SAFETY DATA SHEET

1. Identification

Product identifier: CHLOROFORM

Other means of identification
Product No.: 4444, 4443, 4441, 4432, V551, 9188, 9184, 9183, 9182, 9180, 9175, 9174, H407, 4440, 9257, 11207

Recommended use and restriction on use
Recommended use: Not available.
Restrictions on use: Not known.

Manufacturer/Importer/Supplier/Distributor information

Manufacturer
Company Name: Avantor Performance Materials, Inc.
Address: 3477 Corporate Parkway, Suite 200
Center Valley, PA 18034
Telephone: Customer Service: 855-282-6867
Fax: Contact Person: Environmental Health & Safety
e-mail: info@avantormaterials.com

Emergency telephone number:
24 Hour Emergency: 908-859-2151
Chemtrec: 800-424-9300

2. Hazard(s) identification

Hazard classification

Health hazards
Acute toxicity (Oral) Category 4
Skin corrosion/irritation Category 2
Serious eye damage/eye irritation Category 2A
Carcinogenicity Category 2
Toxic to reproduction Category 2
Specific target organ toxicity - single exposure (Inhalation) Category 1
Specific target organ toxicity - repeated exposure (Inhalation) Category 1

Environmental hazards
Acute hazards to the aquatic environment Category 3
Chronic hazards to the aquatic environment Category 3

Label elements
Hazard symbol:
Signal word: Danger

Hazard statement: Harmful if swallowed. Causes serious eye irritation. Causes skin irritation. Causes damage to organs. Causes damage to organs through prolonged or repeated exposure. Suspected of causing cancer. Suspected of damaging fertility or the unborn child. Harmful to aquatic life with long lasting effects.

Precautionary statement

Prevention: Obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Do not breathe dust/fume/gas/mist/vapors/spray. Do not eat, drink or smoke when using this product. Wear protective gloves/protective clothing/eye protection/face protection. Wash hands thoroughly after handling. Avoid release to the environment.

Response: IF SWALLOWED: Call a POISON CENTER or doctor/physician if you feel unwell. Rinse mouth. 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/attention. IF ON SKIN: Wash with plenty of water. If skin irritation occurs: Get medical advice/attention. Take off contaminated clothing and wash before reuse. Specific treatment (see this label).

Storage: Store locked up.

Disposal: Dispose of contents/container to an appropriate treatment and disposal facility in accordance with applicable laws and regulations, and product characteristics at time of disposal.

Other hazards which do not result in GHS classification: None.

3. Composition/information on ingredients

<table>
<thead>
<tr>
<th>Chemical identity</th>
<th>Common name and synonyms</th>
<th>CAS number</th>
<th>Content in percent (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHLOROFORM</td>
<td></td>
<td>67-66-3</td>
<td>98 - 100%</td>
</tr>
</tbody>
</table>

* All concentrations are percent by weight unless ingredient is a gas. Gas concentrations are in percent by volume.

4. First-aid measures

General information: Get medical advice/attention if you feel unwell. Show this safety data sheet to the doctor in attendance.
Ingestion: Rinse mouth. Call a POISON CENTER or doctor/physician if you feel unwell.

Inhalation: Move to fresh air. Get medical attention if symptoms occur.

Skin contact: Wash skin thoroughly with soap and water. Get medical attention if symptoms occur. Wash contaminated clothing before reuse.

Eye contact: Immediately flush with plenty of water for at least 15 minutes. If easy to do, remove contact lenses. Call a physician or poison control center immediately.

Most important symptoms/effects, acute and delayed

Symptoms: Harmful if swallowed. Irritating to eyes, respiratory system and skin. Narcotic effect. May cause reproductive effects.

Indication of immediate medical attention and special treatment needed

Treatment: Treat symptomatically. Symptoms may be delayed.

5. Fire-fighting measures

General fire hazards: In case of fire and/or explosion do not breathe fumes.

Suitable (and unsuitable) extinguishing media

Suitable extinguishing media: Water spray, foam, dry powder or carbon dioxide.

Unsuitable extinguishing media: None known.

Specific hazards arising from the chemical: Fire may produce irritating, corrosive and/or toxic gases.

Special protective equipment and precautions for firefighters

Special fire fighting procedures: Move containers from fire area if you can do so without risk. Use water spray to keep fire-exposed containers cool. Cool containers exposed to flames with water until well after the fire is out.

Special protective equipment for fire-fighters: Firefighters must use standard protective equipment including flame retardant coat, helmet with face shield, gloves, rubber boots, and in enclosed spaces, SCBA. Self-contained breathing apparatus and full protective clothing must be worn in case of fire.

6. Accidental release measures

Personal precautions, protective equipment and emergency procedures: Keep unauthorized personnel away. Ventilate closed spaces before entering them. Use personal protective equipment. See Section 8 of the MSDS for Personal Protective Equipment. Do not touch damaged containers or spilled material unless wearing appropriate protective clothing.

Methods and material for containment and cleaning up: Absorb spill with vermiculite or other inert material, then place in a container for chemical waste. Clean surface thoroughly to remove residual contamination. Dike far ahead of larger spill for later recovery and disposal.
Notification Procedures: Dike for later disposal. Prevent entry into waterways, sewer, basements or confined areas. Stop the flow of material, if this is without risk. Inform authorities if large amounts are involved.

Environmental precautions: Do not contaminate water sources or sewer. Prevent further leakage or spillage if safe to do so. Avoid discharge into drains, water courses or onto the ground.

7. Handling and storage

Precautions for safe handling: Use personal protective equipment as required. Avoid breathing mists or vapors. Avoid contact with eyes, skin, and clothing. Do not taste or swallow. Wash hands thoroughly after handling. Do not handle until all safety precautions have been read and understood. Obtain special instructions before use.

Conditions for safe storage, including any incompatibilities: Keep containers tightly closed. Keep in a cool, well-ventilated place. Store in a dry place.

8. Exposure controls/personal protection

Control parameters

<table>
<thead>
<tr>
<th>Chemical identity</th>
<th>Type</th>
<th>Exposure Limit values</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHLOROFORM</td>
<td>TWA</td>
<td>10 ppm</td>
<td>US. ACGIH Threshold Limit Values (2011)</td>
</tr>
<tr>
<td></td>
<td>STEL</td>
<td>2 ppm 9.78 mg/m3</td>
<td>US. NIOSH: Pocket Guide to Chemical Hazards (2010)</td>
</tr>
<tr>
<td></td>
<td>Ceiling</td>
<td>50 ppm 240 mg/m3</td>
<td>US. OSHA Table Z-1 Limits for Air Contaminants (29 CFR 1910.1000) (02 2006)</td>
</tr>
<tr>
<td></td>
<td>TWA</td>
<td>2 ppm 9.78 mg/m3</td>
<td>US. OSHA Table Z-1-A (29 CFR 1910.1000) (1989)</td>
</tr>
</tbody>
</table>

Appropriate engineering controls

No data available.

Individual protection measures, such as personal protective equipment

General information: Good general ventilation (typically 10 air changes per hour) should be used. Ventilation rates should be matched to conditions. If applicable, use process enclosures, local exhaust ventilation, or other engineering controls to maintain airborne levels below recommended exposure limits. If exposure limits have not been established, maintain airborne levels to an acceptable level. An eye wash and safety shower must be available in the immediate work area.

Eye/face protection: Wear safety glasses with side shields (or goggles) and a face shield.

Skin protection

Hand protection: Chemical resistant gloves

Other: Wear suitable protective clothing.

Respiratory protection: In case of inadequate ventilation, use air-supplied full-mask.

Hygiene measures: Provide eyewash station and safety shower. Always observe good personal hygiene measures, such as washing after handling the material and before eating, drinking, and/or smoking. Routinely wash work clothing to remove contaminants. Discard contaminated footwear that cannot be cleaned.
9. Physical and chemical properties

Appearance
- Physical state: Liquid
- Form: Liquid
- Color: Colorless
- Odor: Ether-like odor
- Odor threshold: No data available.
- pH: No data available.
- Melting point/freezing point: -63.41 °C
- Initial boiling point and boiling range: 61 °C
- Flash Point: No data available.
- Evaporation rate: 11.6 (butyl acetate=1)
- Flammability (solid, gas): No data available.

Upper/lower limit on flammability or explosive limits
- Flammability limit - upper (%): No data available.
- Flammability limit - lower (%): No data available.
- Explosive limit - upper (%): No data available.
- Explosive limit - lower (%): No data available.

Vapor pressure: 26.3 kPa (25 °C)
Vapor density: 4.12 AIR=1
Relative density: 1.48 (20 °C)
Solubility(ies)
- Solubility in water: 5 g/l (25 °C)
- Solubility (other): No data available.
Partition coefficient (n-octanol/water): 1.97
Auto-ignition temperature: No data available.
Decomposition temperature: No data available.
Viscosity: No data available.

Other information
- Molecular weight: 119.38 g/mol (CHCl3)

10. Stability and reactivity

Reactivity: No dangerous reaction known under conditions of normal use.
Chemical stability: Material is stable under normal conditions.
Possibility of hazardous reactions: Hazardous polymerization does not occur.
Conditions to avoid: Heat, sparks, flames. Contact with incompatible materials.

11. Toxicological information

Information on likely routes of exposure
- Ingestion: Harmful if swallowed. Irritating. May cause nausea, stomach pain and vomiting.
Inhalation: Harmful if inhaled. May cause central nervous system effects.

Skin contact: Causes skin irritation.

Eye contact: Causes serious eye irritation.

Information on toxicological effects

Acute toxicity (list all possible routes of exposure)

Oral
Product: LD 50 (Rabbit): 9,827 mg/kg
LD 50 (Mouse): 118 mg/kg
LD 50 (Rat): 444 mg/kg

Dermal
Product: No data available.

Inhalation
Product: LC 50 (Rat, 4 h): 47.702 mg/l

Repeated dose toxicity
Product: No data available.

Skin corrosion/irritation
Product: Causes irritation.

Serious eye damage/eye irritation
Product: Causes serious eye irritation.

Respiratory or skin sensitization
Product: Not a skin sensitizer.

Carcinogenicity
Product: Suspected of causing cancer.

IARC Monographs on the Evaluation of Carcinogenic Risks to Humans:

CHLOROFORM Overall evaluation: 2B. Possibly carcinogenic to humans.

US. National Toxicology Program (NTP) Report on Carcinogens:

CHLOROFORM Reasonably Anticipated to be a Human Carcinogen.

No carcinogenic components identified

Germ cell mutagenicity

In vitro
Product: No mutagenic components identified

In vivo
Product: No mutagenic components identified

Reproductive toxicity
Product: Suspected of damaging fertility or the unborn child.

Specific target organ toxicity - single exposure
Product: Central nervous system.
Specific target organ toxicity - repeated exposure

Aspiration hazard
Product: Not classified

Other effects: None known.

12. Ecological information

Ecotoxicity:

Acute hazards to the aquatic environment:

Fish
Product: No data available.

Specified substance(s):
CHLOROFORM
LC 50 (Fathead minnow (Pimephales promelas), 96 h): 62.81 - 79.61 mg/l Mortality
LC 50 (Bluegill (Lepomis macrochirus), 96 h): 18.3 mg/l Mortality

Aquatic invertebrates
Product: No data available.

Specified substance(s):
CHLOROFORM
EC 50 (Brine shrimp (Artemia salina), 24 h): 28.6 - 33.8 mg/l Intoxication
EC 50 (Water flea (Daphnia magna), 24 h): 79 mg/l Intoxication
LC 50 (Water flea (Daphnia magna), 216 h): 200 - 512 mg/l Mortality
LC 50 (Water flea (Daphnia magna), 48 h): 19 - 47 mg/l Mortality

Chronic hazards to the aquatic environment:

Fish
Product: No data available.

Aquatic invertebrates
Product: No data available.

Toxicity to Aquatic Plants
Product: No data available.

Persistence and degradability

Biodegradation
Product: The product is not readily biodegradable.

BOD/COD ratio
Product: No data available.

Bioaccumulative potential

Bioconcentration factor (BCF)
Product: No data available on bioaccumulation.

Partition coefficient n-octanol / water (log Kow)
Product: Log Kow: 1.97

Mobility in soil: No data available.

Other adverse effects: Harmful to aquatic life with long lasting effects.

13. Disposal considerations
Disposal instructions: Discharge, treatment, or disposal may be subject to national, state, or local laws.

Contaminated packaging: Since emptied containers retain product residue, follow label warnings even after container is emptied.

14. Transport information

DOT
UN number: UN 1888
UN proper shipping name: Chloroform
Transport hazard class(es): 6.1
Label(s): 6.1
Packing group: III
Marine Pollutant: No

IMDG
UN number: UN 1888
UN proper shipping name: CHLOROFORM
Transport hazard class(es): 6.1
Label(s): 6.1
EmS No.: F-A, S-A
Packing group: III
Marine Pollutant: No

IATA
UN number: UN 1888
Proper Shipping Name: Chloroform
Transport hazard class(es): 6.1
Label(s): 6.1
Marine Pollutant: No
Packing group: III

15. Regulatory information

US federal regulations
TSCA Section 12(b) Export Notification (40 CFR 707, Subpt. D)
US. OSHA Specifically Regulated Substances (29 CFR 1910.1001-1050)
None present or none present in regulated quantities.

CERCLA Hazardous Substance List (40 CFR 302.4):
CHLOROFORM Reportable quantity: 10 lbs.

Superground amendments and reauthorization act of 1986 (SARA)

Hazard categories

- Acute (Immediate)
- Chronic (Delayed)
- Fire
- Reactive
- Pressure Generating

SARA 302 Extremely hazardous substance

<table>
<thead>
<tr>
<th>Chemical Identity</th>
<th>RQ</th>
<th>Threshold Planning Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHLOROFORM</td>
<td>10 lbs.</td>
<td>10000 lbs.</td>
</tr>
</tbody>
</table>
SARA 304 Emergency release notification
Chemical identity        RQ
CHLOROFORM              10 lbs.

SARA 311/312 Hazardous chemical
Chemical identity       Threshold Planning Quantity
CHLOROFORM              500 lbs

SARA 313 (TRI reporting)
Chemical identity   Reporting threshold for other users   Reporting threshold for manufacturing and processing
CHLOROFORM            10000 lbs                           25000 lbs.

Clean Water Act Section 311 Hazardous Substances (40 CFR 117.3)
CHLOROFORM             Reportable quantity: 10 lbs.

Clean Air Act (CAA) Section 112(r) Accidental Release Prevention (40 CFR 68.130):
CHLOROFORM             Threshold quantity: 20000 lbs

US state regulations

US. California Proposition 65
CHLOROFORM             Carcinogenic.
CHLOROFORM             Developmental toxin.

US. New Jersey Worker and Community Right-to-Know Act
CHLOROFORM             Listed

US. Massachusetts RTK - Substance List
CHLOROFORM             Listed

US. Pennsylvania RTK - Hazardous Substances
CHLOROFORM             Listed

US. Rhode Island RTK
CHLOROFORM             Listed

Inventory Status:
Australia AICS:                        On or in compliance with the inventory
Canada DSL Inventory List:             On or in compliance with the inventory
EINECS, ELINCS or NLP:                 On or in compliance with the inventory
Japan (ENCS) List:                     On or in compliance with the inventory
China Inv. Existing Chemical Substances: On or in compliance with the inventory
Korea Existing Chemicals Inv. (KECI):  On or in compliance with the inventory
Canada NDSL Inventory:                 Not in compliance with the inventory.
Philippines PICCS:                     On or in compliance with the inventory
US TSCA Inventory:                    On or in compliance with the inventory
New Zealand Inventory of Chemicals:    On or in compliance with the inventory
Japan ISHL Listing:                    On or in compliance with the inventory
Japan Pharmacopoeia Listing:           Not in compliance with the inventory.

16. Other information, including date of preparation or last revision

NFPA Hazard ID

SDS_US - SDS000000071 9/10
Hazard rating: 0 - Minimal; 1 - Slight; 2 - Moderate; 3 - Serious; 4 - Severe

Issue date: 06-12-2014
Revision date: No data available.
Version #: 1.0
Further information: No data available.

Disclaimer:

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