VALID 02/1999 - 04/1999

SIGMA CHEMICAL CO.
P.O. BOX 14508
ST. LOUIS, MO 63178 USA
TEL: 314-771-5765

MATERIAL SAFETY DATA SHEET

SECTION 1. - - - - - - - - - - CHEMICAL IDENTIFICATION - - - - - - - - - -
CATALOG #: M3634
NAME: MANGANESE CHLORIDE TETRAHYDRATE

SECTION 2. - - - - COMPOSITION/INFORMATION ON INGREDIENTS - - - - -
CAS #: 13446-34-9
MF: CL2M N
SYNONYMS
MANGANESE DICHLORIDE TETRAHYDRATE * MANGANOUS CHLORIDE TETRAHYDRATE *

SECTION 3. - - - - - - - - - - HAZARDS IDENTIFICATION - - - - - - - -
LABEL PRECAUTIONARY STATEMENTS
HARMFUL
HARMFUL IF SWALLOWED.
IRRITATING TO EYES, RESPIRATORY SYSTEM AND SKIN.
POTENTIAL RISK OF IRREVERSIBLE EFFECTS.
TARGET ORGAN(S):
NERVES
LUNGS
IN CASE OF CONTACT WITH EYES, RINSE IMMEDIATELY WITH PLENTY OF
WATER AND SEEK MEDICAL ADVICE.
WEAR SUITABLE PROTECTIVE CLOTHING.

SECTION 4. - - - - - - - - - - FIRST-AID MEASURES - - - - - - - - - -
IN CASE OF CONTACT, IMMEDIATELY FLUSH EYES WITH COPIOUS AMOUNTS OF
WATER FOR AT LEAST 15 MINUTES.
IN CASE OF CONTACT, IMMEDIATELY WASH SKIN WITH SOAP AND COPIOUS
AMOUNTS OF WATER.
IF INHALED, REMOVE TO FRESH AIR. IF NOT BREATHING GIVE ARTIFICIAL
RESPIRATION. IF BREATHING IS DIFFICULT, GIVE OXYGEN.
IF SWALLOWED, WASH OUT MOUTH WITH WATER PROVIDED PERSON IS CONSCIOUS.
CALL A PHYSICIAN.
WASH CONTAMINATED CLOTHING BEFORE REUSE.

SECTION 5. - - - - - - - - - - FIRE FIGHTING MEASURES - - - - - - - - -
EXTINGUISHING MEDIA
NONCOMBUSTIBLE.
USE EXTINGUISHING MEDIA APPROPRIATE TO SURROUNDING FIRE CONDITIONS.
SPECIAL FIREFIGHTING PROCEDURES
WEAR SELF-CONTAINED BREATHING APPARATUS AND PROTECTIVE CLOTHING TO
PREVENT CONTACT WITH SKIN AND EYES.
UNUSUAL FIRE AND EXPLOSIONS HAZARDS
EMITS TOXIC FUMES UNDER FIRE CONDITIONS.

SECTION 6. - - - - - - - - - - ACCIDENTAL RELEASE MEASURES - - - - - - - - -
WEAR SELF-CONTAINED BREATHING APPARATUS, RUBBER BOOTS AND HEAVY
RUBBER GLOVES.
Sweep up, place in a bag and hold for waste disposal.
AVOID RAISING DUST.
VENTILATE AREA AND WASH SPILL SITE AFTER MATERIAL PICKUP IS COMPLETE.

SECTION 7. - - - - - - - - - - HANDLING AND STORAGE - - - - - - - - -
REFER TO SECTION 8.

SECTION 8. - - - - - - - - EXPOSURE CONTROLS/PERSONAL PROTECTION - - - - -
WEAR APPROPRIATE NIOSH/MSHA-APPROVED RESPIRATOR, CHEMICAL-RESISTANT
GLOVES, SAFETY GOGGLES, OTHER PROTECTIVE CLOTHING.
SAFETY SHOWER AND EYE BATH.
USE ONLY IN A CHEMICAL FUME HOOD.
DO NOT BREATHE DUST.
DO NOT GET IN EYES, ON SKIN, ON CLOTHING.
AVOID PROLONGED OR REPEATED EXPOSURE.
WASH THOROUGHLY AFTER HANDLING.
KEEP Tightly CLOSED.

SECTION 9. - - - - - - PHYSICAL AND CHEMICAL PROPERTIES - - - - - -
APPEARANCE AND ODOR
PINK CRYSTALS
PHYSICAL PROPERTIES
MELTING POINT:  58 C
SPECIFIC GRAVITY:  2.010

SECTION 10. - - - - - - - - STABILITY AND REACTIVITY - - - - - - -
STABILITY
STABLE.
INCOMPATIBILITIES
STRONG ACIDS
REACTS VIOLENTLY WITH:
SODIUM
POTASSIUM
ZINC
PROTECT FROM MOISTURE.
HAZARDOUS COMBUSTION OR DECOMPOSITION PRODUCTS
HYDROGEN CHLORIDE GAS
HAZARDOUS POLYMERIZATION
WILL NOT OCCUR.

SECTION 11. - - - - - - - - TOXICOLOGICAL INFORMATION - - - - - - -
ACUTE EFFECTS
HARMFUL IF SWALLOWED.
MAY BE HARMFUL IF INHALED.
MAY BE HARMFUL IF ABSORBED THROUGH THE SKIN.
CAUSES EYE AND SKIN IRRITATION.
MATERIAL IS IRRITATING TO MUCOUS MEMBRANES AND UPPER
RESPIRATORY TRACT.

CHRONIC EFFECTS
LABORATORY EXPERIMENTS HAVE SHOWN MUTAGENIC EFFECTS.
MEN EXPOSED TO MANGANESE DUSTS SHOWED A DECREASE IN FERTILITY.
CHRONIC MANGANESE POISONING PRIMARILY INVOLVES THE CENTRAL NERVOUS
SYSTEM. EARLY SYMPTOMS INCLUDE LANGUOR, SLEEPINESS AND WEAKNESS IN
THE LEGS. A STOLID MASK-LIKE APPEARANCE OF THE FACE, EMOTIONAL
DISTURBANCES SUCH AS UNCONTROLLABLE LAUGHTER AND A SPASTIC GAIT WITH
TENDENCY TO FALL IN WALKING ARE FINDINGS IN MORE ADVANCED CASES. HIGH
INCIDENCE OF PNEUMONIA HAS BEEN FOUND IN WORKERS EXPOSED TO THE DUST
OR FUME OF SOME MANGANESE COMPOUNDS.

TARGET ORGAN(S):
CENTRAL NERVOUS SYSTEM
LUNGS
TO THE BEST OF OUR KNOWLEDGE, THE CHEMICAL, PHYSICAL, AND
TOXICOLOGICAL PROPERTIES HAVE NOT BEEN THOROUGHLY INVESTIGATED.

RTECS #: 009650000
MANGANESE(II) CHLORIDE, TETRAHYDRATE

TOXICITY DATA
ORL-RAT LD50:1484 MG/KG  EVHFA2 10,95,1975
IPR-RAT LD50:138 MG/KG  EVHFA2 10,95,1975
PAR-RAT LD50:225 MG/KG  JINCAO 41,1507,1979
IPR-MUS LD50:144 MG/KG  TXAPA9 63,461,1982
SCU-MUS LD50:320 MG/KG  TOLED5 69,45,1993

TARGET ORGAN DATA
PATERNAL EFFECTS (TESTES, EPIDIDYMIS, SPERM DUCT)
MATERNAL EFFECTS (OTHER EFFECTS ON FEMALE)
EFFECTS ON FERTILITY (POST-IMPLANTATION MORTALITY)
EFFECTS ON EMBRYO OR FETUS (FETO TOXICITY)
SPECIFIC DEVELOPMENTAL ABNORMALITIES (MUSCULOSKELETAL SYSTEM)
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 - - - - - - - -
THE MATERIAL SHOULD BE DISSOLVED IN 1) WATER; 2) ACID SOLUTION OR 3)
OXIDIZED TO A WATER-SOLUBLE STATE. PRECIPITATE THE MATERIAL AS THE
SULFIDE, ADJUSTING THE PH OF THE SOLUTION TO 7 TO COMPLETE PRE-
CIPITATION. FILTER THE INSOLUBLES AND DISPOSE OF THEM IN A HAZARDOUS-
WASTE SITE. DESTROY ANY EXCESS SULFIDE WITH SODIUM HYPOCHLORITE.
NEUTRALIZE THE SOLUTION BEFORE FLUSHING DOWN THE DRAIN.
OBSERVE ALL FEDERAL, STATE AND LOCAL ENVIRONMENTAL REGULATIONS.

SECTION 14. - - - - - - - - TRANSPORT INFORMATION - - - - - - - -
CONTACT SIGMA CHEMICAL COMPANY FOR TRANSPORTATION INFORMATION.

SECTION 15. - - - - - - - - REGULATORY INFORMATION - - - - - - - -
EUROPEAN INFORMATION
CAUTION: SUBSTANCE NOT YET FULLY TESTED.
HARMFUL
R 22
HARMFUL IF SWALLOWED.
R 36/37/38
IRRITATING TO EYES, RESPIRATORY SYSTEM AND SKIN.
R 40
POSSIBLE RISK OF IRREVERSIBLE EFFECTS.
S 26
IN CASE OF CONTACT WITH EYES, RINSE IMMEDIATELY WITH PLENTY OF
WATER AND SEEK MEDICAL ADVICE.
S 36
WEAR SUITABLE PROTECTIVE CLOTHING.

REVIEWS, STANDARDS, AND REGULATIONS

OEL=MAK
ACGIH TLV-TWA 0.2 MG(MN)/M3
MSHA STANDARD-AIR:CL 5 MG(MN)/M3
DTLV* 3,149,1971
OSHA PEL (GEN INDU):CL 5 MG(MN)/M3
CNRB 29,1910.1000,1994
OSHA PEL (CONSTRUC):CL 5 MG(MN)/M3
CNRB 29,1926.55,1994
OSHA PEL (SHIPYARD):CL 5 MG(MN)/M3
CNRB 29,1915.1000,1993
OSHA PEL (FED CONT):CL 5 MG(MN)/M3
CNRB 41,50-204.50,1994
OEL-AUSTRALIA:TLV=2.5 MG(MN)/M3 JAN 1993
OEL-BELGIUM:TLV=AVERAGE 2.5 MG(MN)/M3 JAN 1993
OEL-DENMARK:TLV=2.5 MG(MN)/M3 JAN 1993
OEL-FINLAND:TLV=2.5 MG(MN)/M3 JAN 1993
OEL-HUNGARY:TLV=2.5 MG(MN)/M3; STEL 0.6 MG(MN)/M3 JAN 1993
OEL-JAPAN:TLV=2.5 MG(MN)/M3 JAN 1993
OEL-THE NETHERLANDS:TLV=2.5 MG(MN)/M3 JAN 1993
OEL-POLAND:TLV=2.5 MG(MN)/M3 JAN 1993
OEL-SWEDEN:TLV=2.5 MG(MN)/M3; STEL 2.5 MG(MN)/M3 (RESP. DUST) JAN 1993
OEL-SWEDEN:TLV=2.5 MG(MN)/M3; STEL 5 MG(MN)/M3 (TOTAL DUST) JAN 1993
OEL-UNITED KINGDOM:TLV=2.5 MG(MN)/M3 JAN 1993
OEL IN BULGARIA, COLOMBIA, JORDAN, KOREA CHECK ACGIH TLV
OEL IN NEW ZEALAND, SINGAPORE, VIETNAM CHECK ACGIH TLV
NOS 1983: HZD X1985; NIS 3; TNT 110; NOS 5; TNE 3297; TTE 1033

U.S. INFORMATION
THIS PRODUCT IS SUBJECT TO SARA SECTION 313 REPORTING REQUIREMENTS -
MANGANESE COMPOUNDS.

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. SIGMA, ALDRICH,
FLUKA SHALL NOT BE HELD LIABLE FOR ANY DAMAGE RESULTING FROM HANDLING
OR FROM CONTACT WITH THE ABOVE PRODUCT. SEE REVERSE SIDE OF INVOICE OR
PACKING SLIP FOR ADDITIONAL TERMS AND CONDITIONS OF SALE.