Section 1 - Product and Company Information

Product Name                       NAPHTHALENE
Product Number                     N2380
Brand                              SIGMA

Company                            Sigma-Aldrich
Street Address                     3050 Spruce Street
City, State, Zip, Country          SAINT LOUIS MO 63103 US
Technical Phone:                   314 771 5765
Emergency Phone:                   414 273 3850 Ext. 5996
Fax:                               800 325 5052

Section 2 - Composition/Information on Ingredient

Substance Name                          CAS #                 SARA 313
NAPHTHALENE                             91-20-3               Yes

Formula         C10H8
Synonyms        Albocarbon * Camphor tar * Mighty 150 * Mighty RD1 * Moth balls * Moth flakes * Naftalen (Polish) * Naphthalene (ACGIH:OSHA) * Naphthalin * Naphthaline * Naphthene * NCI-C52904 * RCRA waste number U165 * Tar camphor * White tar

RTECS Number:   QJ0525000

Section 3 - Hazards Identification

EMERGENCY OVERVIEW
Toxic (USA) Harmful (EU). Dangerous for the environment.
Harmful if swallowed. Limited evidence of a carcinogenic effect.
Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

HMIS RATING
HEALTH: 2*
FLAMMABILITY: 3
REACTIVITY: 0

NFPA RATING
HEALTH: 2
FLAMMABILITY: 3
REACTIVITY: 0

*additional chronic hazards present.

For additional information on toxicity, please refer to Section 11.

Section 4 - First Aid Measures

ORAL EXPOSURE
If swallowed, wash out mouth with water provided person is conscious. Call a physician.

INHALATION EXPOSURE
If inhaled, remove to fresh air. If not breathing give artificial respiration. If breathing is difficult, give oxygen.

DERMAL EXPOSURE
In case of skin contact, flush with copious amounts of water for at least 15 minutes. Remove contaminated clothing and shoes. Call a physician.

EYE EXPOSURE
In case of contact with eyes, flush with copious amounts of water for at least 15 minutes. Assure adequate flushing by separating the eyelids with fingers. Call a physician.

Section 5 - Fire Fighting Measures

FLASH POINT
176 °F   80 °C   Method: closed cup

EXPLOSION LIMITS
Lower: 0.9 %   Upper: 5.9 %

AUTOIGNITION TEMP
526 °C

FLAMMABILITY
N/A

EXTINGUISHING MEDIA
Suitable: Water spray. Carbon dioxide, dry chemical powder, or appropriate foam.

FIREFIGHTING
Protective Equipment: Wear self-contained breathing apparatus and protective clothing to prevent contact with skin and eyes. Specific Hazard(s): Emits toxic fumes under fire conditions.

Section 6 - Accidental Release Measures

PROCEDURE TO BE FOLLOWED IN CASE OF LEAK OR SPILL
Evacuate area.

PROCEDURE(S) OF PERSONAL PRECAUTION(S)
Wear self-contained breathing apparatus, rubber boots, and heavy rubber gloves.

METHODS FOR CLEANING UP
Sweep up, place in a bag and hold for waste disposal. Avoid raising dust. Ventilate area and wash spill site after material pickup is complete.

Section 7 - Handling and Storage

HANDLING
User Exposure: Do not breathe dust. Avoid contact with eyes, skin, and clothing. Avoid prolonged or repeated exposure.

STORAGE
Suitable: Keep tightly closed.
Section 8 - Exposure Controls / PPE

ENGINEERING CONTROLS
   Mechanical exhaust required. Safety shower and eye bath.

PERSONAL PROTECTIVE EQUIPMENT
   Respiratory: Government approved respirator.
   Hand: Compatible chemical-resistant gloves.
   Eye: Chemical safety goggles.

GENERAL HYGIENE MEASURES
   Wash thoroughly after handling.

EXPOSURE LIMITS, RTECS

<table>
<thead>
<tr>
<th>Country</th>
<th>Source</th>
<th>Type</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>USA</td>
<td>ACGIH</td>
<td>STEL</td>
<td>15 PPM</td>
</tr>
<tr>
<td>Remarks: Skin</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>USA</td>
<td>ACGIH</td>
<td>TWA</td>
<td>10 PPM</td>
</tr>
<tr>
<td>Remarks: Skin</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>USA</td>
<td>MSHA Standard-air</td>
<td>TWA</td>
<td>10 PPM (50 MG/M3)</td>
</tr>
<tr>
<td>USA</td>
<td>OSHA.</td>
<td>PEL</td>
<td>8H TWA 10 PPM (50 MG/M3)</td>
</tr>
<tr>
<td>New Zealand OEL</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Remarks: check ACGIH TLV</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>USA</td>
<td>NIOSH</td>
<td>TWA</td>
<td>10 PPM</td>
</tr>
<tr>
<td></td>
<td></td>
<td>STEL</td>
<td>15 PPM</td>
</tr>
</tbody>
</table>

EXPOSURE LIMITS

<table>
<thead>
<tr>
<th>Country</th>
<th>Source</th>
<th>Type</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Poland</td>
<td>NDS</td>
<td>TWA</td>
<td>20 MG/M3</td>
</tr>
<tr>
<td>Poland</td>
<td>NDSCh</td>
<td>75 MG/M3</td>
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</tr>
<tr>
<td>Poland</td>
<td>NDSP</td>
<td>-</td>
<td></td>
</tr>
</tbody>
</table>

Section 9 - Physical/Chemical Properties

Appearance: Physical State: Solid

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
<th>At Temperature or Pressure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Molecular Weight</td>
<td>128.17 AMU</td>
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<tr>
<td>pH</td>
<td>N/A</td>
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<tr>
<td>BP/BP Range</td>
<td>218 °C</td>
<td>760 mmHg</td>
</tr>
<tr>
<td>MP/MP Range</td>
<td>77 °C</td>
<td></td>
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<tr>
<td>Freezing Point</td>
<td>N/A</td>
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</tr>
<tr>
<td>Vapor Pressure</td>
<td>0.03 mmHg</td>
<td>25 °C</td>
</tr>
<tr>
<td>Vapor Density</td>
<td>4.4 g/l</td>
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</tr>
<tr>
<td>Saturated Vapor Conc.</td>
<td>N/A</td>
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</tr>
<tr>
<td>SG/Density</td>
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<td></td>
</tr>
<tr>
<td>Bulk Density</td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td>Odor Threshold</td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td>Volatile%</td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td>VOC Content</td>
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<td></td>
</tr>
<tr>
<td>Water Content</td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td>Solvent Content</td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td>Evaporation Rate</td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td>Viscosity</td>
<td>N/A</td>
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<tr>
<td>Surface Tension</td>
<td>31.8 mN/m</td>
<td>100 °C</td>
</tr>
<tr>
<td>Partition Coefficient</td>
<td>Log Kow: 3.3</td>
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</tr>
<tr>
<td>Decomposition Temp.</td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td>Flash Point</td>
<td>176 °F 80 °C</td>
<td>Method: closed cup</td>
</tr>
<tr>
<td>Explosion Limits</td>
<td>Lower: 0.9 %</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Upper: 5.9 %</td>
<td></td>
</tr>
</tbody>
</table>

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Flammability          N/A
Autoignition Temp     526 °C
Refractive Index      1.582               100 °C
Optical Rotation      N/A
Miscellaneous Data    N/A
Solubility            Other Solvents: ALCOHOL, ACETATE, ETHER

N/A = not available

Section 10 - Stability and Reactivity

STABILITY
   Stable: Stable.
   Materials to Avoid: Strong oxidizing agents.

HAZARDOUS DECOMPOSITION PRODUCTS
   Hazardous Decomposition Products: Carbon monoxide, Carbon dioxide.

HAZARDOUS POLYMERIZATION
   Hazardous Polymerization: Will not occur

Section 11 - Toxicological Information

ROUTE OF EXPOSURE
   Skin Contact: May cause skin irritation.
   Skin Absorption: May be harmful if absorbed through the skin.
   Eye Contact: May cause eye irritation.
   Inhalation: May be harmful if inhaled. Material may be irritating to mucous membranes and upper respiratory tract.
   Ingestion: Harmful if swallowed.

TARGET ORGAN(S) OR SYSTEM(S)

SIGNS AND SYMPTOMS OF EXPOSURE
   Absorption into the body leads to the formation of methemoglobin which in sufficient concentration causes cyanosis. Onset may be delayed 2 to 4 hours or longer. Naphthalene is retinotoxic and systemic absorption of its vapors above 15ppm, may result in cataracts, optical neuritis, injuries to the cornea, and marked eye irritation. Ingestion of large quantities have been reported to cause severe hemolytic anemia and hemoglobinuria.

TOXICITY DATA

   Oral
   Child
   100 mg/kg
   LDLO

   Oral
   Rat
   490 mg/kg
   LD50

   Inhalation
   Rat
   > 340 mg/m3
   LC50

Skin
Rat
> 2500 mg/kg
LD50

Oral
Mouse
533 mg/kg
LD50

Intraperitoneal
Mouse
150 MG/KG
LD50

Subcutaneous
Mouse
969 MG/KG
LD50

Intravenous
Mouse
100 MG/KG
LD50

Skin
Rabbit
> 20000 mg/kg
LD50

Oral
Guinea pig
1200 mg/kg
LD50

IRRITATION DATA

Skin
Rabbit
495 mg
Remarks: Open irritation test

Eyes
Rabbit
100 mg
Remarks: Mild irritation effect

CHRONIC EXPOSURE - CARCINOGEN
Result: This product is or contains a component that has been reported to be possibly carcinogenic based on its IARC, ACGIH, NTP, or EPA classification.

Species: Rat
Route of Application: Subcutaneous
Dose: 3500 MG/KG
Exposure Time: 12W
Frequency: I
Tumorigenic Effects: Uterine tumors

Species: Mouse
Route of Application: Inhalation
Dose: 30 PPM
Exposure Time: 6H/2Y
Frequency: I
Result: Tumorigenic: Neoplastic by RTECS criteria. Lungs, Thorax, or Respiration: Tumors.

IARC CARCINOGEN LIST
Rating: Group 2B

NTP CARCINOGEN LIST
Rating: Some evidence.
Species: Mouse
Route: Inhalation

ACGIH CARCINOGEN LIST
Rating: A4

IRIS/EPA CARCINOGEN LIST
Rating: Group C

CHRONIC EXPOSURE - TERATOGEN
Species: Rat
Dose: 4500 MG/KG
Route of Application: Oral
Exposure Time: (6-15D PREG)
Result: Effects on Embryo or Fetus: Fetotoxicity (except death, e.g., stunted fetus). Specific Developmental Abnormalities: Other developmental abnormalities.

Species: Rat
Dose: 5925 MG/KG
Route of Application: Intraperitoneal
Exposure Time: (1-15D PREG)
Result: Specific Developmental Abnormalities: Musculoskeletal system. Specific Developmental Abnormalities: Cardiovascular (circulatory) system.

CHRONIC EXPOSURE - MUTAGEN
Species: Human
Dose: 30 MG/L
Cell Type: lymphocyte
Mutation test: Micronucleus test

Species: Hamster
Dose: 30 MG/L
Cell Type: ovary
Mutation test: Cytogenetic analysis

Species: Hamster
Dose: 15 MG/L  
Cell Type: ovary  
Mutation test: Sister chromatid exchange

CHRONIC EXPOSURE - REPRODUCTIVE HAZARD

Species: Mouse  
Dose: 2400 MG/KG  
Route of Application: Oral  
Exposure Time: (7-14D PREG)  
Result: Effects on Newborn: Live birth index (# fetuses per litter; measured after birth). Effects on Newborn: Viability index (e.g., # alive at day 4 per # born alive).

Section 12 - Ecological Information

PHYSICAL PROPERTIES AFFECTING ECOTOXICITY

COD: 22 %  
BOD after 5 Days: 0 %

ACUTE ECOTOXICITY TESTS
Test Type: EC50 Algae  
Time: 24 h  
Value: 33 mg/l

Test Type: EC50 Daphnia  
Species: Daphnia magna  
Time: 48 h  
Value: 1 - 3.4 mg/l

Test Type: LC50 Fish  
Species: Onchorhynchus mykiss (Rainbow trout)  
Time: 96 h  
Value: 0.9 - 9.80 mg/l

Test Type: LC50 Fish  
Species: Pimephales promelas (Fathead minnow)  
Time: 96 h  
Value: 1 - 6.5 mg/l

Section 13 - Disposal Considerations

APPROPRIATE METHOD OF DISPOSAL OF SUBSTANCE OR PREPARATION
Contact a licensed professional waste disposal service to dispose of this material. Dissolve or mix the material with a combustible solvent and burn in a chemical incinerator equipped with an afterburner and scrubber. Observe all federal, state, and local environmental regulations.

Section 14 - Transport Information

DOT  
Proper Shipping Name: Naphthalene, crude [or] Naphthalene, refined  
UN#: 1334  
Class: 4.1  
Packing Group: Packing Group III
Hazard Label: Flammable solid
PIH: Not PIH

IATA
Proper Shipping Name: Naphthalene, refined
IATA UN Number: 1334
Hazard Class: 4.1
Packing Group: III

Section 15 - Regulatory Information

EU DIRECTIVES CLASSIFICATION
Symbol of Danger: Xn N
Indication of Danger: Harmful. Dangerous for the environment.
R: 22 40 50/53
Risk Statements: Harmful if swallowed. Limited evidence of a carcinogenic effect. Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.
S: 36/37 46 60 61
Safety Statements: Wear suitable protective clothing and gloves. If swallowed, seek medical advice immediately and show this container or label. This material and its container must be disposed of as hazardous waste. Avoid release to the environment. Refer to special instructions/safety data sheets.

US CLASSIFICATION AND LABEL TEXT
Indication of Danger: Toxic (USA) Harmful (EU). Dangerous for the environment.
Risk Statements: Harmful if swallowed. Limited evidence of a carcinogenic effect. Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.
Safety Statements: Keep out of the reach of children. Wear suitable protective clothing and gloves. If swallowed, seek medical advice immediately and show this container or label. This material and its container must be disposed of as hazardous waste. Avoid release to the environment. Refer to special instructions/safety data sheets.

UNITED STATES REGULATORY INFORMATION
SARA LISTED: Yes
DEMINIMIS: 1 %
NOTES: This product is subject to SARA section 313 reporting requirements.
TSCA INVENTORY ITEM: Yes

UNITED STATES - STATE REGULATORY INFORMATION
CALIFORNIA PROP - 65
California Prop - 65: This product is or contains chemical(s) known to the state of California to cause cancer.

CANADA REGULATORY INFORMATION
WHMIS Classification: 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.
DSL: Yes
NDSL: No

Section 16 - Other Information
DISCLAIMER
For R&D use only. Not for drug, household or other uses.

WARRANTY
The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Inc., shall not be held liable for any damage resulting from handling or from contact with the above product. See reverse side of invoice or packing slip for additional terms and conditions of sale. Copyright 2005 Sigma-Aldrich Co. License granted to make unlimited paper copies for internal use only.