

## EMERGENCY MEDICAL TREATMENT GUIDE

# METHYLISOTHIOCYANATE (MITC) EXPOSURE RESULTING FROM TREATED FIELD VAPOR

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**SYNONYMS:** Isothiocyanatomethane; Isothiocyanic acid, methyl ester; Methane, isothiocyanato-; Methyl mustard; Methyl mustard oil; Morton EP-161E; Trapex; Trapexide; Vorlex (Nor-Am); Vorlex 201 (Nor-Am); WN 12.

**USE:** MITC is the conversion product of metam sodium and metam potassium, which are agricultural pesticides applied for soil treatment. Brand names for metam products include Vapam, Kapam, Sectagon, and Metam CLR.

**APPEARANCE and PHYSICAL FORM:** MITC is a colorless gas with horseradish-like odor.

**ADVERSE EFFECTS:** MITC may be harmful if inhaled and cause chemical burns to the respiratory tract. Aspiration may lead to pulmonary edema. MITC is corrosive to the skin and eyes and may be fatal if absorbed through the skin. It may also cause chemical conjunctivitis and corneal damage and is a severe lachrymator. MITC exposure may result in possible skin sensitization.

**CLINICAL EFFECTS:** MITC behaves as a mild irritant at concentrations greater than 0.8 ppm and larger exposures can often be detected through eye sensation within 5 minutes of exposure. The odor threshold for MITC is 1.7 ppm.

### MILD EXPOSURES:

Potential clinical effects from mild exposures to MITC such as inhalation and eye contact with low concentrations that may be associated with vapor from a treated field include:

- Irritation of the eyes, skin, lungs, and the mucous membranes of the gastrointestinal tract.
- Eye irritation at low exposure (800 ppb) may take hours to become noticeable and may include lacrimation.
- Skin exposure may result in erythema (redness of the skin) and skin burns (blisters) to the skin.
- Inhalation/ingestion exposure may result in mucosal irritation of respiratory and gastrointestinal tracts resulting in nausea, vomiting and abdominal pain.

### SEVERE EXPOSURE:

Potential clinical effects from severe exposures to MITC that may follow accidental spills or product misuse may include:

- Severe eye irritation to chemical burning of the cornea.
- Skin burns (redness and blisters) and possible skin sensitization.
- Gastrointestinal tract burns following swallowing of MITC.
- Chemical burns to the respiratory tract following inhalation exposure.

Higher levels of exposure can result in pulmonary edema and bronchial pneumonia.

TREATMENT: Treatment is symptomatic and supportive. If necessary, remove person to fresh air and provide ventilator support.

#### REFERENCES

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5. Bretaudeau Deguigne, M., Lagarce, L., Boels, D., Harry, P., 2011. Metam sodium intoxication: the specific role of degradation products- methyl isothiocyanate and carbon disulphide- as a function of exposure. Clin. Toxicol., 49(5), 416-422.
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9. Material Safety Data Sheet: Metam CLR™ 42%, 2004.
10. Amended Reregistration Eligibility Decision (RED) Document for Methylthiocarbamate Salts (Metam-sodium, Metam-potassium) and Methyl Isothiocyanate (MITC) List B Case Nos. 2390 and 2405, EPA 738-R-09-310 (May 2009).

## TOXICOLOGY BACKGROUND

### Airborne methyl iso-thiocyanate (MITC) vapor

Exposure to airborne concentrations of MITC vapor from a treated field during or immediately after treatment with metam sodium is unlikely to produce more than local, transient sensory irritation effects such as eye and upper respiratory irritation.

### Human Subject Testing

Human subject exposure resulted in eye irritation, detected as statistically significant increases in perception of irritation and eye-blink rate, at air concentrations as low as 800 ppb in human volunteers exposed through specially-fitted goggles. The resultant no observed effect level (NOEL) was 220 ppb.

### Laboratory Animal Inhalation Studies

Animal studies have demonstrated both acute systemic toxicity and irritative capacity of MITC. Acute oral gavage exposure to rats between 25 and 300 mg/kg resulted in LD<sub>50</sub> of 55 mg/kg in females (F) and 82 mg/kg in males (M). Dermal exposure studies of rats at a dose range of 60-600 mg/kg resulted in LD<sub>50</sub> of 181 (F) and 225 (M) mg/kg. Dermal studies of rabbits at a dose range of 50-300 mg/kg yielded LD<sub>50</sub> of 202 (F) and 145 (M) mg/kg. Studies in rabbits confirm that MITC is a powerful irritant both to skin and eyes. Acute inhalation studies of rats show a 1-hour LC<sub>50</sub> of 633 ppm and a 4-hour LC<sub>50</sub> of 180 ppm.

### Carcinogenicity Testing

A 2-year rat and 2-year mouse drinking water study did show some evidence of tissue changes but not of a degree to classify MITC as a carcinogen.