MMAO-3A <= 49% IN TOLUENE

1. CHEMICAL PRODUCT AND COMPANY INFORMATION

Product name MMAO-3A <= 49% in Toluene	**Chemical description** Modified methylaluminoxane in toluene
Synonym(s) MMAO Type 3A in Toluene	**Chemical formula** Mixture
CAS number MIXTURE	**Chemical family** Aluminum alkyl
Supplier Akzo Nobel Polymer Chemicals LLC 525 West Van Buren Street Chicago, IL 60607-3823 USA	
Medical/Handling Emergency + 1-914-693-6946 Dobbs Ferry, NY USA	**Transportation Emergency** CHEMTREC - USA: 1-800-424-9300 CANUTEC - CANADA: 1-613-996-6666
Product use Olefin polymerization	**Product/technical Information** 1-800-828-7929
Date of first issue 2000/09/26	**Date of last issue / Revision #** 2000/09/27 / 0.00

2. COMPOSITION/INFORMATION ON INGREDIENTS

Ingredients	Percentage(s)	CAS number
Modified methylaluminoxane	1.00 - 49.00	146905-79-5
Toluene	51.00 - 99.00	108-88-3

3. HAZARDS IDENTIFICATION

Emergency overview
Clear, colorless liquid
DANGER!
EXTREMELY FLAMMABLE LIQUID AND VAPOR.
VAPOR MAY CAUSE FLASH FIRE.
CONTACT WITH WATER OR MOIST AIR LIBERATES FLAMMABLE GAS.
CAUSES SKIN AND EYE BURNS.
MAY CAUSE HEADACHE, DIZZINESS AND NAUSEA.
CONTAINS MATERIAL WHICH MAY CAUSE LIVER AND KIDNEY DAMAGE.
Metal alkyls in solvent solutions are nonpyrophoric at concentrations at or below the nonpyrophoric limit (NPL) (see section 9) but are reactive with air and/or moisture liberating flammable gases. Ignition may occur from the reaction of air and/or moisture with the metal alkyl in the solvent solution. In case of fire, reignition of the metal alkyl may occur after the fire has been extinguished.

Health effects
Skin contact and inhalation are the primary routes of exposure to this product.
Inhalation of the metal alkyl in this product is unlikely due to the highly reactive nature of the metal alkyl with air and water. Inhalation of the solvent may cause headache, dizziness and nausea.
This material will react with moisture in or on the skin to produce thermal and chemical burns.
This product will react with moisture in the eyes to produce severe chemical and thermal burns.
Ingestion will result in burning of the mouth, throat and any part of the gastrointestinal system with which the material comes in contact. Nausea and vomiting may occur.

MMAO-3A <= 49% IN TOLUENE

Carcinogenicity	
Description	**Applicable**
IARC	no
NTP	no
OSHA	no
ACGIH	no

4. FIRST AID MEASURES

Inhalation
Remove victim to fresh air while protecting yourself from exposure with an appropriate respirator. Remove any contaminated clothing to prevent further inhalation exposure. Use gloves to avoid contaminating yourself. If not breathing, clear victim's airway and start artificial respiration. Avoid inhaling expired air. Artificial respiration may be supplemented by the use of a bag-mask respirator or manually triggered oxygen supply capable of delivering one liter per second or more. If victim is breathing, supplemental oxygen may be given from a demand-type or continuous-flow inhaler, preferably with a physician's advice. Monitor breathing and pulse. If victim stops breathing, restart artificial respiration. If heart has stopped, begin cardiopulmonary resuscitation immediately. Keep person warm and at rest. Get medical attention immediately.

Skin
Immediately, without delay, very gently blot excess chemical from skin while wearing impervious gloves and air tight safety goggles. If victim is wearing air tight safety goggles, do not remove them. Take care not to contaminate the victim's healthy skin and eyes. Wash all affected areas with plenty of water for at least 15 minutes. Do not break open blisters or remove skin. If clothing is stuck to the skin after flushing with water, do not remove it. Do not attempt to neutralize with chemical agents. Wash or discard contaminated clothing and shoes. Obtain medical advice immediately.

Eye
Immediately flush eyes with large quantities of running water for a minimum of 15 minutes. If the victim is wearing contact lenses, remove them. Take care not to contaminate the victim's healthy skin and eyes. Hold the eyelids apart during the flushing to ensure rinsing of the entire surface of the eye and lids. DO NOT let victim rub eye(s). Do not attempt to neutralize with chemical agents. Get medical attention immediately. Oils or ointments should not be used at this time. Continue flushing for an additional 15 minutes if a physician is not immediately available.

Ingestion
Do NOT induce vomiting. Call a physician or a poison control center immediately. Give victim plenty of water to drink. Never give anything by mouth to an unconscious or convulsing person. Get medical attention immediately.

Note to physician
There are no data available that address medical conditions that are generally recognized as being aggravated by exposure to this product.

Attending physician should treat exposed patients symptomatically. Chemical burns on the skin should be treated as thermal burns. Flush eyes with buffered or plain irrigating solutions. If any ulceration or conjunctival injury is present, have an ophthalmologist examine the patient.

5. FIRE-FIGHTING MEASURES

Flash point 40 F 4 C (for toluene)	**Autoignition temperature** not determined
	Explosion limits lower: N/D upper: N/D

Extinguishing media
THE MOST EFFECTIVE FIRE EXTINGUISHING AGENT IS DRY CHEMICAL POWDER PRESSURIZED WITH NITROGEN. Vermiculite or dry sand may also be used. CAUTION: REIGNITION MAY OCCUR. DO NOT USE FOAM, WATER (except as explained below), CARBON TETRACHLORIDE OR CHLOROBROMOMETHANE extinguishing agents as product either reacts violently or liberates toxic fumes and vapors on contact with these agents.

MMAO-3A <= 49% IN TOLUENE

Fire fighting procedures
Protecting against fire by strict adherence to safe operating procedures and proper equipment are the best ways to minimize the possibility of fire damage. Immediate action should be taken to confine the fire. All lines and equipment which could contribute to the fire should be shut off.
Water may be effective in fighting dilute metal alkyl solution fires. Water should be applied as a spray or fog. CAUTION: Flare-up will occur when applying water to a metal alkyl solution fire. Move container from the fire area if possible. Do not scatter spilled material with high pressure water streams. Dike fire water for later disposal. Do not allow contaminated water to enter waterways. If permitted to enter sewers, it may create a fire or explosion hazard. Standard fireman's bunker gear is recommended for fighting metal alkyl fires.
Human exposure must be prevented and nonessential personnel evacuated from the immediate area. Breathing vapors from fires involving metal alkyls should be avoided by using proper respiratory equipment. A NIOSH approved, positive-pressure/pressure demand, air-supplied, full-face respirator should be used.

Fire and explosion hazard
Metal alkyls in solvent solutions are nonpyrophoric at concentrations at or below the nonpyrophoric limit (NPL) (see section 9) but are reactive with air and/or moisture liberating flammable gases. Ignition may occur from the reaction of air and/or moisture with the metal alkyl in the solvent solution. In case of fire, reignition of the metal alkyl may occur after the fire has been extinguished.
This material may react with air, water and compounds containing active hydrogen such as alcohols and acids. Reaction with water and air liberates flammable hydrocarbon gas and alcohol. Compounds containing oxygen or organic halide may react upon contact with the product.
Do not use welding or cutting torch on or near any container of this material, even empty, because an explosion could occur. Do not store near heat or open flame.

Hazardous products of combustion
Carbon monoxide, carbon dioxide, and aluminum oxide fumes.

NFPA ratings

Hazard	**Rating**
Health	3
Flammability	3
Reactivity	3
Other	-W

6. ACCIDENTAL RELEASE MEASURES

Methods for cleaning up
Appropriate personal protective equipment (PPE) should be worn when working with spilled material. Block off source of spill. Spilled material will likely give off smoke and fumes. Ignition may occur immediately.
Spill may be washed away cautiously with large quantities of water. Use water spray to reduce vapors. CAUTION: Water may cause ignition/ reignition to occur. Dike water for later disposal. Do not allow contaminated water to enter waterways.
Highly flammable vapors from volatile hydrocarbon solvent which are heavier than air may accumulate in low areas and/or spread along the ground away from the handling site creating an explosion hazard.

7. HANDLING AND STORAGE

Handling
Electrically grounded tanks and containers should always be used as should non-sparking, electrically grounded hand tools and appliances. Ground or bond to ground all vessels when transferring to prevent the accumulation of static electricity. See National Electric Code.

Storage
Store under an inert atmosphere. Dry nitrogen is a suitable inert gas. Containers should be stored in a cool, well-ventilated area away from flammable materials and sources of heat. Exercise due caution to prevent damage to or leakage from the container.

Maximum storage temperature
not determined

MMAO-3A <= 49% IN TOLUENE

General comments
Under inert conditions the product is not corrosive to metals commonly used in construction. Some plastics and elastomers may be attacked. Contact Akzo Nobel Chemicals Inc. for specific recommendations regarding suitable materials for use with this product.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Respiratory protection
This material is normally handled under nitrogen and closed process conditions. In an emergency where adequate ventilation is not available and conditions could generate fume, mist or aerosol, inhalation must be prevented through the use of NIOSH-approved organic vapor/ acid gas respirators with dust, mist and fume filters to reduce potential for exposure. Where exposure potential necessitates a higher level of protection, use a NIOSH-approved, positive-pressure/ pressure-demand, air-supplied respirator.
When using respirator cartridges or canisters, they must be changed frequently (following each use or at the end of the workshift) to assure breakthrough exposure does not occur.

Skin protection
Skin contact must be prevented through the use of fire-retardant clothing. During sampling, disconnecting lines or opening connections, additional protective outerwear including full-face shield, impervious gloves, aluminized suit, a hard hat, steel toed safety shoes that cover the ankles and chemical safety goggles should also be worn.

Eye protection
Because eye contact with this product may cause severe and possibly permanent damage, chemical goggles and/or a full face shield must be worn whenever handling this product.

ventilation protection
This material is normally handled under closed process conditions.

Other information
This product should not be used until all personnel handling it have been thoroughly trained. Contact Akzo Nobel Chemicals Inc., Chicago, IL. Additional information on safety and handling of organometallics is available in the Akzo Nobel Chemicals Inc. brochure on metal alkyls.
During the development of safe handling procedures, consideration should be given to the need for cleaning of equipment and piping systems to render them nonhazardous before maintenance and repair activities are performed. Waste resulting from these procedures should be handled in an environmentally safe manner.
All food and smoking materials should be kept in a separate area away from the storage/use location. Eating, drinking and smoking should be prohibited in areas where there is a potential for exposure to this material. Before eating, hands and face should be thoroughly washed.
Safety showers, with quick opening valves which stay open, and eye wash fountains, or other means of washing the eyes with a gentle flow of cool to tepid tap water, should be readily available in all areas where this material is handled or stored. Water should be supplied through insulated and heat-traced lines to prevent freezeups in cold weather.

Applicable exposure limits
Other than any exposure limits which may be displayed below, there are no other exposure limits applicable for this product or its components. The exposure limits for the aluminum alkyl shown in Section 8 refers to the "Aluminum, Alkyls, not otherwise classified, as Al" value. ACGIH has given a "SKIN" notation to Toluene.

Agency	Value/Unit of measurement
Modified methylaluminoxane	
ACGIH TLV/TWA	2.000 mg/m³
NIOSH REL/TWA	2.000 mg/m³
Toluene	
OSHA TLV/TWA	750.000 mg/m³
OSHA PEL/CEILING	1125.000 mg/m³
ACGIH TLV/TWA	188.000 mg/m³
NIOSH REL/TWA	375.000 mg/m³

MMAO-3A <= 49% IN TOLUENE

NIOSH REL/STEL	560.000 mg/m³

PEL = Permissible Exposure Limit
TLV = Threshold Limit Value
TWA = Time Weighted Average
STEL = Short Term Exposure Limit
CEIL = Ceiling Exposure Limit
REL = Recommended Exposure Limit
WEEL = Workplace Environmental Exposure Limit
IDLH = Immediate Dangerous to Life and Health

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance and Odor Clear, colorless liquid	**pH value** not determined
Odor threshold (ppm) not determined	**Relative vapor density (air=1)** not determined
Volatile % not determined	**Vapor pressure (mm Hg)** not determined
Boiling point/range not determined	**Evaporation rate** not determined
Melting point/range not determined	
Cloud point not determined	**Pour point** not determined
Flash point 40 F 4 C (for toluene)	**Solubility in water** Reacts
	Solubility in other solvents Soluble in hydrocarbons
Autoignition temperature not determined	
Specific Gravity/Density not determined	**Partition coefficient n-octanol/water** not determined
Bulk density not determined	
Other information The NPL was determined to be greater than 49%.	**Explosion limits** lower: N/D upper: N/D

10. STABILITY AND REACTIVITY

Stability
This product is stable when stored under dry, inert atmosphere and away from heat. Dry nitrogen containing less than 5 ppm oxygen and less than 5 ppm of moisture is recommended. This product is not sensitive to physical impact.

Incompatibilities
This product may react violently with air, water, and compounds containing active hydrogen such as alcohols and acids. Compounds containing oxygen or organic halide may react vigorously upon contact with the product.

Polymerization
Hazardous polymerization is not expected to occur.

Decomposition
Aluminum oxide fumes, carbon dioxide and water vapor are the products of complete combustion of this product. Incomplete combustion may produce carbon monoxide.

Conditions to avoid
Avoid contact with incompatible material, excessive heat and flames.

11. TOXICOLOGICAL INFORMATION

MMAO-3A <= 49% IN TOLUENE

Oral LD50	Specific Ingestion toxicity data is not available for this product. See Section 11 TOXICOLOGICAL INFORMATION - OTHER EFFECTS for information regarding solvent effects.
Dermal LD50	Specific dermal toxicity data is not available for this product. See Section 11- TOXICOLOGICAL INFORMATION - OTHER EFFECTS for information regarding solvent effects.
Inhalation LC50	Specific inhalation toxicity data is not available for this product. See Section 11 TOXICOLOGICAL INFORMATION - OTHER EFFECTS for information regarding solvent effects.
Skin	Chronic dermal exposure effects for this product are not known. Skin contact with this product will cause severe chemical burns.
Eye	Specific eye effects of this product have not been determined. See Section 11 TOXICOLOGICAL INFORMATION - OTHER EFFECTS for information regarding solvent effects.
Chronic toxicity/carcinogenicity	Chronic ingestion effects of this product are not known. Ingestion will result in burns of the mouth, throat, esophagus and digestive tract. Chronic inhalation exposure effects for this product are not known. The carcinogenic/mutagenic properties of this product are not known. The reproductive toxicity of this product is not known. The neurotoxic effects of this product are not known. Overexposure to this product may affect the skin, eyes and respiratory system.
Other toxicological information	TOLUENE is moderately toxic by inhalation. The TCLo for man is 100 ppm. Inhalation of 200-600 ppm of toluene for up to 8 hours has caused fatigue, weakness, confusion, headache, nausea, impaired coordination and reaction time, euphoria, paresthesia of the skin, dizziness and dilated pupils. Inhalation of 800 ppm has caused rapid irritation, nasal mucous secretion, drowsiness and impaired balance. After effects, including muscular fatigue, nervousness and insomnia, lasted for several days. Extreme inhalation may cause death by paralysis of the respiratory center. Repeated or prolonged exposure may cause mucous membrane irritation, vomiting, insomnia, nosebleeds, chest pain, euphoria, headache, vertigo, anorexia, momentary loss of memory, extreme weakness, loss of coordination, impairment of reaction time, tinnitus, petechiae and abnormal bleeding. Examination of workers exposed to 100-1100 ppm revealed hepatomegaly, mild macrocytosis, moderate erythropenia absolute lymphocytosis but no leukopenia. Other workers exposed to toluene fumes developed leukopenia and especially neutropenia.

12. ECOLOGICAL INFORMATION

MMAO-3A <= 49% IN TOLUENE

Ecotoxicological information	The ecological toxicity of this product is not known.
Bioaccumulation	Chemical fate information on this product is not known.
Other information	Other ecological information on this product is not known.

13. DISPOSAL CONSIDERATIONS

Waste disposal in accordance with regulations
Incineration by controlled feed of air and product is a suitable disposal procedure. Alternately, deactivation can be achieved by diluting the product with hydrocarbon (heptane, etc.) to less than 5 weight percent metal alkyl concentration and treating the hydrocarbon solution with water under a nitrogen atmosphere in a vented and agitated container. Always add the diluted metal alkyl solution to a large excess of water. Allow for the generation of heat and flammable hydrocarbons when treating with water. Conduct water treatment in the absence of air to avoid possible ignition of flammable material. The products from hydrolysis are hydrocarbons and aluminum oxide (hydrated).
Consult RCRA hazardous waste regulations prior to deactivation for potential treatment permitting considerations.
Should the unused product become a waste material, it would meet the characteristics of an ignitable and reactive waste per 40 CFR 261, Subpart C. It is the responsibility of the waste generator to determine if his wastes are hazardous by characteristics or listing.
Note: A technical bulletin (No. 95-90) is available from Akzo Nobel Chemicals Inc. describing details of disposal of laboratory quantities of metal alkyls.

Container disposal
Containers for shipment of research quantities (Pyrosafe cylinders) may be safely discarded after thoroughly rinsing residual material from the container with hydrocarbon solvent followed by rinsing with water.
Other shipping containers are returnable to: Akzo Nobel Chemicals Inc., 730 Battleground Road, Deer Park, Texas 77536. Return shipments of containers are to be in compliance with DOT regulations.

14. TRANSPORT INFORMATION

Shipping description	ORGANOMETALLIC COMPOUND SOLUTION, WATER-REACTIVE, FLAMMABLE, N.O.S. (METHYLALUMINOXANE, TOLUENE) 4.3, UN3207, PG I NORTH AMERICAN EMERGENCY RESPONSE GUIDE NO. 138 IMO: UN3207 ICAO: Passenger aircraft- FORBIDDEN Cargo aircraft- containers <= 1 L: contact Akzo Nobel Chemicals Inc.
Required labels	PRIMARY LABEL: DANGEROUS WHEN WET SUBSIDIARY LABEL: FLAMMABLE LIQUID
Environmentally hazardous substance	This product contains toluene (RQ-1000 lbs.) which is an environmentally hazardous material per 49 CFR 172.101, Appendix A.

15. REGULATORY INFORMATION

Products and/or components listed below are subject to the following:	
Modified methylaluminoxane	
Toxic Subst. Cont. Act -listed	yes
Non-Domestic Subst.List-Canada	yes
Toluene	
Clean Air Act Sect. 112	yes
CERCLA Hazardous Substance	yes

MMAO-3A <= 49% IN TOLUENE

Massachusetts Substance List	yes
New Jersey R-T-K Hazard. Sub.	yes
Penn. Hazardous Substance list	yes
California Prop. 65	yes
SARA Title III, Section 302	yes
SARA Title III, Section 313	yes
Toxic Subst. Cont. Act -listed	yes
Domestic Substance List-Canada	yes

Hazard classes	
Description	**Applicable**
HMIS Hazard Rating Source	HMIS
HMIS Health	3
HMIS Flammability	3
HMIS Reactivity	3
WHMIS Hazard Class	B-6; D-2B; E; F

Other regulatory information
Warning: This product contains a chemical known to the State of California to cause birth defects or other reproductive harm.

16. OTHER INFORMATION

Other information
No other information is available.

Created by
Product Safety 914-674-5000