

MATERIAL SAFETY DATA SHEET

San Esters Corporation

CHEMTREC 24-HOUR EMERGENCY NUMBER (800) 424-9300

SECTION 1 CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Product Name:	Allyl methacrylate (AMA)
Manufacturer's Name:	Mitsubishi Rayon Co., Ltd.
Manufacturer's Address:	6-41, Konan 1-chome, Minato-ku Tokyo, 108-8506, Japan
Distributor's Name and Address in United States:	San Esters Corporation 55 East 59 th Street, 19 th Floor New York, NY 10022 Telephone: (800) 337-8377 Telephone: (212) 223-0020 Facsimile: (212) 310-0101
CHEMTREC 24-Hour Emergency Number:	(800) 424-9300
Date Prepared:	April 17, 2000 [Supersedes all previous versions]

SECTION 2 COMPOSITION AND INFORMATION ON INGREDIENTS

Ingredient	CAS Registry No.	Weight %	Exposure Limits
Allyl methacrylate	96-05-9	99.0% (min.) 99.8% (typ.)	NE
Allyl alcohol	107-18-6	<0.01%	TWA 3 ppm-skin (OSHA) TWA 2 ppm-skin (ACGIH)
Methacrylic acid	79-41-4	<0.01%	NE (OSHA) TWA 20 ppm-skin (ACGIH)
Hydroquinone methyl ether (MEHQ)	130-76-5	100 - 250 ppm	NE (OSHA) TWA 5 mg/m ³ (ACGIH)

NE = Not established

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Notes on Composition and Information on Ingredients

MEHQ functions as an inhibitor. The chemical is also identified as 4-methoxy phenol.

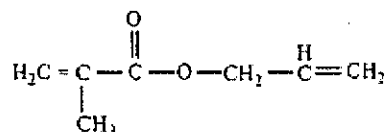
OTHER PRODUCT INFORMATION

Chemical Name: 2-Propenoic acid, 2-methyl-, 2-propenyl ester
(9CI)

Common or Trade Name: Allyl methacrylate (AMA)

Synonyms: 2-Propenoic acid, 2-methyl, allyl ester
2-Propenyl 2-methyl-2-propenoate
Methacrylic acid, allyl ester

Chemical Structure:



Molecular Formula: C₇H₁₀O₂

Molecular Weight: 126.16

EINECS No.: 202-473-0

SECTION 3 HAZARDS IDENTIFICATION

Emergency Overview

<p>Clear liquid with very strong ester odor. Flammable. Toxic by inhalation. Irritating to the upper respiratory tract. Harmful in contact with skin or if swallowed. AMA can undergo hazardous polymerization if not properly inhibited or if exposed to high temperatures or incompatible substances. Very toxic to aquatic organisms. Do not release to the environment.</p>

POTENTIAL HEALTH EFFECTS

INHALATION: Substance is toxic by inhalation. Inhalation exposure can be harmful, possibly lethal. Vapors are likely to be irritating to the upper respiratory tract (including the nasal area) and eyes. Prolonged exposure may be harmful and cause adverse effects including labored breathing and drowsiness. Excessive exposure can cause injury to upper respiratory tract and eyes.

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SKIN: Material is toxic via skin contact and may be absorbed through the skin in harmful, possibly lethal amounts. Exposure may cause slight to moderate skin irritation. Generally not expected to cause skin sensitization. However, in susceptible individuals material may be a potential skin sensitizer and can cause allergic reactions and contact dermatitis resulting in severe irritation, dryness, and cracking of the skin. Irritation and/or allergic reactions may not necessarily be immediately apparent—effects may be delayed.

EYE: Material (including vapors) may cause moderate eye irritation. Excessive exposure may cause permanent eye injury.

INGESTION: Substance is toxic by ingestion. Ingestion could be harmful, possibly lethal.

CHRONIC EFFECTS/CARCINOGENICITY: AMA is not regulated as a carcinogen. No long-term chronic effects or carcinogenicity data are known or available on this product.

NTP: *Not listed*

IARC: *Not listed*

OSHA: *Not listed*

MUTAGENICITY: AMA was not found to be mutagenic in *in vitro* tests. The substance has not been evaluated in *in vivo* mutagenicity studies.

TERATOGENICITY (birth defects): In animal testing, this material was not found to cause birth defects.

REPRODUCTIVE TOXICITY: No such data are known to exist.

MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE: None known.

INCOMPATIBILITY: None known.

SIGNS AND SYMPTOMS OF EXPOSURE: Inhalation exposure may cause labored breathing, dizziness, and drowsiness. May cause irritation to the upper respiratory tract and eyes. May cause skin irritation and possibly allergic reactions.

See Section 11 – Toxicological Information for more information.

SECTION 4 FIRST AID MEASURES

FIRST AID MEASURES

SKIN: Wash with plenty of water, then with soap and water for 15 minutes. Discard contaminated clothing and shoes. Call physician immediately if exposed to large quantities and/or if contact is prolonged.

EYES: Immediately flush with a continuous water stream for at least 20 minutes. Washing immediately after exposure is expected to be very effective in preventing eye damage. Get immediate medical attention.

INHALATION: Remove to fresh air. If not breathing give artificial respiration. If there is breathing difficulty, give oxygen. Get immediate medical attention.

INGESTION/SWALLOWED: Do not induce vomiting. Dilute by giving 1 or 2 glasses of milk or water. Nothing by mouth if unconscious. Get immediate medical attention.

SECTION 5 FIRE FIGHTING MEASURES

FLASH POINT: 93 °F [34 °C] (closed cup); 133 °F [56 °C] (open cup)

EXPLOSION/FLAMMABLE LIMITS: Not known.

AUTOFLAMMABILITY TEMPERATURE: 788 °F [420 °C]

EXTINGUISHING MEDIA: Use dry chemical, foam, carbon dioxide, and water spray/fog as needed. For large fires alcohol resistant foams are preferred. Synthetic or protein foams can be used, but may not be as effective. Water may not be as effective for large fires.

SPECIAL FIRE FIGHTING PROCEDURES: As in any fire, wear a self-contained breathing apparatus pressure demand (MSHA/NIOSH approved or equivalent) and full protective gear. Toxic vapors may evolve. This material is considered to be a flammable liquid under OSHA. Fight fires from a safe distance or protected areas. Fire hoses with fog nozzles may be used for controlling fires but care must be exercised not to spread flaming. Use of large volumes of water may produce run-off that could be toxic to wildlife and/or pose a hazardous waste disposal issue. Water may not be effective for large fires.

UNUSUAL FIRE AND EXPLOSION HAZARDS: Heat can cause exothermic polymerization. Sealed containers can explode in the heat of fire. Vapors may travel to ignition source because they are heavier than air. Run off may create an explosion, fire, and environmental hazard.

SEE SECTION 7
"PRECAUTIONS TO BE TAKEN IN HANDLING AND STORAGE" FOR FURTHER INFORMATION

SECTION 6 ACCIDENTAL RELEASE MEASURES
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SPILL/RELEASE AND CLEANUP PROCEDURES: In case of spill, evacuate the area and remove all ignition sources. Dike and contain spill with vermiculite, clay-based absorbents, or other absorbent materials such as polyethylene fiber and polypropylene fiber products. This material is very toxic to aquatic organisms. Do not discharge the washings and other effluents into ponds, streams, or lakes. Wear appropriate respiratory and protective clothing as described in Section 8 during any cleanup and response activities. In the event of an uncontrolled release of this material, the user should determine if the release is reportable under applicable laws and regulations.

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SECTION 7
HANDLING AND STORAGE

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORAGE: Caution – hazardous polymerization may cause drum to rupture. Evacuate immediate area. Material undergoing hazardous polymerization is generally evidenced by a warm drum, high drum pressure, and/or bulging drum. If hazardous polymerization is evident, control or slow polymerization by spraying drum with cold water. When polymerization has ended (cold drum), carefully remove drum cap or bung (use blanket to cover cap or bung to prevent splashing) to release excess pressure. Workers conducting such operations should wear personal equipment including eye, face, and hand protection. If the material has not fully polymerized (i.e., not 100% solid), add 1% w/w of phenothiazine (PZT) to stabilize material for transport and disposal. Properly dispose of both the drum and its contents.

AMA contains the inhibitor methyl ether of hydroquinone (MEHQ), at a level of approximately 100 - 250 ppm, which requires oxygen in air in order to be effective. Inhibitor level must be checked monthly in material stored for more than 3 months. Inhibitor must be maintained at original level to prevent unintended polymerization. Permit air space to exist inside storage containers, however, never use pure nitrogen or oxygen blanketing.

OTHER PRECAUTIONS: Do not drop. Keep away from fire, heat, open flames, lights, and other ignition sources. Wear goggles and gloves when handling. Harmful or fatal if inhaled, absorbed through the skin, or swallowed. Avoid breathing vapors. Eyewash stations and emergency showers must be present in areas where this product is handled, especially areas where loading/unloading operations occur. Wash hands thoroughly after handling and before eating, drinking, or smoking. Ground all containers when transferring the material.

Do not contaminate water, food, or feed by storage or disposal. Keep the product in original containers. Store in cool, dry, well ventilated, low fire risk area away from sunlight. Keep containers closed. Store only in approved containers, under approved conditions. Avoid pressure build-up in containers. An automatic water spray device should be immediately available. A spill control and containment plan should be provided. Storage area should be indoors and not subject to rapid temperature changes as such changes may cause increased internal pressure. Isolate from toxic materials; substances that may release corrosive, toxic or flammable fumes on reaction; or organic materials and flammable substances.

SECTION 8
EXPOSURE CONTROLS AND PERSONNEL PROTECTION

RESPIRATORY PROTECTION: Workers handling AMA where vapors are present should wear a supplied-air respirator or self-contained breathing apparatus. Respirators equipped with organic vapor cartridges are anticipated to provide adequate respiratory protection during short-term exposures to low vapor concentrations of AMA. Use MSHA/NIOSH-approved respiratory equipment. Respirators should be selected based on the form and concentration of the contaminant in the air and in accordance with OSHA (29 CFR 1910.134). Handle only in the presence of adequate ventilation.

PROTECTIVE GLOVES: Wear chemical resistant gloves appropriate to the conditions to prevent skin exposure. Glove material comparisons indicate that gloves of BUTYL RUBBER are anticipated to afford adequate hand protection. (Gloves made of PVC, nitrile, and neoprene are not expected to provide adequate hand protection.) Rinse and remove gloves immediately after use, and wash hand thoroughly with soap and water. Gloves should be removed and replaced immediately if there are any signs of degradation or breakthrough.

PROTECTIVE CLOTHING: Wear protective clothing and boots impervious to the product for the duration of the anticipated exposure if there is a potential for skin contact. An emergency shower should be readily accessible. Discard any contaminated clothing.

EYE PROTECTION: Chemical safety goggles meeting the specifications of ANSI Standard Z87.1 should be worn whenever there is the possibility of contact with the eyes. Spectacle type safety glasses do not provide satisfactory protection. An eyewash fountain should be readily accessible. Wear plastic face shield in addition to safety goggles where there is a danger of splashing.

AIR MONITORING: No information is available.

EXPOSURE GUIDELINES: No exposure guidelines have been established for this substance.

SECTION 9 PHYSICAL AND CHEMICAL PROPERTIES

Appearance:	Colorless
Odor:	Very strong ester odor
APHA:	10
Boiling Point:	144 °C (760 mm Hg)
Specific Gravity:	0.933 (20 °C)
Vapor Pressure:	4.6 mm Hg (20 °C) 5.0 mm Hg (25 °C) 10.0 mm Hg (40.8 °C)
Sat'd Vapor Concentration:	6000 ppm (20 °C)
Vapor Density:	Heavier than air
Refractive Index (n _D):	1.437 (20 °C)
Viscosity:	1.09 CPS (20 °C)
Freezing Point:	< -60 °C
Solubility (20°C):	4 g/l
Percent Volatile:	100%
Weight per gallon:	7.8 lbs.
Tg of Homopolymer:	52 °C

SECTION 10 STABILITY AND REACTIVITY
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STABILITY: Stable under normal conditions when properly inhibited.

CONDITIONS TO AVOID: Avoid heat, fire, open flames, direct light, ignition sources, and UV radiation.

INCOMPATIBILITY/MATERIALS TO AVOID: Incompatible with free radical initiators, oxidizing and reducing agents, and free iron or rust.

HAZARDOUS DECOMPOSITION OR BYPRODUCTS: Not expected under normal conditions.

HAZARDOUS POLYMERIZATION: Hazardous polymerization can occur, particularly at elevated temperatures, and may result in the release of hazardous decomposition products and vapors.

CONDITIONS TO AVOID POLYMERIZATION: Avoid free radical initiators, and oxidizing and reducing agents. Also avoid excessive heat, open flames, UV radiation, and ignition sources. Store product with inhibitor.

SEE SECTION 7
"PRECAUTIONS TO BE TAKEN IN HANDLING AND STORAGE" FOR FURTHER INFORMATION

SECTION 11 TOXICOLOGICAL INFORMATION

ACUTE TOXICOLOGICAL DATA:

Test	Result
Oral Rat LD ₅₀	400 - 430 mg/kg
Inhalation Rat LC ₅₀	4-hour 312 ppm 1-hour 1544 ppm
Dermal Rabbit LD ₅₀	345 - 635 mg/kg

OTHER ACUTE DATA: In another 4-hour acute inhalation study in rats, no deaths were reported in 6 rats exposed to 248 ppm while all 6 rats exposed to 497 ppm died.

EYE IRRITATION DATA: Undiluted AMA was not found to be irritating when tested in 6 rabbits at a level of 0.1 ml (unrinsed). In a separate study under the same conditions, the substance was found to produce slight irritation in the test animals. Exposure to AMA vapors during one- and four-hour acute inhalation studies produced lacrimation, chemodacryorrhea, and eye closure. In another study, rabbits exposed to 500 mg of AMA displayed mild irritation over a 24 hour period.

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SKIN IRRITATION DATA: Undiluted AMA was not found to be irritating when tested in 6 rabbits over a 24-hour test period with occluded exposure. The Primary Irritation Index (PII) was found to be 0.25 of 4. In a separate study under the same conditions (except that the material was semi-occluded), the substance was found to produce slight irritation or well defined, but reversible, cutaneous irritation in 6 of 6 test animals. The PII in this second study was found to be 1.5 and the compound was judged slightly irritating. A test involving humans exposed to 3% AMA in olive oil caused skin irritation in 3 of 11 persons. The degree of irritation or the reliability of this study has not been determined. Separately, 20 mg of AMA over a 24-hour period caused moderate irritation in rabbits.

SKIN SENSITIZATION DATA: In two guinea pigs maximization tests (Magnusson and Kligmann), using both diluted and undiluted test material, there were no cutaneous reactions and the compound was judged non-sensitizing. A third study (Polak method) in guinea pigs yielded the same results.

SUBCHRONIC DATA: Rabbits were exposed dermally to AMA for 6 hours/day for 28 days at concentrations 0, 25, 50, and 100 mg/kg/day. No signs of toxicity, abnormal behavior, adverse effects, mortality, or chemical related microscopic effects were observed. The NOEL was found to be 25 mg/kg/day.

REPRODUCTIVE TOXICITY: There are no reproductive effects data on the compound.

TERATOGENICITY (birth defects): Rats were exposed to AMA at concentrations of 0, 12, 25, 50, and 100 ppm for 6 hours/day daily during days 6 to 20 of gestation. No significant increases in embryo/fetal lethality or fetal malformations were observed after exposure, though researchers noted that there was a concentration related decrease in fetal body weight at 100 ppm. Fetotoxicity was observed at the maternally toxic dose of 100 ppm. The NOAEL for developmental toxicity was found to be 50 ppm.

MUTAGENICITY: This substance produced negative results when tested *in vitro* in *S. typhimurium* both with and without metabolic activation (Ames test). In the *in vitro* mammalian cytogenetics test using human lymphocytes both with and without activation, AMA was not found to be clastogenic. There are no *in vivo* data on the substance.

CHRONIC EFFECTS/CARCINOGENICITY: There are no chronic effects or carcinogenicity data on AMA.

SECTION 12 ECOLOGICAL INFORMATION
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SUMMARY OF ECOLOGICAL DATA: This material is very toxic to aquatic organisms. AMA was found to be readily biodegradable.

ECOTOXICOLOGICAL DATA:

Test	Result
Fish - <i>Pimephales promelas</i> LC ₅₀ 96-hr NOEC [96-hr]	0.62 mg/l 0.34 mg/l
Fish - <i>Pimephales promelas</i> LC ₅₀ 96-hr NOEC [96-hr]	0.99 mg/l 0.6 mg/l
Fish - <i>Leuciscus idus</i> LC ₅₀ 48-hr NOEC [48-hr]	6.6 mg/l 5.0 mg/l
<i>Daphnia magna</i> LC ₅₀ 24-hr LC ₅₀ 48-hr	4.2 mg/l 2.4 mg/l
Bacteria - <i>Pseudomonas putida</i> EC ₁₀ 72-hr	136 mg/L

ENVIRONMENTAL FATE DATA: Substance was found to have undergone 67% degradation after 28 days when tested under OECD 301D. Therefore, the substance is considered readily biodegradable.

PHYSICAL/CHEMICAL PROPERTIES: The measured Log K_{ow} was found to be 1.48. The calculated Log K_{ow} found to be 1.57. Estimates of environmental fate using the Level III Fugacity Model determined that the half life of AMA at a 41% concentration in water was 444 hours.

SECTION 13 DISPOSAL CONSIDERATIONS

RCRA CLASSIFICATION: If discarded in its manufactured form, this product is expected to be a characteristic hazardous waste under RCRA. However, it is the responsibility of the user to determine at the time of disposal whether a material containing the product or derived from the product should be classified as a hazardous waste.

SPECIAL INSTRUCTIONS: This material is very toxic to aquatic organisms. Do not discharge effluent containing this product into municipal sewers or open bodies of water. This substance is expected to be a characteristic hazardous waste under RCRA. All recovered material should be packaged, labeled, transported, and disposed of in conformance with applicable laws and regulations. Incinerate the wastes in an approved facility which complies with local, state, and federal regulations. For disposing of the container, completely empty the container. Rinse empty container with water and dispose of the container in a sanitary landfill or by incineration.

SECTION 14
TRANSPORT INFORMATION

U.S./INTERNATIONAL SHIPPING INFORMATION UNDER DOT/IMO/IATA REGULATIONS

Label/Placard:	Toxic Liquid (w/ primary hazard class no. "6" on label) Flammable (subsidiary hazard w/ the hazard class number "3" omitted or covered)
Proper Shipping Name:	Toxic liquids, flammable, organic, n.o.s. (Allyl Methacrylate)
Hazard Class:	Class 6.1, packaging group II; Subsidiary risk: Class 3, packaging group III
UN or ID No.:	UN 2929
DOT Exemption:	San Esters Corp. has obtained DOT Exemption Number 11910 that allows San Esters to transport this substance within the United States in IMO Type 1 tanks with bottom unloading outlets. This exemption applies only to San Esters.
Other:	None

SECTION 15
REGULATORY INFORMATION

REGULATORY STATUS OF AMA: This substance is listed on the Toxic Substances Control Act (TSCA) Chemical Substance Inventory. This product, as well as its impurities, may trigger other specific reporting, recordkeeping, and testing requirements under: EPCRA/SARA III, RCRA, CERCLA, CAA, SDWA, and CWA.

CALIFORNIA PROPOSITION 65: This product contains no chemicals listed under California Proposition 65.

OTHER STATE CHEMICAL LISTS: This product contains certain chemicals that are identified on several state chemical lists.

SECTION 16
OTHER INFORMATION

DISCLAIMER: The information presented herein is believed to be factual. However, none of this information is to be taken as a warranty or representation for which the San Esters Corporation, Mitsubishi Rayon Company, Ltd., Mitsubishi Rayon America, or the preparer bears legal responsibility. The user should review any recommendation in the specific context of the intended use to determine whether it is appropriate.

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