MATERIAL SAFETY DATA SHEET

1. Product and Company Identification

<table>
<thead>
<tr>
<th>Material name</th>
<th>HEXANES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Version #</td>
<td>04</td>
</tr>
<tr>
<td>Revision date</td>
<td>08-26-2011</td>
</tr>
<tr>
<td>CAS #</td>
<td>Mixture</td>
</tr>
<tr>
<td>Product Codes</td>
<td>J.T.Baker: 9277, 9306, 9309, 9367, N169</td>
</tr>
<tr>
<td>Synonym(s)</td>
<td>NORMAL HEXANE * HEXYL HYDRIDE</td>
</tr>
<tr>
<td>Manufacturer information</td>
<td>Avantor Performance Materials, Inc.</td>
</tr>
<tr>
<td></td>
<td>3477 Corporate Parkway</td>
</tr>
<tr>
<td></td>
<td>Suite #200</td>
</tr>
<tr>
<td></td>
<td>Center Valley, PA 18034 US</td>
</tr>
<tr>
<td></td>
<td>24 Hour Emergency 908-859-2151</td>
</tr>
<tr>
<td></td>
<td>Chemtrec 800-424-9300</td>
</tr>
<tr>
<td></td>
<td>Customer Service 855-282-6867</td>
</tr>
</tbody>
</table>

2. Hazards Identification

Emergency overview

DANGER

Extremely flammable liquid and vapor - vapor may cause flash fire. Will be easily ignited by heat, spark or flames. Harmful if inhaled. Harmful or fatal if swallowed. Causes skin and eye irritation. Causes respiratory tract irritation. High vapor concentrations may cause drowsiness and irritation of the eyes or respiratory tract. May damage fertility or the unborn child. Prolonged exposure may cause chronic effects.

Potential health effects

- **Routes of exposure**
  - Inhalation. Ingestion. Skin contact. Eye contact.
  - Eyes: Causes eye irritation. High vapor/aerosol concentrations may be irritating.
  - Skin: Causes skin irritation. Prolonged or repeated contact with skin may cause redness, itching, irritation and eczema/chapping.
  - Inhalation: Harmful if inhaled. May cause irritation to the mucous membranes and upper respiratory tract. In high concentrations, vapors and aerosol mists have a narcotic effect and may cause headache, fatigue, dizziness and nausea.
  - Ingestion: Harmful or fatal if swallowed. Ingestion may result in vomiting; aspiration (breathing) of vomitus into lungs must be avoided as even small quantities may result in aspiration pneumonitis.

- **Target organs**

- **Chronic effects**
  - Can cause nervous system damage. May cause adverse reproductive effects - such as birth defects, miscarriages, or infertility based on animal data. Frequent or prolonged contact may defat and dry the skin, leading to discomfort and dermatitis.

- **Potential environmental effects**
  - Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

3. Composition / Information on Ingredients

<table>
<thead>
<tr>
<th>Components</th>
<th>CAS #</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>N-HEXANE</td>
<td>110-54-3</td>
<td>60 - 100</td>
</tr>
<tr>
<td>2-METHYLPENTANE</td>
<td>107-83-5</td>
<td>1 - 5</td>
</tr>
<tr>
<td>3-METHYLPENTANE</td>
<td>96-14-0</td>
<td>1 - 5</td>
</tr>
<tr>
<td>METHYLCYCLOPENTANE</td>
<td>96-37-7</td>
<td>1 - 5</td>
</tr>
<tr>
<td>PENTANE</td>
<td>109-66-0</td>
<td>&lt; 3</td>
</tr>
</tbody>
</table>
4. First Aid Measures

First aid procedures

Eye contact

Immediately flush with plenty of water for at least 15 minutes. If easy to do, remove contact lenses. Get medical attention.

Skin contact

In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Get medical attention. Wash contaminated clothing before reuse. Destroy or thoroughly clean contaminated shoes.

Inhalation

Move to fresh air. If breathing is difficult, give oxygen. If breathing stops, provide artificial respiration. Get medical attention.

Ingestion

Call a physician or poison control center immediately. Do not induce vomiting. If vomiting occurs, the head should be kept low so that stomach vomit doesn't enter the lungs.

Notes to physician

Hexane - Individuals with neurological disease should avoid exposure. Treat symptomatically. Symptoms may be delayed.

General advice

Ensure that medical personnel are aware of the material(s) involved, and take precautions to protect themselves. Show this safety data sheet to the doctor in attendance.

5. Fire Fighting Measures

Flammable properties

HIGHLY FLAMMABLE! Vapors may cause a flash fire or ignite explosively. Vapors may travel considerable distance to a source of ignition and flash back. Heat may cause the containers to explode.

Extinguishing media

Suitable extinguishing media


Unsuitable extinguishing media

Do not use water jet as an extinguisher, as this will spread the fire.

Protection of firefighters

Specific hazards arising from the chemical

Can be ignited easily and burns vigorously. Vapor from the solvent may accumulate in container headspace resulting in flammability hazard.

Protective equipment for firefighters

As in any fire, wear self-contained breathing apparatus pressure-demand, MSHA/NIOSH (approved or equivalent) and full protective gear.

Fire fighting equipment/instructions

Firefighters must use standard protective equipment including flame retardant coat, helmet with face shield, gloves, rubber boots, and in enclosed spaces, SCBA. Withdraw immediately in case of rising sound from venting safety device or any discoloration of tanks due to fire. Move containers from fire area if you can do so without risk. For massive fire in cargo area, use unmanned hose holder or monitor nozzles, if possible. If not, withdraw and let fire burn out. Some of these materials, if spilled, may evaporate leaving a flammable residue. Cool containers exposed to flames with water until well after the fire is out.

Specific methods

In the event of fire and/or explosion do not breathe fumes. Use water spray to cool unopened containers.

Hazardous combustion products

Carbon monoxide and carbon dioxide.

6. Accidental Release Measures

Personal precautions

Wear appropriate protective equipment and clothing during clean-up. Keep unnecessary personnel away. Keep upwind. Keep out of low areas. Ventilate closed spaces before entering them. Do not touch damaged containers or spilled material unless wearing appropriate protective clothing. Local authorities should be advised if significant spillsages cannot be contained.

Environmental precautions

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

Methods for containment

ELIMINATE all ignition sources (no smoking, flares, sparks or flames in immediate area). Stop the flow of material, if this is without risk. Prevent entry into waterways, sewer, basements or confined areas. Dike the spilled material, where this is possible.
Methods for cleaning up

Use only non-sparking tools. All equipment used when handling the product must be grounded.

Large Spills: Use a non-combustible material like vermiculite, sand or earth to soak up the product and place into a container for later disposal. Dike far ahead of spill for later disposal.

Small Spills: Wipe up with absorbent material (e.g. cloth, fleece). Collect in a non-combustible container for prompt disposal.

Never return spills in original containers for re-use. Clean surface thoroughly to remove residual contamination. Clean up in accordance with all applicable regulations.

J. T. Baker SOLUSORB® solvent adsorbent is recommended for spills of this product.

7. Handling and Storage

Handling

DO NOT handle, store or open near an open flame, sources of heat or sources of ignition. Protect material from direct sunlight. Take precautionary measures against static discharges. Wear appropriate personal protective equipment. Avoid breathing mist or vapor. Avoid contact with eyes, skin, and clothing. Do not taste or swallow. Use only with adequate ventilation. Wash thoroughly after handling. See Section 8 of the MSDS for Personal Protective Equipment.

Storage

Keep away from food, drink and animal feedingstuffs. Keep out of the reach of children. Keep container tightly closed in a cool, well-ventilated place. Ground container and transfer equipment to eliminate static electric sparks. Comply with all national, state, and local codes pertaining to the storage, handling, dispensing, and disposal of flammable liquids.

8. Exposure Controls / Personal Protection

Occupational exposure limits

<table>
<thead>
<tr>
<th>Component</th>
<th>Type</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>2-METHYLPENTANE (107-83-5)</td>
<td>TWA</td>
<td>200.0000 ppm</td>
</tr>
<tr>
<td>3-METHYLPENTANE (96-14-0)</td>
<td>TWA</td>
<td>200.0000 ppm</td>
</tr>
<tr>
<td>N-HEXANE (110-54-3)</td>
<td>TWA</td>
<td>20.0000 ppm</td>
</tr>
<tr>
<td>PENTANE (109-66-0)</td>
<td>TWA</td>
<td>600.0000 ppm</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Component</th>
<th>Type</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>2-METHYLPENTANE (107-83-5)</td>
<td>STEL</td>
<td>1000.0000 ppm</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3520.0000 mg/m3</td>
</tr>
<tr>
<td></td>
<td>TWA</td>
<td>500.0000 ppm</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1760.0000 mg/m3</td>
</tr>
<tr>
<td>3-METHYLPENTANE (96-14-0)</td>
<td>STEL</td>
<td>3520.0000 mg/m3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1000.0000 ppm</td>
</tr>
<tr>
<td></td>
<td>TWA</td>
<td>500.0000 ppm</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1760.0000 mg/m3</td>
</tr>
<tr>
<td>N-HEXANE (110-54-3)</td>
<td>TWA</td>
<td>176.0000 mg/m3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>50.0000 ppm</td>
</tr>
<tr>
<td>PENTANE (109-66-0)</td>
<td>STEL</td>
<td>750.0000 ppm</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2210.0000 mg/m3</td>
</tr>
<tr>
<td></td>
<td>TWA</td>
<td>600.0000 ppm</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1770.0000 mg/m3</td>
</tr>
</tbody>
</table>
Canada - Quebec

Components | Type | Value
--- | --- | ---
2-METHYLPENTANE (107-83-5) | STEL | 1000.0000 ppm
 | | 350.0000 ppm mg/m³
 | TWA | 500.0000 ppm
 | | 1760.0000 ppm mg/m³
3-METHYLPENTANE (96-14-0) | STEL | 3500.0000 ppm mg/m³
 | | 1000.0000 ppm
 | TWA | 500.0000 ppm
 | | 1760.0000 ppm mg/m³
N-HEXANE (110-54-3) | TWA | 50.0000 ppm
 | | 176.0000 mg/m³
PENTANE (109-66-0) | TWA | 120.0000 ppm
 | | 350.0000 mg/m³

Engineering controls
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. Explosion proof exhaust ventilation should be used.

Personal protective equipment
Eye / face protection
Wear safety glasses with side shields (or goggles) and a face shield.
Skin protection
Wear appropriate chemical resistant clothing. Wear appropriate chemical resistant gloves.
Respiratory protection
Use a positive-pressure air-supplied respirator if there is any potential for an uncontrolled release, exposure levels are not known, or any other circumstances where air-purifying respirators may not provide adequate protection.

9. Physical & Chemical Properties

Appearance
Clear.
Color
Colorless.
Odor
Slight.
Odor threshold
Not available.
Physical state
Liquid.
Form
Liquid.
pH
Not available.
Melting point
-139 °F (-95.03 °C)
Freezing point
-139 °F (-95.03 °C)
Boiling point
156.2 °F (68.7555 °C)
Flash point
-9.4 °F (-23 °C) Pensky-Martens Closed Cup
Evaporation rate
9 BuAc
Flammability limits in air, upper, % by volume
7.7 % Hexane
Flammability limits in air, lower, % by volume
1.2 % Hexane
Vapor pressure
20.233 kPa
Vapor density
3
Specific gravity
0.6563
Relative density
Not available.
10. Chemical Stability & Reactivity Information

**Chemical stability**
Material is stable under normal conditions.

**Conditions to avoid**
Heat, flames and sparks.

**Incompatible materials**
Strong oxidizing agents.

**Hazardous decomposition products**
Upon decomposition, this product emits carbon monoxide, carbon dioxide and/or low molecular weight hydrocarbons.

**Possibility of hazardous reactions**
Hazardous polymerization does not occur.

11. Toxicological Information

**Toxicological data**

<table>
<thead>
<tr>
<th>Product</th>
<th>Test Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>HEXANES (Mixture)</td>
<td>Acute Inhalation LC50 Rat: 21264 mg/l estimated</td>
</tr>
<tr>
<td></td>
<td>Acute Oral LD50 Rat: 16757 mg/kg estimated</td>
</tr>
<tr>
<td><strong>Components</strong></td>
<td></td>
</tr>
<tr>
<td>N-HEXANE (110-54-3)</td>
<td>Acute Inhalation LC50 Rat: 48000 mg/l 4.00 Hours</td>
</tr>
<tr>
<td></td>
<td>Acute Oral LD50 Rat: 15840 mg/kg</td>
</tr>
<tr>
<td>PENTANE (109-66-0)</td>
<td>Acute Inhalation LC50 Rat: 364 mg/l 4.00 Hours</td>
</tr>
</tbody>
</table>

**Acute effects**
Harmful if inhaled. Harmful or fatal if swallowed.

**Sensitization**
Not a skin sensitizer.

**US ACGIH Threshold Limit Values: Skin designation**
N-HEXANE (CAS 110-54-3) Can be absorbed through the skin.

**Local effects**
Irritating to eyes, respiratory system and skin. High vapor concentrations may cause drowsiness and irritation of the eyes or respiratory tract.

**Chronic effects**
Organic solvents may be absorbed into the body by inhalation and ingestion and cause permanent damage to the nervous system, including the brain. Frequent or prolonged contact may defat and dry the skin, leading to discomfort and dermatitis.

**Carcinogenicity**
This product is not considered to be a carcinogen by IARC, ACGIH, NTP, or OSHA.

**Neurological effects**
High vapor/aerosol concentrations (attainable only at elevated temperatures) may cause central nervous system effects such as dizziness, drowsiness or headaches. Central and/or peripheral nervous system damage.

**Mutagenicity**
No data available to indicate product or any components present at greater than 0.1% are mutagenic or genotoxic.

**Reproductive effects**
Suspected of damaging fertility. Suspected of damaging the unborn child.

**Teratogenicity**
No data available to indicate product or any components present at greater than 0.1% may cause birth defects.

**Symptoms and target organs**
Irritation. Upper respiratory tract irritation. Drowsiness and dizziness.

**Epidemiology**
No epidemiological data is available for this product.
12. Ecological Information

Ecotoxicological data

<table>
<thead>
<tr>
<th>Product</th>
<th>Test Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>HEXANES (Mixture)</td>
<td>EC50 Daphnia: 1.4637 mg/l 24.00 hours</td>
</tr>
<tr>
<td></td>
<td>LC50 Fish: 60.88 mg/l 96.00 hours estimated</td>
</tr>
</tbody>
</table>

Components

<table>
<thead>
<tr>
<th>Component</th>
<th>Test Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>N-HEXANE (110-54-3)</td>
<td>LC50 Fathead minnow (Pimephales promelas): 2.101 mg/l</td>
</tr>
<tr>
<td></td>
<td>96.00 hours estimated</td>
</tr>
</tbody>
</table>

Ecotoxicity

Expected to be toxic to aquatic organisms. May cause long-term adverse effects in the environment.

Environmental effects

Toxic to aquatic organisms. Bioaccumulation is unlikely to be significant because of the low water solubility of this product. An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.

Aquatic toxicity

Toxic to aquatic organisms. May cause long-term adverse effects in the aquatic environment.

Persistence and degradability

The product is not expected to be biodegradable.

Partition coefficient

Not available

13. Disposal Considerations

Disposal instructions

Dispose of this material and its container to hazardous or special waste collection point. Incinerate the material under controlled conditions in an approved incinerator. All wastes must be handled in accordance with local, state and federal regulations.

Waste from residues / unused products

Dispose of in accordance with local regulations.

Contaminated packaging

Since emptied containers retain product residue, follow label warnings even after container is emptied. Residual vapors may explode on ignition; do not cut, drill, grind, or weld on or near this container. Offer rinsed packaging material to local recycling facilities.

14. Transport Information

TDG

<table>
<thead>
<tr>
<th>Proper shipping name</th>
<th>HEXANES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hazard class</td>
<td>3</td>
</tr>
<tr>
<td>UN number</td>
<td>UN1208</td>
</tr>
<tr>
<td>Packing group</td>
<td>II</td>
</tr>
</tbody>
</table>

15. Regulatory Information

Canadian regulations

This product has been classified in accordance with the hazard criteria of the CPR and the MSDS contains all the information required by the CPR.

WHMIS status

Controlled

WHMIS classification

B2 - Flammable/Combustible
D2A - Other Toxic Effects-VERY TOXIC
D2B - Other Toxic Effects-TOXIC
WHMIS labeling

Inventory status

<table>
<thead>
<tr>
<th>Country(s) or region</th>
<th>Inventory name</th>
<th>On inventory (yes/no)*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Australia</td>
<td>Australian Inventory of Chemical Substances (AICS)</td>
<td>Yes</td>
</tr>
<tr>
<td>Canada</td>
<td>Domestic Substances List (DSL)</td>
<td>Yes</td>
</tr>
<tr>
<td>Canada</td>
<td>Non-Domestic Substances List (NDSL)</td>
<td>No</td>
</tr>
<tr>
<td>China</td>
<td>Inventory of Existing Chemical Substances in China (IECSC)</td>
<td>Yes</td>
</tr>
<tr>
<td>Europe</td>
<td>European Inventory of Existing Commercial Chemical Substances (EINECS)</td>
<td>Yes</td>
</tr>
<tr>
<td>Europe</td>
<td>European List of Notified Chemical Substances (ELINCS)</td>
<td>No</td>
</tr>
<tr>
<td>Japan</td>
<td>Inventory of Existing and New Chemical Substances (ENCS)</td>
<td>No</td>
</tr>
<tr>
<td>Korea</td>
<td>Existing Chemicals List (ECL)</td>
<td>Yes</td>
</tr>
<tr>
<td>New Zealand</td>
<td>New Zealand Inventory</td>
<td>Yes</td>
</tr>
<tr>
<td>Philippines</td>
<td>Philippine Inventory of Chemicals and Chemical Substances (PICCS)</td>
<td>Yes</td>
</tr>
<tr>
<td>United States &amp; Puerto Rico</td>
<td>Toxic Substances Control Act (TSCA) Inventory</td>
<td>Yes</td>
</tr>
</tbody>
</table>

*A "Yes" indicates that all components of this product comply with the inventory requirements administered by the governing country(s)

Saf-T-Data

Health: 2 - Moderate (Life)
Flammability: 3 - Severe (Flammable)
Reactivity: 1 - Slight
Contact: 3 - Severe (Life)
Lab Protective Equip: DB - GOGGLES & SHIELD; LAB COAT & APRON; VENT HOOD; PROPER GLOVES; CLASS B EXTINGUISHER
Storage Color Code: R - Red (Flammable)

16. Other Information

NFPA ratings

Health: 2
Flammability: 3
Instability: 0
Disclaimer

THE INFORMATION PRESENTED IN THIS MATERIAL SAFETY DATA SHEET (MSDS/SDS) WAS PREPARED BY TECHNICAL PERSONNEL BASED ON DATA THAT THEY BELIEVE IN THEIR GOOD FAITH JUDGMENT IS ACCURATE. HOWEVER, THE INFORMATION PROVIDED HEREIN IS PROVIDED "AS IS," AND AVANTOR PERFORMANCE MATERIALS MAKES AND GIVES NO REPRESENTATIONS OR WARRANTIES WHATSOEVER, AND EXPRESSLY DISCLAIMS ALL WARRANTIES REGARDING SUCH INFORMATION AND THE PRODUCT TO WHICH IT RELATES, WHETHER EXPRESS, IMPLIED, OR STATUTORY, INCLUDING WITHOUT LIMITATION, WARRANTIES OF ACCURACY, COMPLETENESS, MERCHANTABILITY, NON-INFRINGEMENT, PERFORMANCE, SAFETY, SUITABILITY, STABILITY, AND FITNESS FOR A PARTICULAR PURPOSE, AND ANY WARRANTIES ARISING FROM COURSE OF DEALING, COURSE OF PERFORMANCE, OR USAGE OF TRADE. THIS MSDS/SDS IS INTENDED ONLY AS A GUIDE TO THE APPROPRIATE PRECAUTIONARY HANDLING OF THE MATERIAL BY A PROPERLY TRAINED PERSON USING THIS PRODUCT, AND IS NOT INTENDED TO BE COMPREHENSIVE AS TO THE MANNER AND CONDITIONS OF USE, HANDLING, STORAGE, OR DISPOSAL OF THE PRODUCT. INDIVIDUALS RECEIVING THIS MSDS/SDS MUST ALWAYS EXERCISE THEIR OWN INDEPENDENT JUDGMENT IN DETERMINING THE APPROPRIATENESS OF SUCH ISSUES. ACCORDINGLY, AVANTOR PERFORMANCE MATERIALS ASSUMES NO LIABILITY WHATSOEVER FOR THE USE OF OR RELIANCE UPON THIS INFORMATION. NO SUGGESTIONS FOR USE ARE INTENDED AS, AND NOTHING HEREIN SHALL BE CONSTRUED AS, A RECOMMENDATION TO INFRIEGE ANY EXISTING PATENTS OR TO VIOLATE ANY FEDERAL, STATE, LOCAL, OR FOREIGN LAWS. AVANTOR PERFORMANCE MATERIALS REMINDS YOU THAT IT IS YOUR LEGAL DUTY TO MAKE ALL INFORMATION IN THIS MSDS/SDS AVAILABLE TO YOUR EMPLOYEES.

Issue date 08-26-2011

This data sheet contains changes from the previous version in section(s):

Exposure Controls / Personal Protection: Respiratory protection