ATTN: SAFETY DIRECTOR
MARY ONSRUD
UNIVERSITY OF WISCONSIN WHITewater
P O BOX 296
WHITewater WI 53190

ALDRICH CHEMICAL COMPANY, INC.
P.O. BOX 355
MILWAUKEE, WISCONSIN 53201, USA

EMERGENCY PHONE 1-414-273-3850
DATE 09/24/99
CUST#: 523216
PO#: CC/ONSRUD/92399

MATERIAL SAFETY DATA SHEET PAGE 1

SECTION 1. - - - - - - CHEMICAL IDENTIFICATION - - - - - - -

CATALOG #: 27037-7
NAME: TOLUENE, 99.8%, HPLC GRADE

SECTION 2. - - - - COMPOSITION/INFORMATION ON INGREDIENTS - - - -

CAS #: 108-88-3
MF #: 7H8
EC NO.: 203-625-9

SYNONYMS
ANTISAL IA * BENZENE, METHYL- * CP 25 * METHACIDE * METHANE, PHENYL- *
METHYLBENZENE * METHYLBENZOL * NCI-C07272 * PHENYLMETHANE * RCRA
WASTE NUMBER U220 * TOLUEN (DUTCH) * TOLUEN (CZECH) * TOLUENE (ACGIH: OSHA) * TOLUENO (SPANISH) * TOLUOL * TOLUOLO (ITALIAN) * TOLU-SOL *

SECTION 3. - - - - - - HAZARDS IDENTIFICATION - - - - - - -

LABEL PRECAUTIONARY STATEMENTS
FLAMMABLE (USA)
HIGHLY FLAMMABLE (EU)
TOXIC
TOXIC BY INHALATION, IN CONTACT WITH SKIN AND IF SWALLOWED.
CALIF. PROP. 65 REPRODUCTIVE HAZARD.
CAUSES SEVERE IRRITATION.
TARGET ORGAN(S): LIVER
KIDNEYS
BRAIN
BLADDER
KEEP AWAY FROM SOURCES OF IGNITION - NO SMOKING.
IN CASE OF ACCIDENT OR IF YOU FEEL UNWELL, SEEK MEDICAL ADVICE IMMEDIATELY (SHOW THE LABEL WHERE POSSIBLE).
IN CASE OF CONTACT WITH EYES, RINSE IMMEDIATELY WITH PLENTY OF WATER AND SEEK MEDICAL ADVICE.
AFTER CONTACT WITH SKIN, WASH IMMEDIATELY WITH PLENTY OF WATER.
WEAR SUITABLE PROTECTIVE CLOTHING, GLOVES AND EYE/FACE PROTECTION.

SECTION 4. - - - - - - FIRST-AID MEASURES - - - - - - - -

IN CASE OF CONTACT, IMMEDIATELY FLUSH EYES OR SKIN WITH copious AMOUNTS OF WATER FOR AT LEAST 15 MINUTES WHILE REMOVING CONTAMINATED CLOTHING AND SHOES.
IF INHALED, REMOVE TO FRESH AIR. IF NOT BREATHING GIVE ARTIFICIAL RESPIRATION. IF BREATHING IS DIFFICULT, GIVE OXYGEN.

SECTION 5. - - - - - - FIRE FIGHTING MEASURES - - - - - - -

EXTINGUISHING MEDIA

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MATERIAL SAFETY DATA SHEET PAGE 2

CATALOG #: 27037-7
NAME: TOLUENE, 99.8%, HPLC GRADE

CARBON DIOXIDE, DRY CHEMICAL POWDER OR APPROPRIATE FOAM. WATER MAY BE EFFECTIVE FOR COOLING, BUT MAY NOT EFFECT EXTINGUISHMENT.

SPECIAL FIREFIGHTING PROCEDURES
WEAR SELF-CONTAINED BREATHING APPARATUS AND PROTECTIVE CLOTHING TO PREVENT CONTACT WITH SKIN AND EYES.
USE WATER SPRAY TO COOL FIRE-EXPOSED CONTAINERS.

UNUSUAL FIRE AND EXPLOSIONS HAZARDS
VAPOR MAY TRAVEL CONSIDERABLE DISTANCE TO SOURCE OF IGNITION AND FLASH BACK.
CONTAINER EXPLOSION MAY OCCUR UNDER FIRE CONDITIONS.
FLAMMABLE LIQUID.
EMITS TOXIC FUMES UNDER FIRE CONDITIONS.

SECTION 6. ACCIDENTAL RELEASE MEASURES
WEAR SELF-CONTAINED BREATHING APPARATUS, RUBBER BOOTS AND HEAVY RUBBER GLOVES.
COVER WITH AN ACTIVATED CARBON ADSORBENT, TAKE UP AND PLACE IN CLOSED CONTAINERS. TRANSPORT OUTDOORS.
VENTILATE AREA AND WASH SPILL SITE AFTER MATERIAL PICKUP IS COMPLETE.
EVACUATE AREA.
SHUT OFF ALL SOURCES OF IGNITION.
USE NONSPARKING TOOLS.

SECTION 7. HANDLING AND STORAGE
REFER TO SECTION 8.

SECTION 8. EXPOSURE CONTROLS/PERSONAL PROTECTION
USE ONLY IN A CHEMICAL FUME HOOD.
SAFETY SHOWER AND EYE BATH.
WASH THOROUGHLY AFTER HANDLING.
DO NOT BREATHE VAPOR.
DO NOT GET IN EYES, ON SKIN, ON CLOTHING.
AVOID PROLONGED OR REPEATED EXPOSURE.
SELF-CONTAINED BREATHING APPARATUS SHOULD BE WORN.
COMPATIBLE CHEMICAL-RESISTANT GLOVES.
CHEMICAL SAFETY GOGGLES.
KEEP TIGHTLY CLOSED.
KEEP AWAY FROM HEAT, SPARKS, AND OPEN FLAME.
STORE IN A COOL DRY PLACE.
TOXIC.
SEVERE IRRITANT.

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

PHYSICAL PROPERTIES
BOILING POINT: 110.6 C
MELTING POINT: -93 C

CONTINUED ON NEXT PAGE

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 MATERIAL SAFETY DATA SHEET  PAGE 3

CATALOG #: 27037-7
NAME: TOLUENE, 99.8%, HPLC GRADE
FLASHPOINT: 40 F
4C
EXPLOSION LIMITS IN AIR: 7%
UPPER 1%
LOWER AUTOIGNITION TEMPERATURE: 997 F
26MM 25 C
VAPOR PRESSURE: 22MM 20 C
SPECIFIC GRAVITY: 0.865
VAPOR DENSITY: 3.2

SECTION 10. STABILITY AND REACTIVITY
STABILITY
STABLE.
INCOMPATIBILITIES
STRONG OXIDIZING AGENTS
HAZARDOUS COMBUSTION OR DECOMPOSITION PRODUCTS
CARBON MONOXIDE, CARBON DIOXIDE
HAZARDOUS POLYMERIZATION
WILL NOT OCCUR.

SECTION 11. TOXICOLOGICAL INFORMATION
ACUTE EFFECTS
CAUSES SEVERE SKIN IRRITATION.
HARMFUL IF ABSORBED THROUGH SKIN.
CAUSES SEVERE EYE IRRITATION.
HIGH CONCENTRATIONS ARE EXTREMELY DESTRUCTIVE TO THE TISSUE OF THE
MUCOUS MEMBRANES AND UPPER RESPIRATORY TRACT.
HARMFUL IF SWALLOWED.
EXPOSURE CAN CAUSE:
LUNG IRRITATION, CHEST PAIN AND EDEMA WHICH MAY BE FATAL.
MAY CAUSE NERVOUS SYSTEM DISTURBANCES.
INHALATION STUDIES ON TOLUENE HAVE DEMONSTRATED THE DEVELOPMENT OF
INFLAMMATORY AND ULCEROUS LESIONS OF THE PENIS, PREPUCE AND SCROTUM IN
ANIMALS.

CHRONIC EFFECTS
TARGET ORGAN(S):
BRAIN
LIVER
KIDNEYS
BLADDER

RTCS #: XS5250000
TOLUENE

IRRITATION DATA
EYE-HMN 300 PPM

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JIHTAB 25,282,1943

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MATERIAL SAFETY DATA SHEET PAGE 4

CATALOG #: 27037-7
NAME: TOluene, 99.8%, HPLC grade

<table>
<thead>
<tr>
<th>CATALOG #</th>
<th>NAME</th>
<th>Toluene, 99.8%, HPLC grade</th>
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<tbody>
<tr>
<td>SKN-RBT</td>
<td>500 MG MOD</td>
<td>FCTOD7 20,563,1982</td>
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<tr>
<td>SKN-RBT</td>
<td>870 MG MLD</td>
<td>85JCAE - 29,1986</td>
</tr>
<tr>
<td>EYE-RBT</td>
<td>85JCAE - 29,1986</td>
<td></td>
</tr>
<tr>
<td>EYE-RBT</td>
<td>100 MG/30S RINSE MLD</td>
<td>FCTOD7 20,573,1982</td>
</tr>
</tbody>
</table>

TOXICITY DATA

| ORL-HMN | LDLo: 50 MG/KG | YAKUD5 22,883,1980 |
| IHL-RAT | LD50: 636 MG/KG | NRTXDN 2,567,1961 |
| IHL-RAT | LC50: 49 GM/M3/4H | GTPZAB 32(10), 23, 1988 |
| IPR-RAT | LD50: 1132 MG/KG | ENVRAI 40, 411, 1986 |
| IVN-RAT | LD50: 1960 MG/KG | MELAAS 5, 486, 1963 |
| UNR-RAT | LD50: 6900 MG/KG | GISAAA 45(12), 64, 1980 |
| IHL-MUS | LC50: 110 MG/24H | NRTXDN 2,567,1981 |
| IPR-MUS | LD50: 59 MG/KG | NRTXDN 2,567,1981 |
| SCU-MUS | LD50: 2250 MG/KG | NRTXDN 8, 237, 1987 |
| UNR-MUS | LD50: 22 GM/KG | GISAAA 45(12), 64, 1980 |
| SKN-RBT | LD50: 14100 UL/KG | AIHAAP 30, 470, 1969 |
| IPR-GPG | LD50: 500 MG/KG | NRTXDN 2,567,1981 |
| ORL-MAM | LD50: 4 GM/KG | GTPZAB 32(10), 25, 1988 |
| IHL-MAM | LC50: 30 GM/M3 | GTPZAB 32(10), 25, 1988 |

TARGET ORGAN DATA

BRAIN AND COVERINGS (RECORDINGS FROM SPECIFIC AREAS OF CNS)

AUTONOMIC NERVOUS SYSTEM (OTHER: PARASYMPATHOMIMETIC)

BEHAVIORAL (GENERAL ANESTHETIC)

BEHAVIORAL (SOMNOLENCE)

BEHAVIORAL (HALLUCINATIONS, DISTORTED PERCEPTIONS)

BEHAVIORAL (CONVULSIONS OR EFFECT ON SEIZURE THRESHOLD)

BEHAVIORAL (CHANGE IN MOTOR ACTIVITY)

BEHAVIORAL (MUSCLE CONTRACTION OR SPASTICITY)

BEHAVIORAL (ANTIPSYCHOTIC)

BEHAVIORAL (IRRITABILITY)

BEHAVIORAL (CHANGE IN PSYCHOPHYSIOLOGICAL TESTS)

LUNGS, THORAX OR RESPIRATION (OTHER CHANGES)

BLOOD (CHANGES IN BONE MARROW NOT INCLUDED IN ABOVE)

MATERNAL EFFECTS (OTHER EFFECTS ON FEMALE)

EFFECTS ON FERTILITY (ABORTION)

SPECIFIC DEVELOPMENTAL ABNORMALITIES (MUSCULOSKELETAL SYSTEM)

SPECIFIC DEVELOPMENTAL ABNORMALITIES (UROGENITAL SYSTEM)

EFFECTS ON NEWBORN (BIOCHEMICAL AND METABOLIC)

EFFECTS ON NEWBORN (PHYSICAL)

EFFECTS ON NEWBORN (DELAYED EFFECTS)

ONLY SELECTED REGISTRY OF TOXIC EFFECTS OF CHEMICAL SUBSTANCES (RTECS) DATA IS PRESENTED HERE. SEE ACTUAL ENTRY IN RTECS FOR COMPLETE INFORMATION.

SECTION 12. - - - - - - ECOLOGICAL INFORMATION - - - - - - - -

DATA NOT YET AVAILABLE.

SECTION 13. - - - - - - DISPOSAL CONSIDERATIONS - - - - - -

CONTINUED ON NEXT PAGE 3145
CATALOG #: 27037-7
NAME: TOLUENE, 99.8%, HPLC GRADE

BURN IN A CHEMICAL INCINERATOR EQUIPPED WITH AN AFTERBURNER AND SCRUBBER BUT EXERT EXTRA CARE IN IGNITING AS THIS MATERIAL IS HIGHLY FLAMMABLE.
OBSERVE ALL FEDERAL, STATE AND LOCAL ENVIRONMENTAL REGULATIONS.

SECTION 14. TRANSPORT INFORMATION

SECTION 15. REGULATORY INFORMATION

EUROPEAN INFORMATION
EC INDEX NO: 601-021-00-3
HIGHLY FLAMMABLE
TOXIC
R 11
R 20
HARMFUL BY INHALATION.
S 16
KEEP AWAY FROM SOURCES OF IGNITION - NO SMOKING.
S 23
DO NOT BREATH FUMES.
S 29
DO NOT EMPTY INTO DRAINS.
S 33
TAKE PRECAUTIONARY MEASURES AGAINST STATIC DISCHARGES.

REVIEWS, STANDARDS, AND REGULATIONS

OEL=MAK
ACGIH TLV-NOT CLASSIFIABLE AS A HUMAN CARCINOGEN. DTLVS* TLV/BEI 1997
ACGIH TLV-TWA 188 MG/M3 (50 PPM) (SKIN). DTLVS* TLV/BEI 1997
IARC CANCER REVIEW: ANIMAL INADEQUATE EVIDENCE IMEMDT 47.79 1989
IARC CANCER REVIEW: HUMAN INADEQUATE EVIDENCE IMEMDT 47.79 1989
IARC CANCER REVIEW: GROUP 3 IMEMDT 47.79 1989
MSHA STANDARD-AIR: TWA 100 PPM (375 MG/M3) (SKIN)
DTLWS* 29 1973
OSHA PEL (GEN INDU): 8H TWA 200 PPM; CL 300; PK 500/10M
CFRGR 29 1926.55 1994
OSHA PEL (CONSTRUC): 8H TWA 200 PPM (750 MG/M3)
CFRGR 29 1918.1000 1993
OSHA PEL (SHIPPING): 8H TWA 200 PPM (750 MG/M3)
CFRGR 29 1915.1000 1993
OSHA PEL (FED CONT): 8H TWA 200 PPM (750 MG/M3)
CFRGR 41 50-204.50 1994
OEL-AUSTRALIA: TWA 100 PPM (375 MG/M3); STEL 150 PPM (560 MG/M3) JAN 1993
OEL-AUSTRIA: MAK 100 PPM (380 MG/M3) JAN 1999
OEL-BELGIUM: TWA 100 PPM (377 MG/M3); STEL 150 PPM (565 MG/M3) JAN 1993
OEL-DENMARK: TWA 35 PPM (130 MG/M3) SKIN JAN 1999
OEL-FINLAND: TWA 100 PPM (375 MG/M3); STEL 150 PPM; SKIN JAN 1993

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MATERIAL SAFETY DATA SHEET PAGE 6

CATALOG #: 27037-7
NAME: TOLUENE, 99.8%, HPLC GRADE

OEL-GERMANY: TWA 100 PPM (380 MG/M3) JAN 1993
OEL-RAIJA: OEL 50 PPM (188 MG/M3), JAN 1999
OEL-HUNGARY: TWA 100 MG/M3; STEL 300 MG/M3, SKIN JAN 1993
OEL-JAPAN: TWA 100 PPM (380 MG/M3) JAN 1993
OEL-POLAND: MAC(TWA) 100 MG/M3, MAC(STEL) 350 MG/M3, JAN 1999
OEL-THE NETHERLANDS: TWA 100 PPM (375 MG/M3); SKIN JAN 1993
OEL-THE PHILIPPINES: TWA 100 PPM (375 MG/M3), JAN 1993
OEL-RUSSIA: TWA 100 PPM, STEL 50 MG/M3, JAN 1993
OEL-SWEDEN: TWA 50 PPM (200 MG/M3); STEL 100 PPM (400 MG/M3); SKIN JAN 1993
OEL-SWITZERLAND: TWA 100 PPM (380 MG/M3); STEL 500 PPM, JAN 1993
OEL-THAILAND: TWA 200 PPM; STEL 300 PPM, JAN 1993
OEL-TURKEY: TWA 200 PPM (350 MG/M3) JAN 1993
OEL UNITED KINGDOM: TWA 100 PPM (375 MG/M3); STEL 150 PPM; SKIN JAN 1993
OEL IN BULGARIA, COLOMBIA, JORDAN, KOREA CHECK ACGIH TLV
OEL IN NEW ZEALAND, SINGAPORE, VIETNAM CHECK ACGIH TLV
NIOSH REL TO TOLUENE- AIR: 10H TWA 100 PPM; STEL 150 PPM
NIOSH* DHHS #92-100, 1992
NOHS 1974: HZD 73300; NIS 412; TNS 125516; NOS 296; TNE 1589482
NOES 1983: HZD 73300; NIS 393; TNS 128510; NOS 232; TNE 2015881; TFE 391255
ATSDR TOXICOLOGY PROFILE: (NTIS** PB/90/198904/AS)
EPA GENETOX PROGRAM 1988, NEGATIVE: CELL TRANSFORM. -SA7/SHE; IN VITRO
OEL HUMAN
EPA GENETOX PROGRAM 1988, NEGATIVE: SPERM MORPHOLOGY-MOUSE
EPA GENETOX PROGRAM 1988, INCONCLUSIVE: E COLI POLA WITHOUT S9
EPA TSCA SECTION 8(B) CHEMICAL INVENTORY
EPA TSCA 8(A) PRELIMINARY ASSESSMENT INFORMATION, FINAL RULE
PERAC 47.26992.82
EPA TSCA SECTION 8(D) UNPUBLISHED HEALTH/SAFETY STUDIES ON EPA IRIS DATABASE
EPA TSCA TEST SUBMISSION (TSCATS) DATA BASE, JUNE 1999
NIOSH ANALYTICAL METHOD, 1994: TOLUENE IN BLOOD, 8002
NIOSH ANALYTICAL METHOD, 1994: HYDROCARBONS, BP 36-126 DEGREE C, 1500
NIOSH ANALYTICAL METHOD, 1994: HYDROCARBONS, AROMATIC, 1501
NIOSH ANALYTICAL METHOD, 1994: TOLUENE (PASSIVE) 4000
NTP CARCINOGENESIS STUDIES (INHALATION); NO EVIDENCE: MOUSE, RAT
NTPTR* NTP-TR-371, 1990

U.S. INFORMATION
THIS PRODUCT IS SUBJECT TO SARA SECTION 313 REPORTING REQUIREMENTS.
THIS PRODUCT IS OR CONTAINS CHEMICAL(S) KNOWN TO THE STATE OF
CALIFORNIA TO CAUSE DEVELOPMENTAL TOXICITY.
CALIFORNIA PROPOSITION 65:

SECTION 16. - - - - - - - - - - OTHER INFORMATION - - - - - - - - - - - - - - -
THE ABOVE INFORMATION IS BELIEVED TO BE CORRECT BUT DOES NOT PURPORT TO
BE ALL INCLUSIVE AND SHALL BE USED ONLY AS A GUIDE. ALDRICH SHALL NOT BE
HELD LIABLE FOR ANY DAMAGE RESULTING FROM HANDLING OR PROM CONTACT WITH
THE ABOVE PRODUCT. SEE REVERSE SIDE OF INVOICE OR PACKING SLIP FOR

CONTINUED ON NEXT PAGE
MATERIAL SAFETY DATA SHEET

CATALOG #: 27037-7
NAME: TOLUENE, 99.8%, HPLC GRADE

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RONKONKOMA, NEW YORK 11779-7238, USA

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