3. COMPOSITION/INFORMATION ON INGREDIENTS

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<tr>
<th>Chemical Name</th>
<th>CAS-No.</th>
<th>Concentration</th>
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<tr>
<td>Tetrahydrofuran</td>
<td>109-99-9</td>
<td>100.00%</td>
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</table>

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

Treatment: Treat symptomatically.

SECTION 5. FIREFIGHTING MEASURES

Suitable extinguishing media: Alcohol-resistant foam
   Carbon dioxide (CO2)
   Dry chemical
   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/flashing back to vapor source. May form explosive peroxides. In case of fire hazardous decomposition products may be produced such as: Carbon monoxide Carbon dioxide (CO2)

Special protective equipment for firefighters: Wear self-contained breathing apparatus and protective suit.

SECTION 6. ACCIDENTAL RELEASE MEASURES

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. Do not breathe vapours or spray mist. 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 spillage, soak up with non-combustible absorbent material, (e.g. sand, earth, diatomaceous earth, vermiculite) and transfer to a container for disposal according to local / national 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. Do not breathe vapours or spray mist. Avoid contact with skin, eyes and clothing.

Advice on protection against fire and explosion : May form explosive peroxides. Keep away from fire, sparks and heated surfaces. Take precautionary measures against static discharges. Ensure all equipment is electrically grounded before beginning transfer operations. Use explosion-proof equipment. Keep product and empty container away from heat and sources of ignition. No sparking tools should be used. 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. Protect from exposure to air/oxygen (peroxide formation). Protect against light. 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 vapor 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. 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. Do not breathe vapours or spray mist. Avoid contact with skin, eyes and clothing.

This material has an established AIHA ERPG exposure limit.


**Exposure Guidelines**

<table>
<thead>
<tr>
<th>Components</th>
<th>CAS-No.</th>
<th>Value</th>
<th>Control parameters</th>
<th>Update</th>
<th>Basis</th>
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Page 6 / 16
### Tetrahydrofuran (BDH1149-19L, BDH1149-204L, BDH1149-4LG)

<table>
<thead>
<tr>
<th>Component</th>
<th>CAS Number</th>
<th>STEL: Short term exposure limit</th>
<th>OEL Date</th>
<th>OEL Description</th>
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<tr>
<td>Tetrahydrofuran</td>
<td>109-99-9</td>
<td>295 mg/m³ (100 ppm)</td>
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<tr>
<th>Component</th>
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<th>OEL Date</th>
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<td>Ontario OELs. (Control of Exposure to Biological or Chemical Agents)</td>
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### Tetrahydrofuran (BDH1149-19L, BDH1149-204L, BDH1149-4LG)

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<th>TWA : time weighted average</th>
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<th>CAD SK OEL: Canada. Saskatchewan OELs (Occupational Health and Safety Regulations, 1996, Table 21)</th>
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</thead>
</table>
SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

Physical state : liquid, clear
Colour : colourless
Odour : ether-like
pH : Note: not applicable
Melting point/freezing point : -108.5 °C
Boiling point/boiling range : 66 °C
Flash point : 7 °F (-14 °C)
Method: closed cup
Evaporation rate : 14.5
Method: Compared to Butyl acetate.

Lower explosion limit : 2 %(V)
Upper explosion limit : 11.8 %(V)
Vapour pressure : 189 hPa
Vapour density : 2.5
Note: (Air = 1.0)

Density : 0.8892 g/cm³ at 20 °C

Water solubility : Note: completely soluble

Ignition temperature : 321 °C

Molecular Weight : 72.11 g/mol

SECTION 10. STABILITY AND REACTIVITY

Conditions to avoid : Heat, flames and sparks.
Keep away from direct sunlight.
Protect from exposure to air/oxygen (peroxide formation).
Protect against light.

Materials to avoid : Strong oxidizing agents
                      Strong acids and strong bases
                      May form explosive peroxides.
                      May attack many plastics, rubbers and coatings.

Hazardous decomposition products : Peroxides
In case of fire hazardous decomposition products may be produced such as:
Carbon monoxide
Carbon dioxide (CO₂)

Hazardous reactions : Hazardous polymerisation may occur.
Stable under recommended storage conditions.
SECTION 11. TOXICOLOGICAL INFORMATION

Acute oral toxicity : LD50: 1,650 mg/kg
Species: rat

Acute inhalation toxicity : LC50: 53.1 mg/l
Exposure time: 4 h
Species: rat

: LC50: 21000 ppm
Exposure time: 3 h
Species: rat

Skin irritation
Tetrahydrofuran : Species: rabbit
Result: Irritating to skin.

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

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

SECTION 12. ECOLOGICAL INFORMATION

Ecotoxicity effects

Toxicity to fish : LC50: 2,160 mg/l
Exposure time: 96 h
Species: Pimephales promelas (fathead minnow)

: LC50: 2,820 mg/l
Species: Leuciscus idus (Golden orfe)

Toxicity to bacteria : LC50: > 580 mg/l
Further information on ecology

Additional ecological information: Bioaccumulation is unlikely.

SECTION 13. DISPOSAL CONSIDERATIONS

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

Contaminated packaging: Empty remaining contents. Empty containers should be taken to an approved waste handling site for recycling or disposal.

SECTION 14. TRANSPORT INFORMATION

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<th>TDG</th>
<th>UN/ID No.</th>
<th>UN 2056</th>
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<td>Marine pollutant</td>
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</table>
SECTION 15. REGULATORY INFORMATION

Inventories

US. Toxic Substances Control Act : On TSCA Inventory

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

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

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

Korea. Existing Chemicals Inventory (KECI) : 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

WHMIS Classification : B2: Flammable liquid
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.
Material Safety Data Sheet

Tetrahydrofuran (BDH1149-19L, BDH1149-204L, BDH1149-4LG)

WHMIS Components: Tetrahydrofuran 109-99-9

NPRI Components: Tetrahydrofuran 109-99-9

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.
Previous Issue Date: 03/25/2009
Prepared by: Honeywell Performance Materials and Technologies  Product Stewardship Group