

# Chemical Encyclopedia



## N,N-diethyl-meta-toluamide

### *Also Known As:*

DEET, N,N-diethyl-m-toluamide, diethyltoluamide

## Description

DEET is the most widely used insect repellent in the United States. DEET can only repel insects; it does not kill them. DEET is applied to skin and clothing to ward off biting and sucking insects, such as mosquitoes, flies, fleas, ticks, and chiggers, and is sold as aerosol and non-aerosol sprays, creams, lotions, sticks, foams and towelettes. Combination sun screen/insect repellent products typically contain DEET. Some formulations of DEET may also contain permethrin.

Insect repellents typically contain up to 30% DEET, and formulations of 100% DEET are also available.

Canada has begun a phaseout of insect repellents containing more than 30% DEET. Combination sunscreen/insect repellent products will no longer be permitted due to the possibility of overexposure to DEET due to multiple applications.

Insect repellents containing DEET should be used sparingly on children and only at the lowest effective concentration. They should not be used at all on children younger than two months old.

## Health Effects

### Immediate Health Effects

If SWALLOWED, N,N-diethyl-meta-toluamide is Very Highly Toxic

If ABSORBED THROUGH SKIN, N,N-diethyl-meta-toluamide is Very Highly Toxic

If INHALED (SNIFFED OR BREATHED IN), N,N-diethyl-meta-toluamide is Very Highly Toxic

### Longterm or Delayed Health Effects

This chemical is considered an Unclassifiable Carcinogen by the World Health Organization, the U.S. Environmental Protection Agency, or another agency.

### Other

Slight skin irritation. Eye irritation. In sensitive individuals, may cause allergic dermatitis.

Applying DEET to skin has occasionally produced blisters, sometimes followed by severe scarring.

There have been 18 reported cases where DEET exposure caused seizures and encephalopathy in children since 1960. Three died as a result.

If ingested, may affect the central nervous system.

In some, but not all, studies, test animals fed high doses of DEET experienced kidney and liver damage, and decreased body weight and food consumption.

In a recent study of prolonged exposure to rats, damage to brain cells was noted.

## How Exposures Occur

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### Absorption Through the Skin

Children are exposed to DEET through application of mosquito or tick repellents containing this pesticide. DEET can be absorbed through the skin and/or inhaled during use. Children could also inhale or touch DEET if it is sprayed around the home, on pets, and in pet quarters.

Overexposure to DEET is more likely if the repellent or sunscreen containing DEET is frequently applied.

### Ingestion

Children may take in excessive levels of DEET through hand to mouth activity, which is common among young children.

Ingestion of liquid formulations of DEET are also possible if kept within children's reach.

### Across the Placenta

DEET can cross the placenta and expose babies in the womb. While there is no evidence of health effects resulting from exposure during the second and third trimesters, pregnant women should avoid the use of DEET during their first trimester.

## Significant Statistics

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As of 1998, 225 products containing DEET were registered for use in the United States.

*R.E.D. (Reregistration Eligibility Decision) Facts: DEET.* U.S. Environmental Protection Agency, Office of Prevention, Pesticides, and Toxic Substances, April 1998. <http://www.epa.gov/oppsrrd1/REDs/factsheets/0002fact.pdf>

About 30% of the U.S. population uses DEET every year, including 34% of children.

*Reregistration Eligibility Decision: DEET.* U.S. Environmental Protection Agency, Office of Prevention, Pesticides, and Toxic Substances, September 1998. <http://www.epa.gov/oppsrrd1/REDs/0002red.pdf>

Between 5 and 7 million pounds of DEET are used each year in the U.S.

*1998-1999 Pesticide Market Estimates.* U.S. Environmental Protection Agency, Office of Prevention, Pesticides and Toxic Substances, August 2002. [http://www.epa.gov/oppbead1/pestsales/99pestsales/table\\_of\\_contents1999.html](http://www.epa.gov/oppbead1/pestsales/99pestsales/table_of_contents1999.html)

## Solutions

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### How to detect N,N-diethyl-meta-toluamide

Read labels. Look for the word DEET or the chemical names N,N-diethyl-m-toluamide or diethyltoluamide on packaging and ingredient lists. You can find out if DEET is an ingredient in a particular product on Pesticide Action Network Pesticide Database.

### How to minimize exposure to N,N-diethyl-meta-toluamide

If you do use insect repellents that contain DEET, choose one that contains the least amount of DEET (less than 10%).

**Do not use DEET on children and infants younger than two months old!**

Avoid combination sunscreen/insect repellent creams that contain DEET. Since sunscreens must be applied frequently and generously, use of combination formulas may result in unnecessary overexposure to DEET.

**Apply DEET only to clothing.** Do not apply to skin to minimize exposure. Use as little of the product as possible to achieve coverage. Saturation will not necessarily improve the repellent's efficacy.

If the product must be applied to skin, always test for possible skin irritation on a small area first.

Never apply DEET to children's faces or hands, which they may put in their mouth or near eyes. Never spray on cuts or irritated skin. If a reaction after use of insect repellents occurs, wash treated skin, and seek medical attention. Take the repellent with you to the hospital or doctor's office.

After coming indoors, wash treated clothing and skin well with soap and water as soon as possible.

**Alternatives**

Avoid getting bitten:

- Cover skin with clothing! Wear long-sleeved shirts, long pants, socks, closed shoes or boots instead of sandals and even hats with pull-down mosquito netting, if needed. Tuck pants into socks.

- During daylight hours, wear light-colored clothing, which heats the skin less, minimizing insect-attracting perspiration, and makes ticks easier to see.

- Avoid using scented soaps or other fragranced products that may attract bugs.

- Avoid outdoor activity at dusk when mosquitoes are most active.

If you have pets that live both indoors and out, check their fur frequently for crawling or embedded ticks that may be carried into the home. Ticks can be removed from lawn areas by devising a tick drag: Attach a large piece of white flannel to a stick or pole. Drag cloth across the grass (which simulates the passing of a host), then pick off and dispose of ticks. Freezing, burning, or drowning/flushing are effective for killing them.

In your home, keep screens closed on summer nights. Keep mosquito populations around your home down by eliminating mosquito breeding grounds, standing water. Clean clogged roof gutters. Remove old tires, flowerpots and other rainwater catchers. Refill or clean bird baths every few days.

[How To Keep Mosquitos From Biting](#) provides information on preventing and avoiding mosquito bites in a one-page list.

**For More information****Books, articles, factsheets and reports**

Kemple, Megan. "Alternatives: Protection From Mosquito Bites," *Journal for Pesticide Reform*, Vol. 21, No. 2 (Summer 2001).

<http://www.pesticide.org/mosqprotect.pdf>

Long, Becky. "Alternatives: Coping With Ticks," *Journal for Pesticide Reform*, Vol. 16, No. 4 (Winter 1996).

<http://www.pesticide.org/ticks.pdf>

*How to Use Insect Repellents Safely*, U.S. Environmental Protection Agency (April, 2002).

<http://www.epa.gov/pesticides/factsheets/insectrp.htm>

**Other government agencies**

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National Pesticide Information Center

Oregon State University  
333 Weniger Hall  
Corvallis, OR 97331-6502  
800-858-7378

<http://npic.orst.edu/>

U.S. Environmental Protection Agency

Office of Pesticide Programs  
Ariel Rios Building  
1200 Pennsylvania Ave., NW  
Washington, DC 20460

<http://www.epa.gov/pesticides>

#### **Nonprofit organizations**

Northwest Coalition for Alternatives to Pesticides (NCAP)

P.O. Box 1393  
Eugene, OR 97440  
541-344-5044

<http://www.pesticide.org>

#### **Other websites**

Pesticide Action Network Pesticide Database

<http://www.pesticideinfo.org>

Environmental Defense Chemical Scorecard

<http://www.scorecard.org>

Pesticide Action Network Pesticide Advisor

<http://www.panna.org/resources/advisor.dv.html>

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