Material Safety Data Sheet
4,4'-Methylenedianiline

ACC# 97293

Section 1 - Chemical Product and Company Identification

MSDS Name: 4,4'-Methylenedianiline
Catalog Numbers: AC158040000, AC158040010, AC158040050, AC158042500, AC414270000, AC414271000 AC414271000, AC414275000
Synonyms: p,p'-Diaminodiphenylmethane; 4,4'-Diaminodiphenylmethane; MDA; Bis(4-aminophenyl)methane.
Company Identification:

Acros Organics N.V.
One Reagent Lane
Fair Lawn, NJ 07410

For information in North America, call: 800-ACROS-01
For emergencies in the US, call CHEMTREC: 800-424-9300

Section 2 - Composition, Information on Ingredients

CAS#	Chemical Name	Percent	EINECS/ELINCS
101-77-9	4,4'-Methylenedianiline	> 97	202-974-4

Section 3 - Hazards Identification

EMERGENCY OVERVIEW

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

Potential Health Effects
Eye: Causes eye irritation. MDA has caused blindness in cats and guinea pigs from atrophy of the rods and cones in the retina.
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.
Chronic: Repeated exposure may cause sensitization dermatitis. Chronic exposure may cause liver damage. Potential 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 a t 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: Treat symptomatically and supportively.

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.
Flash Point: 221 deg C (429.80 deg F)
Autoignition Temperature: Not available.
Explosion Limits, Lower: Not available.
Upper: Not available.
NFPA Rating: (estimated) 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

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

Chemical Name	ACGIH	NIOSH	OSHA - Final PELs
4,4'-Methylenedianiline	0.1 ppm TWA; Skin - potential significant contribution to overall exposure by the cutaneous r oute	none listed	10 ppb TWA; 100 ppb STEL; 5 ppb Action Level (Cancer suspect agent, Liver toxin - see 29 CFR 1910.1050)

OSHA Vacated PELs: 4,4'-Methylenedianiline: No OSHA Vacated PELs are listed for this chemical.
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
Appearance: 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:270 deg C
Solubility: 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
LD50/LC50:
CAS# 101-77-9:
Draize test, rabbit, eye: 100 mg/24H Moderate;
Oral, mouse: LD50 = 264 mg/kg;
Oral, rabbit: LD50 = 620 mg/kg;
Oral, rat: LD50 = 517 mg/kg;
Skin, rabbit: LD50 = 200 mg/kg;
.

Carcinogenicity:

CAS# 101-77-9:

- **ACGIH:** A3 - Confirmed animal carcinogen with unknown relevance to humans
- **California:** carcinogen, initial date 1/1/88
- **NTP:** Suspect carcinogen
- **IARC:** Group 2B carcinogen

Epidemiology: One case of bladder cancer slightly in excess of the expected incidence was reported in a study of 10 MDA workers with a history of hepatotoxicity.
Teratogenicity: No information found
Reproductive Effects: No information found
Mutagenicity: See actual entry in RTECS for complete information.
Neurotoxicity: No information found
Other Studies:

Section 12 - Ecological Information

Ecotoxicity: No data available. No information available.
Environmental: Terrestrial: May undergo a covalent chemical bonding with humic materials which can result in its chemical alteration to a latent form and tight adsorption. When covalently bound in this latent form, leaching in soil systems is not expected. Aquatic: May be susceptible to significant photooxidation via hydroxyl and peroxy radicals; half-lives for these photooxidations may be on the order of 19-30 sunlight hours. Atmospheric: Expected to degrade rapidly in the ambient atmosphere by reaction with photochemically produced hydroxyl radicals. Half-life 1.6 hours.
Physical: Expected to biodegrade but not bioconcentrate.
Other: Marine pollutant.

Section 13 - Disposal Considerations

Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. US EPA guidelines for the classification determination are listed in 40 CFR Parts 261.3. Additionally, waste generators must consult state and local hazardous waste regulations to ensure complete and accurate classification.
RCRA P-Series: None listed.
RCRA U-Series: None listed.

Section 14 - Transport Information

	US DOT	Canada TDG
Shipping Name:	4,4'-DIAMINODIPHENYL METHANE	4,4'-DIAMINODIPHENYLMETHANE
Hazard Class:	6.1	6.1
UN Number:	UN2651	UN2651
Packing Group:	III	III

Section 15 - Regulatory Information

US FEDERAL

TSCA
CAS# 101-77-9 is listed on the TSCA inventory.
Health & Safety Reporting List
CAS# 101-77-9: Effective 10/4/82, Sunset 10/4/92
Chemical Test Rules
None of the chemicals in this product are under a Chemical Test Rule.
Section 12b
None of the chemicals are listed under TSCA Section 12b.
TSCA Significant New Use Rule
None of the chemicals in this material have a SNUR under TSCA.
CERCLA Hazardous Substances and corresponding RQs
CAS# 101-77-9: 10 lb final RQ; 4.54 kg final RQ
SARA Section 302 Extremely Hazardous Substances
None of the chemicals in this product have a TPQ.
SARA Codes
CAS # 101-77-9: immediate, delayed.
Section 313
This material contains 4,4'-Methylenedianiline (CAS# 101-77-9, > 97%),which is subject to the reporting requirements of Section 313 of SARA Title III and 40
Clean Air Act:
CAS# 101-77-9 is listed as a hazardous air pollutant (HAP).
This material does not contain any Class 1 Ozone depletors.
This material does not contain any Class 2 Ozone depletors.
Clean Water Act:
None of the chemicals in this product are listed as Hazardous Substances under the CWA.
None of the chemicals in this product are listed as Priority Pollutants under the CWA.
None of the chemicals in this product are listed as Toxic Pollutants under the CWA.
OSHA:
None of the chemicals in this product are considered highly hazardous by OSHA.

STATE

CAS# 101-77-9 can be found on the following state right to know lists: California, New Jersey, Pennsylvania, Minnesota, Massachusetts.

California Prop 65

The following statement(s) is(are) made in order to comply with the California Safe Drinking Water Act:

WARNING: This product contains 4,4'-Methylenedianiline, a chemical known to the state of California to cause cancer.
California No Significant Risk Level: CAS# 101-77-9: 0.4 æg/day NSRL

European/International Regulations

European Labeling in Accordance with EC Directives

Hazard Symbols:

T N

Risk Phrases:

R 43 May cause sensitization by skin contact.
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 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 45 In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).
S 53 Avoid exposure - obtain special instructions before use.
S 61 Avoid release to the environment. Refer to special instructions /safety data sheets.

WGK (Water Danger/Protection)

CAS# 101-77-9: 3

Canada - DSL/NDSL

CAS# 101-77-9 is listed on Canada's DSL List.

Canada - WHMIS

This product has a WHMIS classification of 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.

Canadian Ingredient Disclosure List

CAS# 101-77-9 is listed on the Canadian Ingredient Disclosure List.

Section 16 - Additional Information

MSDS Creation Date: 9/02/1997
Revision #8 Date: 8/23/2005