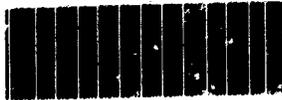


FYI-94-03105
INIT 07/14/94

74I-0794-03105



84940000105

Contains No CBI

Information Package on Isodecyl Methacrylate (IDMA)
(CAS No. 29964-84-9) for Submittal to the ITC

Submitted by: R. L. Keener, Chemical Standards Manager
Government and Regulatory Affairs Department
Rohm and Haas Company (Corporate Headquarters)
Independence Mall West
Philadelphia, PA 19105

I. Production Data

A. Production Sites

1. **Manufacture of Technical Grade**
Rohm and Haas Texas, Inc.
PO Box 672
Dear Park, Texas 77536
2. **Purification to Sales Grade**
Rohm and Haas Delaware Valley, Inc.
PO Box 279
Bristol, PA 19007

B. Production Grades of IDMA

Technical Grade - 94-96% Assay
Sales Grade (RocrylTM 310 Isodecyl Methacrylate Monomer) - 98% Assay

C. Process Description

A description and flow diagram for the processes involved in the manufacture and internal use of Technical IDMA are presented in Attachment 1.

A description and flow diagram for the purification process used to prepare Sales Grade IDMA from Technical Grade IDMA are presented in Attachment 2.

D. Production Volumes and Trends

The 1981 production volume of Technical Grade IDMA was less than 25 million pounds and future production volumes are expected to remain close to that level. Less than 5% of the Technical Grade IDMA was converted to Sales Grade IDMA during 1981.

II. Occupational Exposure

A. Type of Process System

As indicated in Attachments 1 and 2, most of the operations involved in the manufacture purification storage and internal use of IDMA are carried out in enclosed processes.

B. No. of Workers Involved

See Attachments 1 and 2

C. Exposures

Attachments 1 and 2 describe those operations during the manufacture, processing and internal use where potential exposure to IDMA could occur. Potential inhalation exposures are minimized by the low vapor pressure of IDMA and by the use of closed processing equipment. Moreover, the potential for skin and eye contact is minimized by the standard administrative requirement for Rohm and Haas Workers to wear protective gloves and eyewear whenever the potential for exposure exists.

III Use Data

A. Internal Use as an Intermediate

During 1981, about 90-95% of the company's production of Technical Grade IDMA was used internally in the manufacture of polymeric products. Most of these products, containing about 1800 ppm of residual IDMA, were used as additives for lubricating oils and other petroleum products.

B. Exports

During 1981, about 1% of the company's Technical Grade IDMA was exported from the U.S.

C. Domestic Sales

During 1981, less than 5% of the Company's Technical IDMA was processed to Sales Grade IDMA and sold to domestic customers.

D. Consumer Uses

IDMA is a chemical intermediate which is subsequently converted into polymeric form during its use in the manufacture of industrial oil additives and coatings. We are not aware of any direct consumer uses for IDMA monomer.

IV Environmental Releases

Environmental release from manufacturing, processing and use operations are summarized in Attachments 1 and 2. There are no known releases to water and only negligible air emissions during these operations: The only significant environmental release is a neutralized sludge obtained from the manufacture of technical grade IDMA. This sludge is landfilled on the manufacturer's site in an appropriately secured landfill facility.

0 0 0 5

V Toxicological Data

A summary of the toxicological properties of IDMA is presented in Attachment 3 and reports summarizing acute inhalation, oral, dermal and irritation studies on IDMA are presented in Attachment 4.

VI MSDS/Technical Literature

Rohm and Haas MSDS's on Technical Grade and Sales Grade IDMA are presented in Attachments 5 and 6 to this report. A technical bulletin (CM-34) describing a number of long chain alkyl methacrylates, including IDMA, appears as Attachment 7 to this report.

RLK:as
Attachments

0 0 . 0 6

Manufacturing and Use Data for Technical Grade IDMA**EXPOSURE**

1. Block Process Diagram Attached
2. People, hours, days exposed

	<u>People</u>	<u>Hour/Day</u>	<u>Days</u>
Manufacture	24	2.5	216
Use	5	0.5	360

3. Operations with Exposure Potential
 - a. Sampling Reactor
 - b. Sampling Finished Monomer
 - c. Charging Polymerization Mix
 - d. Tankcar Loading
 - e. Waste Disposal
 - f. Analysis of Samples

4. Exposure Route - Inhalation

Exposure Levels - Estimated less than 1 ppm average

- Estimated less than 100 ppm peak (2 min.)

5. Exposure Control -

- a. Closed to Process Equipment
- b. Rubber Gloves, Splash Goggles
- c. Outside Sampling Areas
- d. Hoods for Analyses

ENVIRONMENTAL

1. Releases to Air, Land, Water

- a. Air: .75 lbs./day
- b. Land: 1200 pound/day
- c. Water: None

2. Environmental Controls - On-Site Landfill

3. Disposal Methods - Landfill - 260,000 lbs./yr.
Incineration - 260,000 lbs./yr.

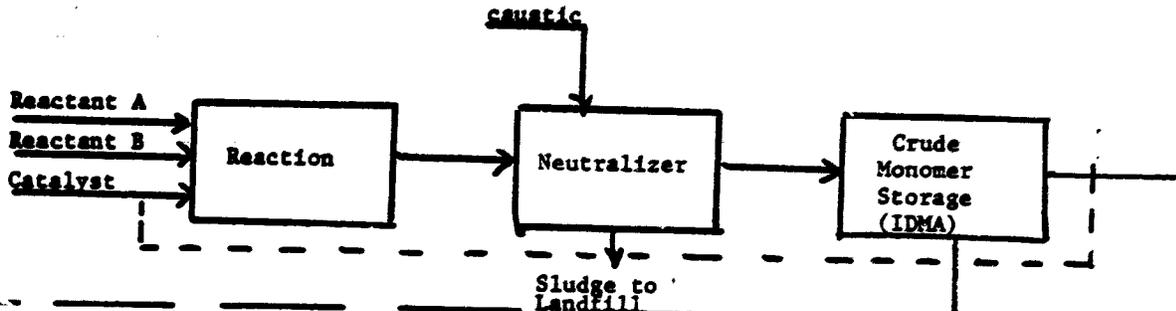
The major use of IDMA is to copolymerize with other monomers in solution for use as additives for lubricating oils and other petroleum products. Through multi-step catalyst addition, polymerization is forced to near completion, resulting in less than 1800 ppm IDMA in products. With these low levels and protection from other materials used in the process, employees are also protected from any significant exposure.

A minor use for IDMA is to prepare a purer product, Acryl 310. Exposure and environmental data are contained in Mr. Goodwin's memo (attached).

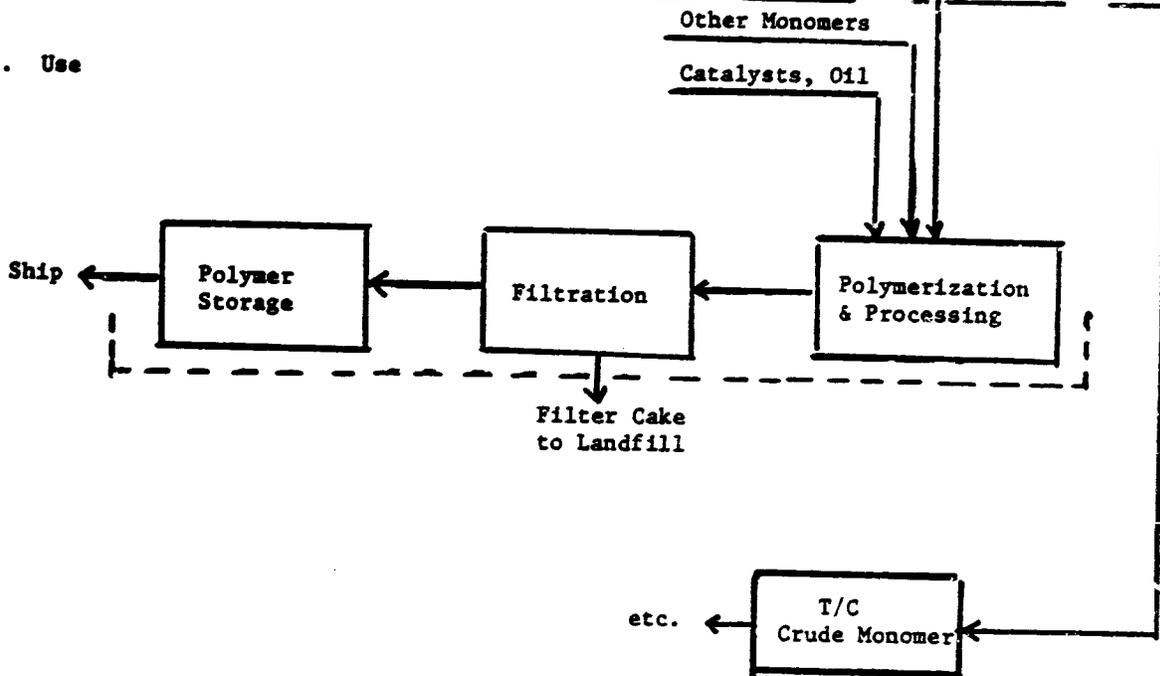
MJB
MJB:mab
Attachment

Block Process Diagram* for the Manufacture
and Use of Technical IDMA

A. Manufacture



B. Use



* Dotted line indicates those parts of the process closed to the Workplace Environment (-----).

ENVIRONMENTAL AND EXPOSURE DATA FOR TQPA (NOCTYL 310) TREATMENT PROCESS

EXPOSURE

1. Block Process Diagram - attachment
2. People, Hours, Days Exposed - 1 man, 8 hours per month
3. Operations with Exposure Potential
 - a. Opening of the manway on the feed tank to charge filter aid and other treatment chemicals
 - b. Opening of the manway on the drumming tank to charge inhibitor
 - c. Manually opening and cleaning the filter press
 - d. Filling of drums
4. Exposure Route - inhalation

Exposure Levels:	0.5 ppm	(11/79)
	2.0	(11/79)
	4.1	(11/79)
	0.7	(11/79)
	0.3	(1981)
5. Exposure Control - rubber gloves, splash goggles

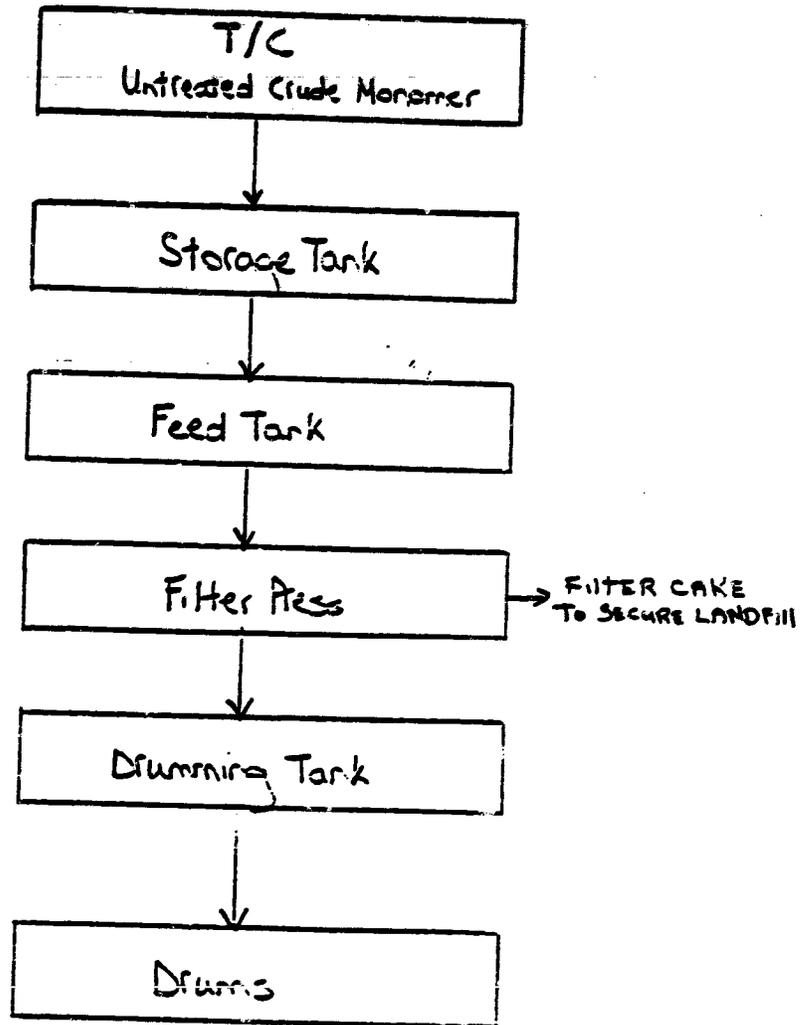
ENVIRONMENTAL

1. Releases to Air, Land and Water -
 - a. Air: 1.6 pounds/month
 - b. Land: 5 pounds/day
 - c. Water: none
2. Environmental Controls - none
3. Disposal Methods - filter press sludge to secure landfill

Allowable Limit (TWA) = 50 ppm

BLOCK PROCESS DIAGRAM - IDMA TREATMENT PROCESS

Attachment 2, p.2



cc: D.H. Clemons
J.S. Clovis
S.A. Ellis
W.D. Emory
H.J. Groube
R.E. Harren
A.W. Hayes
C.E. Hoey
L.D. Johnson

S. Krasinski
P.J. McNulty
I. Rosenthal
L.J. Shestack
J.M. Smith
A.S. West
M.L. White
TD Central File

TD 824-304

Spring House, May 17, 1982

To: Those Listed
From: T. Fedorowski
Subject: Review of Monomer Toxicity Data:
Report No. 14, Isodecyl Methacrylate

Attached is the above subject report.

In brief, isodecyl methacrylate is relatively non-toxic in terms of lethality or systemic effects upon acute/accidental exposure. It may irritate the skin. No significant abnormality in newborn animals was observed when pregnant animals were exposed to isodecyl methacrylate. No long-term exposure studies have been identified, therefore, no evaluation of potential effects from long-term exposure to isodecyl methacrylate can be made.



T. Fedorowski

TF/mct
Attachment

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Characteristics of Isodecyl MethacrylateStructureCAS No.

29964-84-9

Composition

C 74.29%, H 11.58%, O 14.14%

Empirical Formula $\text{C}_{14}\text{H}_{26}\text{O}_2$

Formula Weight 226.36

Physical Properties

Vapor Pressure - 1 mm Hg/78°C

Specific Weight - 0.878 g/ml (25°/15.6°C)

Boiling Point - 120°C/3 mm; 78°C/1.1 mm

Conversion Factors

1 mg of Isodecyl methacrylate vapor/m³ air =
0.1080 ppm (v/v) at 25°C at 1 atm.

1 ppm = 9.258 mg/m³

Executive Summary of Isodecyl Methacrylate Toxicity Data

Isodecyl methacrylate is judged to be non-toxic by single oral exposure and slightly toxic by single dermal or inhalation exposure. Moderate irritation to the skin and essentially no irritation to the eyes results when isodecyl methacrylate comes in contact with these tissues.

A teratology study conducted with rats utilizing intraperitoneal injection suggests that isodecyl methacrylate may cause embryonic death but does not produce any significant fetal abnormality. Based on this study isodecyl methacrylate is judged not to present any significant teratogenic hazard. It should be noted that the route of exposure employed in this study, intraperitoneal injection, is an artificial route of exposure used only in medicine.

No long term exposure studies have been conducted with isodecyl methacrylate, thus no evaluation of its potential effects from repeated exposure can be made.

Summary of Isodecyl Methacrylate Toxicity Data

<u>Study</u>	<u>Result</u>
<u>Acute</u>	
Rat, oral LD ₅₀	> 5 g/kg
Rat, dermal LD ₅₀	> 3 g/kg
Rat, inhalation LD ₅₀	> 97 ppm (1 hr, nominal concentration)
Rat, intraperitoneal LD ₅₀	2.166 g/kg
Mouse, intraperitoneal LD ₅₀	3.238 g/kg
Dog, intravenous LD ₅₀	Between 0.162 and 0.324 g/kg
Rabbit, skin irritation	Moderate irritation
Rabbit, eye irritation	Inconsequentially irritating
<u>Teratology</u> (intraperitoneal, rats)	Embryotoxic, not teratogenic

Review of Isodecyl Methacrylate Toxicity Data

I. Acute Toxicity Studies

A. Lethality Studies

1. Oral

Six male albino rats were orally administered 5.0 g/kg of isodecyl methacrylate (Industrial Bio-Test Laboratories, Inc., 1973). No deaths or significant toxic signs were observed during the 14 days of observation following exposure. No pathologic abnormalities were noted during necropsy. Based on this study, isodecyl methacrylate is judged to be "practically non-toxic". The oral LD₅₀ is greater than 5 g/kg.

2. Dermal

Six albino rabbits were dermally exposed to 3 g/kg of isodecyl methacrylate for 24 hours (Industrial Bio-Test Laboratories, Inc., 1973). Intact or abraded skin sites were used on each of three animals. Observations were carried out 24 and 72 hours after application. Two of the three rabbits that received isodecyl methacrylate on the intact skin died on the 11th day after exposure. Desquamation of the skin was observed in all of the animals at the 72 hour observation. Hypoactivity was reported. Based on these results isodecyl methacrylate would be judged to be "slightly" toxic. The dermal LD₅₀ is greater than 3 g/kg.

3. Inhalation

Six albino rats were exposed to an average nominal concentration of 0.9 mg/L air (97 ppm) of isodecyl methacrylate for one hour (Industrial Bio-Test Laboratories, Inc., 1973.) The animals were observed for the following 14 days. No deaths or significant signs of toxicity were noted. No gross pathologic abnormality was observed at necropsy. Based on these results isodecyl methacrylate would be considered to be "practically non-toxic" upon acute inhalation exposure. The LC₅₀ is greater than 97 ppm (900 mg/m³).

4. Intraperitoneal

An acute intraperitoneal LD₅₀ of 2.166 g/kg (1.033-4.540, 95% confidence limits) was reported for rats by Singh et al, 1972. The isodecyl methacrylate contained 100 ppm hydroquinone as the polymerization inhibitor.

Ten male ICR mice were injected intraperitoneally with isodecyl methacrylate and observed for seven days (Lawrence et al, 1972). The isodecyl methacrylate contained 100 ppm hydroquinone as the polymerization inhibitor. The LD₅₀ was reported to be 3.238 g/kg (2.736-3.834 g/kg, 95% confidence limits).

5. Intravenous

A dose of 0.324 g/kg was lethal to three dogs while 0.162 g/kg was not lethal (Mir et al., 1974).

Series of Isodecyl Methacrylate Toxicity Data

I. Acute Toxicity Studies (Continued)

B. Skin Irritation Studies

Skin irritation data, per se, was not found in the literature. Moderate irritation was observed during a dermal toxicity study in which 3 g/kg of isodecyl methacrylate was applied to intact and abraded skin sites of six rabbits (Industrial Bio-Test Laboratories, Inc., 1973). Observations were carried out 24 and 72 hours after application. Desquamation of the skin was observed in all animals at the 72 hour observation. A primary irritation score of 2.7 was calculated. Based on this result, isodecyl methacrylate is considered to be a moderate irritant to the skin.

C. Eye Irritation Studies

Isodecyl methacrylate, 0.1 ml, was instilled into one eye of each of six albino rabbits (Industrial Bio-Test Laboratories, Inc., 1973). The eyes were not washed. Observations occurred for seven days. Only slight conjunctival irritation was observed one hour after treatment. No other irritation was observed. Based on these results isodecyl methacrylate is considered to be inconsequentially irritating to eyes.

II. Teratology

Groups of five pregnant Sprague Dawley rats were injected intraperitoneally with 1/10, 1/5, or 1/3 the LD₅₀ (217, 433, 722 mg/kg) isodecyl methacrylate on days 5, 10, and 15 of gestation (Singh et al., 1972). On the 20th day of gestation, the rats were killed. An untreated group of rats was maintained as negative controls. Positive control animals received cottonseed oil, distilled water, or normal saline, at a dose of 0.82 ml/mg, which corresponded to the largest volume of isodecyl methacrylate injected.

A dose-related increase in resorption sites of 5, 25, 44%, low to high dose, respectively, was observed in the isodecyl methacrylate exposed animals. Untreated controls and cottonseed oil controls had no resorptions while distilled water and normal saline treated controls had 7.7 and 7.4% resorptions, respectively. When the control animals were "pooled", a 1.3 to 7.5%, 95% confidence interval, was obtained. When compared with this interval, isodecyl methacrylate produced, at the two highest levels of exposure, a statistically significant increase in resorptions.

Review of Isodecyl Methacrylate Toxicity Data

II. Teratology (Continued)

Fetal weights of all isodecyl methacrylate treated rats were statistically significantly smaller than untreated controls. However this is not considered to be a significant effect since all treated control fetuses also had statistically significantly decreased weights.

This data suggests that isodecyl methacrylate may have a potential for embryotoxicity but does not present a high order of concern for teratogenic effects. Such a conclusion has also been expressed by Autian in 1975.

III. Other Studies

A. Studies on the Isolated Perfused Rabbit Heart

The isolated perfused rabbit heart was perfused with isodecyl methacrylate at concentrations of 0.001%, 0.01%, or 0.1% in Lockes' Solution (v/v) for one minute (Mir et al., 1973). Significant decreases in heart rate and force of contraction were noted at the two higher doses and an increase in coronary blood flow was observed at all three doses. All the effects noted were reversible.

B. Studies on the Respiratory and Cardiovascular Functions in Dogs

Male mongrel dogs were administered, intravenously, doses of 0.0461, 0.0922, or 0.1844 ml/kg (41, 81, or 162 mg/kg) of isodecyl methacrylate as a 5% suspension in saline (Mir et al., 1974). A 5-20% reduction in arterial blood pressure and a 6-30% reduction in heart rate were observed for 2-4 minutes after exposure. Respiratory rate rose sharply (7, 79, 137% for 41, 81, 162 mg/kg, respectively) but returned to normal within minutes.

References

1. Autian, J. 1975. Structure-toxicity relationships of acrylic monomers. *Environ. Health Perspectives* 11: 141-152.
2. Industrial Bio-Test Laboratories, Inc. Acute Toxicity Report, Private report to Rohm and Haas Company, October 1, 1973.
3. Lawrence, W.H., G.E. Bass, W.P. Purcell, and J. Autian. 1972. Use of mathematical models in the study of structure-toxicity relationships of dental compounds: I. Esters of acrylic and methacrylic acids. *J. Dental Research* 51: 526-535.
4. Mir, G.M., W.H. Lawrence, and J. Autian. 1973. Toxicological and pharmacological actions of methacrylate monomers I: Effects on isolated, perfused rabbit heart. *J. Pharm. Sciences* 62: 770-782.
5. Mir, G.M., W.H. Lawrence, and J. Autian. 1974. Toxicological and pharmacological actions of methacrylate monomers III: Effects on respiratory and cardiovascular functions of anesthetized dogs. *J. Pharm. Sciences* 63: 376-381.
6. Singh, A.R., W.H. Lawrence, and J. Autian. 1972. Embryonic-fetal toxicity and teratogenic effects of a group of methacrylate esters in rats. *J. Dental Research* 51: 1632-1638.



REPORT TO

ROHM AND HAAS COMPANY

ACUTE INHALATION TOXICITY STUDY WITH
ISODECYL METHACRYLATE
IN ALBINO RATS

REQUISITION NO. SH-4-755

RELEASE NO. 4

IBT NO. 663-03648

I. Summary

An acute inhalation toxicity study was conducted on Isodecyl Methacrylate, Code 6-6443, Lot 32893, wherein six albino rats having an average body weight of 190 grams, were exposed to a maximum attainable vapor concentration for one hour in a 325-liter inhalation chamber. After exposure, all rats were observed for the following 14 days.

Test conditions were as follows:

Air flow thru generator = 9.9 L/min. at 29.92" Hg and 25°C
Test atmosphere temperature = 35°C
Time allotted for equilibrium = 161 min.
Average nominal concentration = 0.9 mg/L air

II. Results

There were no deaths or untoward behavioral reactions. The average body weight gain was 52 grams. Necropsy examinations revealed no gross pathologic alterations.

TEST MATERIAL: Methyl Methacrylate, Code RELEASE NO.: 4
 Identification NO.: PH-4-733 8-6443 IDT NO.: 601-03647

DOSAGE: 5,000 mg/kg
 CONDITIONS: Undiluted

LD₅₀ > 5,000 mg/kg

ACUTE ORAL TOXICITY
Male Albino Rats

Animal No.	Body Wgt. (g) & Time of Death		Cumulative Mort.	Time Intervals of Reactions	Signs of Intoxication														
	0	14			Salivation	Increased respiration	Decreased respiration	Tremors	Fibrillations	Convulsions	Diarrhea	Diuresis	Cyanosis	Ruffed fur	Hyperactivity	Hypoactivity	Salivation	Hemorrhagic rhinitis	Conjunctivitis
1	171	327	0/6																
2	171	319																	
3	173	329																	
4	162	300																	
5	164	304																	
6	174	332																	
Gross Autopsy Survivors: <u>No gross pathologic alterations were noted.</u>				1 H															
Decedents: _____				2 H															
_____				3 H															
_____				4 H															
_____				1 D															
_____				2 D															
_____				3 D															
_____				4 D															
_____				5 D															
_____				6 D															
_____				7 D															
_____				8 -															
_____				14 D															

KEY: H = Hour(s); D = Day(s); O = Onset; R = Recovery; N = No recovery.

DOSAGE: 3,000 mg/kg
 CONDITIONS: Undiluted

LD₅₀ > 3,000 mg/kg

ACUTE DERMAL TOXICITY
Albino Rabbits

Animal No.	Body Wgt. (kg) & Time of Death			Skin Reactions								
	0	14	Cumulative Mort.	Intact Site				Abraded Site				
				Animal No.	24 Hrs. Er.	72 Hrs. Ed.	24 Hrs. Er.	72 Hrs. Ed.	24 Hrs. Er.	72 Hrs. Ed.	24 Hrs. Er.	72 Hrs. Ed.
1	2.36	1.83	2/6	1	-	-	-	-	2	1	2	0, D
2	2.30	2.19		2	-	-	-	-	2	2	2	0, D
3	3.02	2.79		3	2	1	2	0, D, F	-	-	-	-
4	2.62	2.57		4	-	-	-	-	2	2	2	0, D, F
5	2.32	11 days		5	2	1	2	0, D, F	-	-	-	-
6	2.44	11 days		6	2	1	2	0, D, F	-	-	-	-
Mean				2.0	1.0	2.0	0.0	2.0	1.7	2.0	0.0	
Primary Irritation Score = 2.7												
D = Desquamation F = Fissuring												

Signs of Intoxication: Hypoactivity

ACUTE DERMAL TOXICITY CONT.

Gross Autopsy

Survivors: No gross pathologic alterations were noted. Attachment 4, p3

Decedents: No gross pathologic alterations were noted.

CONDITIONS: 0.1 ml, Undiluted

EYE IRRITATION TOXICITY
Albino Rabbits

Tissue	Animal Number	1 Hour	24 Hours	48 Hours	72 Hours	7 Days
Cornea (D-A)	1	0	0	0	0	0
Iris		0	0	0	0	0
Conjunctiva (R-S-D)		0	0	0	0	0
Cornea (D-A)	2	0	0	0	0	0
Iris		0	0	0	0	0
Conjunctiva (R-S-D)		2 (1-0-0)	0	0	0	0
Cornea (D-A)	3	0	0	0	0	0
Iris		0	0	0	0	0
Conjunctiva (R-S-D)		2 (1-0-0)	0	0	0	0
Cornea (D-A)	4	0	0	0	0	0
Iris		0	0	0	0	0
Conjunctiva (R-S-D)		4 (2-0-0)	0	0	0	0
Cornea (D-A)	5	0	0	0	0	0
Iris		0	0	0	0	0
Conjunctiva (R-S-D)		2 (1-0-0)	0	0	0	0
Cornea (D-A)	6	0	0	0	0	0
Iris		0	0	0	0	0
Conjunctiva (R-S-D)		4 (2-0-0)	0	0	0	0
Averages						
Cornea		0.0	0.0	0.0	0.0	0.0
Iris		0.0	0.0	0.0	0.0	0.0
Conjunctiva		2.3	0.0	0.0	0.0	0.0
Total		2.3	0.0	0.0	0.0	0.0

Respectfully submitted,

INDUSTRIAL BIO-TEST LABORATORIES, INC.

C. W. Mastri

C. W. Mastri, B.S.
Section Head, Acute Toxicity

0 0 2 3

WILSON JONES COMPANY

 HAZARD TO HEALTH AND SAFETY
 INTERNATIONAL MAIL POST
 POLYMERIZATION IN 1982

 EMERGENCY TELEPHONE
 818-888-8888 (HOME AND HOME)
 800-888-8888 (TOLL-FREE)

 HAZARD RATINGS **Exp**
 4 - EXTREME
 3 - HIGH
 2 - MODERATE
 1 - SLIGHT
 0 - INSIGNIFICANT
 1/2 - OUTSIDE HEALTH HAZARD - SEE SECTION IV

MATERIAL SAFETY DATA SHEET

 DRAFT JUN 29 1982
 Return to CHS

TECHNICAL ISODECYL METHACRYLATE FORMULA C14 H20 O2	CODE 75295 DATE ISSUED 05/19/82	REV 906940-1	FREIGHT CLASSIFICATION CHEMICALS NOI
CHEMICAL NAME OR SYNONYM Isodecyl methacrylate		(- INGREDIENTS)	

	WEIGHT %	TWA/TLV
Isodecyl methacrylate	94-96	Not established
Methacrylic acid	0.05	20 PPM ACGIH
Inhibitors: Hydroquinone, Phenothiazine (50-100 ppm)		

(II - PHYSICAL DATA)

APPEARANCE - COLOR - pH Amber liquid; mild aromatic odor	VISCOSITY 2.5 cps. (Brookfield)
MELTING OR FREEZING POINT -22C/-8F	BOILING POINT 220C/428F
SOLUBILITY IN WATER Negligible	VAPOR PRESSURE (mm Hg) 1 mm @ 78C
PERCENT VOLATILE (BY WEIGHT) 0	SPECIFIC GRAVITY (WATER = 1) 0.878
	VAPOR DENSITY (AIR = 1) Heavier
	EVAPORATION RATE (BUTYL ACETATE = 1) Slower

(III - FIRE AND EXPLOSION HAZARD DATA)

FLASH POINT 245F FMCC	AUTOIGNITION TEMPERATURE No data	LOWER EXPLOSION LIMIT(%) NA	UPPER EXPLOSION LIMIT(%) NA
---------------------------------	--	---------------------------------------	---------------------------------------

 EXTINGUISHING MEDIA
 FOAM "ALCOHOL" FOAM CO₂ DRY CHEMICAL WATER FOG OTHER

 SPECIAL FIRE FIGHTING PROCEDURES
 Wear MSHA/NIOSH approved self-contained breathing apparatus. Use water spray to cool fire-exposed containers.

 UNUSUAL FIRE AND EXPLOSION HAZARDS
 Heat can induce polymerization with rapid release of energy causing containers to rupture violently.

(IV - HEALTH HAZARD DATA)

 RECOMMENDED ROHS AND MAAS HEALTH GUIDE TWA (MAXIMUM TIME-WEIGHTED-AVERAGE CONCENTRATION FOR AN 8-HOUR WORK PERIOD)
 Isodecyl methacrylate - 50 ppm; Methacrylic acid - 20 ppm

 EFFECTS OF OVEREXPOSURE
 > **Skin Contact:** Liquid will cause moderate irritation. Possible skin sensitizer.
 > **Eye Contact:** Liquid will cause slight irritation.

 EMERGENCY AND FIRST AID PROCEDURES
 > **Inhalation:** Move subject to fresh air.

 > **Eye and Skin Contact:** Flush eyes with plenty of water for at least 15 minutes and consult a physician if irritation persists; wash affected skin areas with soap and water; remove and wash clothing before reuse.

 > **Ingestion:** If swallowed dilute by giving 2 glasses of water to drink and call a physician. Never give anything by mouth to an unconscious person.

V - REACTIVITY DATA

STABILITY/ CONDITIONS TO AVOID
 STABLE UNSTABLE Excessive heat
HAZARDOUS DECOMPOSITION PRODUCTS

HAZARDOUS POLYMERIZATION CONDITIONS TO AVOID
 MAY OCCUR WILL NOT OCCUR Elevated temperatures and polymerization catalysts.
INCOMPATIBILITY MATERIALS TO AVOID Oxidizing or reducing agents. Inert atmospheres. Any contamination.
 WATER OTHER

VI - SPILL OR LEAK PROCEDURE

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED
Dike and contain spill with inert material (sand, earth, etc.) and transfer liquid and solid diking material to separate containers for recovery or disposal. Remove contaminated clothing and wash affected skin areas with soap and water. Wash clothing before reuse. Keep spill out of sewers and open bodies of water.

WASTE DISPOSAL METHODS Dilute with a suitable flammable solvent, then incinerate in approved equipment. Contaminated diking material should be landfilled according to current local, state and federal regulations.

VII - SPECIAL PROTECTION INFORMATION

VENTILATION TYPE
Normal room ventilation.
RESPIRATORY PROTECTION

None required for normal operations.

PROTECTIVE GLOVES EYE PROTECTION
Impervious Splashproof goggles

OTHER PROTECTIVE EQUIPMENT
Impervious apron, eyewash facility

VIII - STORAGE AND LABELING

STORAGE TEMPERATURE INDOOR HEATED REFRIGERATED OUTDOOR
MAX. AMBIENT MIN.

Store at ambient temperatures. Allow blanket of air over monomer in all storage containers whether pail, drum or bulk. Product should be used within one year. Control storage temperature to avoid freezing or layering. If frozen or layered, thaw and agitate container contents frequently to redistribute inhibitors. Material stored in bulk should be tested for stability every 3 months (drums - 6 months) using Rohm and Haas Test Method TM-1011.

IX - TOXICITY INFORMATION

Rat oral LD50: > 5 g/kg
Rabbit dermal LD50: >3 g/kg
Rabbit eye irritation: Slight transient irritation
Rabbit skin irritation: Moderate irritation in dermal test. Score = 2.7

X - MISCELLANEOUS INFORMATION

NA - NOT APPLICABLE KEY 906940-1 DATE OF ISSUE 05/19/82 SUPERSEDES 08/27/81
C - CEILING VALUE

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FORM 550 REV. 7/80 (B)

0025

ROHM AND HAAS COMPANY

CONGRUATE HEALTH AND SAFETY
INDEPENDENCE HALL WEST
PHILADELPHIA, PA 19106

EMERGENCY TELEPHONE
215-898-3888 (ROHM AND HAAS)
800-424-8888 (CHEMTREC)



HAZARD RATING **Flam**
4 = EXTREME
3 = HIGH
2 = MODERATE
1 = SLIGHT
0 = INSIGNIFICANT
* = CHRONIC HEALTH HAZARD - SEE SECTION IV

Toxicity
2 1 1

Special

MATERIAL SAFETY DATA SHEET

DRAFT

Revised to CHS by JUN 29 1982

MATERIAL ROCRYL™ 310 ISODECYL METHACRYLATE Monomer	CODE 56105	REV 905511-2	HAZARD CLASSIFICATION CHEMICALS NOI
FORMULA C14 H26 O2	DATE ISSUED 05/19/82		
CHEMICAL NAME OR SYNONYMS Isodecyl Methacrylate - inhibited (I - INGREDIENTS)			

	WEIGHT %	TWA/TLV
Isodecyl Methacrylate Inhibited with 10 ppm HQ	98	

(II - PHYSICAL DATA)

APPEARANCE - ODOOR - pH Pale clear liquid; mild odor	VISCOSITY 2.5 cps	
MELTING OR FREEZING POINT -22C/-8F	BOILING POINT 220C	VAPOR PRESSURE (mm Hg) 1 mm @ 78C
SOLUBILITY IN WATER Negligible	PERCENT VOLATILE (BY WEIGHT) 0	SPECIFIC GRAVITY (WATER = 1) 0.878
		VAPOR DENSITY (AIR = 1) >1
		EVAPORATION RATE (BUTYL ACETATE = 1) <1

(III - FIRE AND EXPLOSION HAZARD DATA)

FLASH POINT 245F FMCC	AUTOIGNITION TEMPERATURE No data	LOWER EXPLOSION LIMIT(%) NA	UPPER EXPLOSION LIMIT(%) NA
EXTINGUISHING MEDIA <input type="checkbox"/> FOAM <input type="checkbox"/> "ALCOHOL" FOAM <input checked="" type="checkbox"/> CO ₂ <input checked="" type="checkbox"/> DRY CHEMICAL <input checked="" type="checkbox"/> WATER FOG <input type="checkbox"/> OTHER			

SPECIAL FIRE FIGHTING PROCEDURES

Wear MSHA/NIOSH approved, pressure demand, self-contained breathing apparatus. Use water spray to cool fire-exposed containers. Fight fires from a protected location.

UNUSUAL FIRE AND EXPLOSION HAZARDS

Heat can induce polymerization with rapid release of energy causing containers to rupture violently.

(IV - HEALTH HAZARD DATA)

RECOMMENDED ROHM AND HAAS HEALTH GUIDE TWA (MAXIMUM TIME-WEIGHTED-AVERAGE CONCENTRATION FOR AN 8-HOUR WORK PERIOD)
50 ppm

EFFECTS OF OVEREXPOSURE

Skin Contact: Liquid will cause moderate irritation. Possible skin sensitizer.
Eye Contact: Liquid will cause slight irritation.

EMERGENCY AND FIRST AID PROCEDURES

Inhalation: Move subject to fresh air.

Eye and Skin Contact: Flush eyes with large amounts of water for at least 15 minutes. Consult a physician if irritation persists. Wash affected skin areas with soap and water.

Ingestion: If swallowed dilute by giving 2 glasses of water to drink and call a physician. Never give anything by mouth to an unconscious person.

(V - REACTIVITY DATA)

STABILITY <input type="checkbox"/> STABLE <input type="checkbox"/> UNSTABLE	CONDITIONS TO AVOID Excessive heat
---	--

HAZARDOUS DECOMPOSITION PRODUCTS

HAZARDOUS POLYMERIZATION <input type="checkbox"/> MAY OCCUR <input checked="" type="checkbox"/> WILL NOT OCCUR	CONDITIONS TO AVOID Elevated temperatures and polymerization catalysts.
--	---

INCOMPATIBILITY (MATERIALS TO AVOID) <input type="checkbox"/> WATER <input checked="" type="checkbox"/> OTHER	Oxidizing and reducing agents. Inert atmosphere. Any contamination.
---	---

(VI - SPILL OR LEAK PROCEDURE)

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED
Dike and contain spill with inert material (sand, earth, fuller's earth, etc.) and transfer liquid and solid diking material to separate containers for recovery or disposal. Remove contaminated clothing and wash affected skin areas with water. Wash clothing before reuse. Keep spill out of all sewers and open bodies of water.

WASTE DISPOSAL METHODS
Dilute with a suitable flammable solvent, then incinerate in approved equipment. Contaminated diking material should be landfilled according to current local, state and federal regulations.

(VII - SPECIAL PROTECTION INFORMATION)

VENTILATION TYPE
Normal room ventilation.

RESPIRATORY PROTECTION
None required for normal operations.

PROTECTIVE GLOVES Impervious	EYE PROTECTION Splashproof goggles
--	--

OTHER PROTECTIVE EQUIPMENT
Impervious apron, eyewash facility

(VIII - STORAGE AND LABELING)

STORAGE TEMPERATURE MAX. Ambient MIN.	INDOOR	HEATED	REFRIGERATED	OUTDOOR
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Store at ambient temperatures. Allow blanket of air over monomer in all storage containers whether pail, drum or bulk. Product should be used within one year. Control storage temperature to avoid freezing or layering. If frozen or layered, thaw and agitate container contents frequently to redistribute inhibitors. Material stored in bulk should be tested for stability every 3 months (drums - 6 months) using Rohm and Haas Test Method TM-1011.

(IX - TOXICITY INFORMATION)

Oral LD50 (rat) >5 g/kg
 Dermal LD50 (rabbit) >3g/kg
 Eye irritation (rabbits) - slight transient irritation
 Skin irritation (rabbits) - moderate irritation in dermal test. Score = 2.7

(X - MISCELLANEOUS INFORMATION)

ROCRYL™ IS A TRADEMARK OF ROHM AND HAAS COMPANY OR ONE OF ITS SUBSIDIARIES OR AFFILIATES.

NA = NOT APPLICABLE C = CEILING VALUE	KEY 905511-2	DATE OF ISSUE 05/19/82	SUPERSEDES 10/08/81
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ROHM AND HAAS COMPANY
 INDEPENDENCE MALL WEST
 PHILADELPHIA, PENNSYLVANIA 19106



LONG-CHAIN ALKYL METHACRYLATES

ISODECYL METHACRYLATE (IDMA)



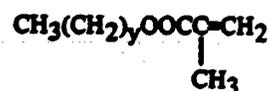
Molecular Weight
226

LAURYL METHACRYLATE (LMA)



x=11-13
Molecular Weight
262

STEARYL METHACRYLATE (SMA)



y=15-17
Molecular Weight
332

Isodecyl methacrylate (IDMA), lauryl methacrylate (LMA), and stearyl methacrylate (SMA) are polymerizable, liquid esters supplied in commercial quantities by Rohm and Haas Company. They are useful in the preparation of homopolymers and copolymers to which the long-chain alkyl group bestows high solubility in aliphatic hydrocarbons, internal plasticization, and generally hydrophobic properties. The polymeric products may be useful in the stabilization and modification of petroleum products, in the preparation of dispersions, in the plasticization of rubbers and plastics, in the manufacture of adhesives, binders, protective coatings, and finishes or sizes for textiles, paper, and leather.

AVAILABILITY

These monomers are available in commercial quantities and are shipped as inhibited grades (See Table I). They can be supplied in bulk quantities and in the following standard packages:

55-gal. drum	400 lbs.
5-gal. pail	37 lbs.
1-gal. pail	7 lbs.

PHYSICAL PROPERTIES

Table I lists typical physical properties of IDMA, LMA, and SMA: these do not constitute specifications.

TABLE I PHYSICAL PROPERTIES OF ROHM AND HAAS LONG-CHAIN ALKYL METHACRYLATES			
	IDMA	LMA	SMA
Appearance	Clear liquids, free of visible foreign matter		
CAS Registry Number	29964-84-3	C ₁₂ ester 142-90-5 C ₁₄ ester 2549-53-3	C ₁₆ ester 2495-27-4 C ₁₈ ester 32360-05-7
Assay, % (GLC)	92.0	C ₁₂ ester 62 C ₁₄ ester 25	C ₁₆ ester 30 C ₁₈ ester 56
Acidity (as methacrylic acid), %	0.02	0.005	0.01
Water (by Karl Fischer), %	0.15	0.09	0.09
Inhibitor, ppm	10 HQ+MEHQ	100 HQ	100 HQ
Color (APHA), when shipped	100	50	100
Refractive Index, n _D ²⁵	1.4410	1.444	1.4502
Specific Gravity (25/15.6°C)	0.878	0.868	0.864
Density, lb/gal.	7.31	7.23	7.20
Freezing Point, °F.		-8	58
Flash Point (Setaflash Tester), °F.	>230	>230	>200
Vapor Pressure	1 mm/78°C. 3 mm/120°C.		
Solubility	Soluble in common organic solvents; insoluble in water.		

STORAGE AND HANDLING. TOXICITY

IDMA, LMA and SMA as supplied contain shipping inhibitor and may be considered to be fully inhibited monomers which can be stored safely for a year at ambient temperature. IDMA and LMA remain liquid at temperatures normally encountered during winter. Stearyl methacrylate, however, may solidify during cold weather, since crystals begin to form at 59°F. (15°C.). Solidified SMA can be thawed by placing the containers in a warm room (80-100°F.) for about a day with occasional rolling to mix. To insure uniform distribution of the inhibitor, the contents should be melted completely and mixed well before removing material from the container.

0 0 2 9

HEALTH AND SAFETY

CONTACT MAY CAUSE EYE AND SKIN IRRITATION. MAY CAUSE SENSITIZATION REACTIONS IN SUSCEPTIBLE PERSONS.

Avoid contact with the eyes and prolonged contact with skin; wash thoroughly after handling. Do not take internally.

KEEP OUT OF REACH OF CHILDREN

In case of contact, flush eyes immediately with plenty of water at least 15 minutes; get prompt medical attention if irritation persists. Flush skin thoroughly with water.

If swallowed and victim is conscious, dilute by giving water to drink and call a physician. Never give anything by mouth to an unconscious person.

Material Safety Data Sheets giving information on handling procedures, safety hazards, and waste disposal methods are available on request.

TOXICITY

	IDMA	LMA	SMA
Acute oral (LD ₅₀)—rats	>5 g/kg	>5 g/kg	>5 g/kg
Acute dermal (LD ₅₀)—rabbits	>3 g/kg	>3 g/kg	>3 g/kg
Skin irritation—rabbits	moderate	moderate	slight
Primary irritation index	2.7	2.0	1.0
Eye irritation—rabbits	slight	none	none

POLYMERIZATION PARAMETERS (TABLE II)

The Research Division of Rohm and Haas Company, using a dilatometric method, measured the initial rate of polymerization (k_p) for uninhibited, degassed grades of IDMA, LMA, and SMA in bulk at 44.1° with azoisobutyronitrile (AIBN) as initiator.

The Price-Alfrey copolymerization parameters (Q, e) of LMA (M_2) were computed from measured monomer reactivity ratios (r_1, r_2) in its copolymerization with styrene (M_1). The Q and e values for SMA are published values (1) based on a reported copolymerization with methacrylonitrile (2). The glass transition temperature (T_g) was obtained for all three homopolymers; the value for poly(stearyl methacrylate) probably represents a motion of the alkyl side chain rather than the main chain. Published values are also given for the constants (K, α) in the intrinsic viscosity-molecular weight relations of the polymers of LMA and SMA; the equation for this relation is

$$[\eta] = KM_v^\alpha$$

where $[\eta]$ is the intrinsic viscosity of fractionated polymer measured in a given solvent at a given temperature (usually 30°C.), M_v is the viscosity molecular weight, and K and α are constants. Values for some lower methacrylates are included to furnish a basis for comparison.

TABLE II
POLYMERIZATION PARAMETERS FOR METHACRYLATES

Monomers	k, 44.1°C. %/hr ^a	r ₁ ^b	r ₂ ^b	Q	e	T _g °C.	K x 10 ⁵	α	Solvent
MMA	27	0.52	0.46	0.74	0.40	105	5.2	0.76	Benzene (3)
BMA	41	0.52	0.47	0.74	0.39	20	1.56	0.81	2-Butanone (4)
IDMA	44					-41			
LMA	95	0.56	0.52	0.71	0.32	-65	8.64	0.64	Buryl Acetate (5)
SMA	130			1.07(?)	0.56(1)	38	2.5	0.75	Tetrahydrofuran(6)

a - Where the initial rate of polymerization, %/hr = $k\sqrt{[AIBN]}$, and [AIBN] is the concentration of AIBN.
b - r₁ and r₂ are reactivity ratios for styrene (M₁) and methacrylate (M₂) respectively.

POLYMERIZATION

The long-chain alkyl methacrylates can be polymerized or copolymerized with other monomers by any of the common processes. In a typical bulk process, the monomers may be homopolymerized by heating them for 15 hours at 70-100°C. in the presence of 0.5% (based on monomer) of benzoyl peroxide (7). Azo compounds are also effective initiators. Conventional solvents, especially aromatic hydrocarbons, are useful in solution processes. When the final product is to be a solution in oil, mixtures of mineral oils and aromatic hydrocarbons can be utilized, and the volatile solvent is stripped after completion of the polymerization. Processes for emulsion copolymerization have been developed by the Research Division of Rohm and Haas Company and this information is available on request.

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Printed in U.S.A.