Material Safety Data Sheet
4,4'-Methylenedianiline

MSDS# 97293

Section 1 - Chemical Product and Company Identification

MSDS Name: 4,4'-Methylenedianiline
Catalog Numbers: AC158040000, AC158040010, AC158040050, AC158042500, AC414270000, AC414271000
Synonyms: p,p'-Diaminodiphenylmethane; 4,4'-Diaminodiphenylmethane; MDA; Bis(4-aminophenyl)methane.

Company Identification:
Acros Organics BVBA
Janssen Pharmaceuticaan 3a
2440 Geel, Belgium

Company Identification: (USA)
Acros Organics
One Reagent Lane
Fair Lawn, NJ 07410

For information in the US, call: 800-ACROS-01
For information in Europe, call: +32 14 57 52 11
Emergency Number, Europe: +32 14 57 52 99
CHEMTREC Phone Number, US: 800-424-9300
CHEMTREC Phone Number, Europe: 703-527-3887

Section 2 - Composition, Information on Ingredients

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CAS#: 101-77-9
Chemical Name: 4,4'-Methylenedianiline
%: > 97
EINECS#: 202-974-4
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Hazard Symbols: T N
Risk Phrases: 45 39/23/24/25 43 48/20/21/22 51/53

Section 3 - Hazards Identification

EMERGENCY OVERVIEW

Danger! May cause allergic skin reaction. May be fatal if absorbed through the skin. May cause liver damage. May cause cancer in humans. Harmful if inhaled or swallowed. Potential cancer hazard. Marine pollutant. Causes eye, skin, and respiratory tract irritation. Target Organs: Liver, eyes, skin.

Potential Health Effects

Eye: Causes eye irritation.

Skin: Causes skin irritation. May be fatal if absorbed through the skin. May cause skin sensitization, an allergic reaction, which becomes evident upon re-exposure to this material. May cause photosensitive skin reactions in certain individuals. MDA produces an intense yellow staining of skin and nails and sometimes hair.

Ingestion: Harmful if swallowed. May cause irritation of the digestive tract. 4,4'-Methylenedianiline can cause liver disease (toxic hepatitis). Symptoms include loss of appetite, jaundice, dark urine, fever, upper abdominal pain and fatigue.
Inhalation: Harmful if inhaled. Causes respiratory tract irritation. May cause effects similar to those described for ingestion.

Repeated exposure may cause sensitization dermatitis. Chronic exposure may cause liver damage. Potential chronic: cancer hazard. 4,4’-Methylenedianiline can cause heart damage. One case of transient cardiac ischemia (deficiency of blood) following exposure to MDA dusts has been documented.

Section 4 - First Aid Measures

Eyes: In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Get medical aid.

Skin: In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Get medical aid immediately. Wash clothing before reuse.

Ingestion: If swallowed, do not induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. Get medical aid.

Inhalation: If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical aid.

Notes to Physician:

Section 5 - Fire Fighting Measures

General Information:

As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. During a fire, irritating and highly toxic gases may be generated by thermal decomposition or combustion. Use water spray to keep fire-exposed containers cool.

Combustible material; may burn but does not ignite readily.

Extinguishing Media:

Water or foam may cause frothing. Use water spray, dry chemical, carbon dioxide, or appropriate foam.

Autoignition Temperature: Not available.

Flash Point: 221 deg C (429.80 deg F)

Explosion Limits: Lower: Not available

Explosion Limits: Upper: Not available

NFPA Rating: health: 3; flammability: 1; instability: 0;

Section 6 - Accidental Release Measures

General Information:

Use proper personal protective equipment as indicated in Section 8.

Spills/Leaks:

Vacuum or sweep up material and place into a suitable disposal container. Avoid runoff into storm sewers and ditches which lead to waterways. Clean up spills immediately, observing precautions in the Protective Equipment section. Avoid generating dusty conditions. Provide ventilation.

Section 7 - Handling and Storage

Handling:

Wash thoroughly after handling. Remove contaminated clothing and wash before reuse. Use with adequate ventilation. Minimize dust generation and accumulation. Do not get in eyes, on skin, or on clothing. Keep container tightly closed. Avoid breathing dust.

Storage: Store in a tightly closed container. Store in a cool, dry, well-ventilated area away from incompatible substances.

Section 8 - Exposure Controls, Personal Protection

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>ACGIH</th>
<th>NIOSH</th>
<th>OSHA - Final PELs</th>
</tr>
</thead>
<tbody>
<tr>
<td>4,4’-Methylenedianiline</td>
<td>0.1 ppm; Skin -</td>
<td>none listed</td>
<td>5 ppb Action Level; 10 ppb</td>
</tr>
<tr>
<td></td>
<td>significant</td>
<td></td>
<td>TWA; 100 ppb</td>
</tr>
<tr>
<td></td>
<td>contribution to</td>
<td></td>
<td>STEL (Cancer suspect agent,</td>
</tr>
<tr>
<td></td>
<td>overall exposure</td>
<td></td>
<td>Liver toxin -</td>
</tr>
<tr>
<td></td>
<td>by the cutaneous</td>
<td></td>
<td>see 29 CFR (1910.1050)</td>
</tr>
</tbody>
</table>

OSHA Vacated PELs: 4,4’-Methylenedianiline: None listed
Engineering Controls:
Use process enclosure, local exhaust ventilation, or other engineering controls to control airborne levels below recommended exposure limits. Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower. See 29CFR 1910.1050 for regulations applying to all occupational exposures to 4,4’-Methylenedianiline.

Exposure Limits

Personal Protective Equipment

Eyes: Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166.
Skin: Wear appropriate protective gloves to prevent skin exposure.
Clothing: Wear appropriate protective clothing to prevent skin exposure.
Respirators: A respiratory protection program that meets OSHA's 29 CFR 1910.134 and ANSI Z88.2 requirements or European Standard EN 149 must be followed whenever workplace conditions warrant respirator use.

Section 9 - Physical and Chemical Properties

Physical State: Powder
Color: white to beige
Odor: faint odor - amine-like
pH: 9-10 (10% slurry)
Vapor Pressure: 0.1 mm Hg @ 152 deg C
Vapor Density: 6.8 (air=1)
Evaporation Rate: Not available
Viscosity: Not available
Boiling Point: 398-399 deg C @ 768mmHg
Freezing/Melting Point: 88-92 deg C
Decomposition Temperature:
Solubility in water: Slightly soluble
Specific Gravity/Density: 1.056 g/ml @ 100°C
Molecular Formula: C13H14N2
Molecular Weight: 198.27

Section 10 - Stability and Reactivity

Chemical Stability: Stable under normal temperatures and pressures.
Conditions to Avoid: Dust generation, excess heat, prolonged exposure to air.
Incompatibilities with Other Materials Strong oxidizing agents.
Hazardous Decomposition Products Nitrogen oxides, carbon monoxide, carbon dioxide, aniline.
Hazardous Polymerization Has not been reported.

Section 11 - Toxicological Information

RTECS#: CAS# 101-77-9: BY5425000
RTECS: CAS# 101-77-9: Draize test, rabbit, eye: 100 mg/24H Moderate;
LD50/LC50: Oral, mouse: LD50 = 264 mg/kg;
LD50/LC50: Oral, rat: LD50 = 517 mg/kg;
LD50/LC50: Skin, rabbit: LD50 = 200 mg/kg;

Carcinogenicity: 4,4’-Methylenedianiline - ACGIH: A3 - Confirmed Animal Carcinogen with Unknown Relevance to Humans California: carcinogen, initial date 1/1/88 NTP: Suspect carcinogen IARC: Group 2B carcinogen
Other: See actual entry in RTECS for complete information.

Section 12 - Ecological Information

Other: No information available.

Section 13 - Disposal Considerations
Dispose of in a manner consistent with federal, state, and local regulations.

Section 14 - Transport Information

US DOT
Shipping Name: 4,4'-DIAMINODIPHENYL METHANE
Hazard Class: 6.1
UN Number: UN2651
Packing Group: III
Canada TDG
Shipping Name: Not available
Hazard Class:
UN Number:
Packing Group:

USA RQ: CAS# 101-77-9: 10 lb final RQ; 4.54 kg final RQ

Section 15 - Regulatory Information

European/International Regulations

European Labeling in Accordance with EC Directives

Hazard Symbols: T N
Risk Phrases:
R 45 May cause cancer.
R 39/23/24/25 Toxic: danger of very serious irreversible effects through inhalation, in contact with skin and if swallowed.
R 43 May cause sensitization by skin contact.
R 48/20/21/22 Harmful: danger of serious damage to health by prolonged exposure through inhalation, in contact with skin and if swallowed.
R 51/53 Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

Safety Phrases:
S 53 Avoid exposure - obtain special instructions before use.
S 45 In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).
S 61 Avoid release to the environment. Refer to special instructions/safety data sheets.

WGK (Water Danger/Protection)

CAS# 101-77-9: 3

Canada

CAS# 101-77-9 is listed on Canada's DSL List
Canadian WHMIS Classifications: D1A, D2A
This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the MSDS contains all of the information required by those regulations.
CAS# 101-77-9 is listed on Canada's Ingredient Disclosure List

US Federal

TSCA

CAS# 101-77-9 is listed on the TSCA Inventory.

Section 16 - Other Information

MSDS Creation Date: 9/02/1997
Revision #10 Date 7/20/2009

The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantibility or any other warranty, express or implied,
with respect to such information, and we assume no liability resulting from its use. Users should make
their own investigations to determine the suitability of the information for their particular purposes. In no
event shall the company be liable for any claims, losses, or damages of any third party or for lost profits
or any special, indirect, incidental, consequential, or exemplary damages howsoever arising, even if the
company has been advised of the possibility of such damages.

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