

## Sources of Exposure

## Toxicokinetics and Biomonitoring

## Biomarkers/Environmental Levels

### General Populations

- *N*-Nitrosodiphenylamine has not been found in air, water, or soil, so it is unlikely that the general public will be exposed to this chemical.
- Persons living near facilities producing *N*-Nitrosodiphenylamine or waste sites containing it may have a higher risk of exposure to *N*-nitrosodiphenylamine.

### Occupational Populations

- Workers involved in the production and use of *N*-nitrosodiphenylamine, such as those in the rubber-processing industry, may be exposed.

### Toxicokinetics

- Little toxicokinetics information is available in animals.
- *N*-nitrosodiphenylamine is absorbed through the gastrointestinal tract, but quantitative data are not available.
- No data on distribution are available.
- Limited data suggest that the main metabolic pathway for *N*-nitrosodiphenylamine is cytochrome P-450-dependent denitrosation and ring hydroxylation in the liver.
- *N*-nitrosodiphenylamine is eliminated primarily in the urine and the main metabolite appears to be nitrate.

### NHANES Biomonitoring

- There are no data regarding levels of *N*-nitrosodiphenylamine in the general population.

### Biomarkers

- *N*-Nitrosodiphenylamine can be detected and quantitated in the blood, serum, and urine of animals, however these methods have not been used to test humans for exposure.
- In animals a metabolite of *N*-nitrosodiphenylamine has been detected in urine.

### Environmental Levels

#### *Air*

- There are no recent monitoring data for air levels *N*-nitrosodiphenylamine in the United States.

#### *Water*

- There are no recent monitoring data for water levels of *N*-nitrosodiphenylamine in the United States.

#### *Sediment and Soil*

- There are no monitoring data for levels of *N*-nitrosodiphenylamine in the sediment or soil in the United States.

### Reference

Agency for Toxic Substances and Disease Registry (ATSDR). 2017. Toxicological Profile for *N*-Nitrosodiphenylamine. Atlanta, GA: U.S. Department of Health and Human Services, Public Health Services.

# ToxGuide™ for *N*-Nitrosodiphenylamine



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U.S. Department of Health and  
Human Services  
Public Health Service  
Agency for Toxic Substances  
and Disease Registry  
[www.atsdr.cdc.gov](http://www.atsdr.cdc.gov)



## Chemical and Physical Information

## Routes of Exposure

## Relevance to Public Health (Health Effects)

### *N*-Nitrosodiphenylamine

- *N*-Nitrosodiphenylamine is an industrial compound that belongs to a group of chemicals called nitrosamines. It has been produced since 1945.
- It is an orange-brown or yellow solid.
- *N*-Nitrosodiphenylamine is not known to occur naturally in the environment, however, under laboratory conditions there is some evidence that microorganisms can produce it.
- *N*-Nitrosodiphenylamine is produced by reacting diphenylamine and sodium nitrite in water that has been acidified with sulfuric acid.
- *N*-Nitrosodiphenylamine is used as a vulcanization retardant in rubber compounds used to make tires.

- Inhalation – Likely route of exposure for the occupational populations and for people living near hazardous waste site.
- Oral – Unlikely route of exposure for the general and occupational population.
- Dermal – Possible route of exposure for occupational population.

### *N*-Nitrosodiphenylamine in the Environment

- In air, *N*-nitrosodiphenylamine exists almost entirely in the vapor phase and is decomposed by sunlight. It also reacts with hydroxyl radicals, with a half-life of 7 hours.
- *N*-Nitrosodiphenylamine is soluble in water and expected to volatilize slowly.
- It is expected that *N*-nitrosodiphenylamine has low mobility in soil. It is not expected to leach into ground water.
- In soil and water, biodegradation is the major environmental fate process for *N*-nitrosodiphenylamine.
- In laboratory tests, most *N*-nitrosodiphenylamine disappears from water and soil within several weeks.
- The relatively low experimental bioconcentration potential and short half-life of *N*-nitrosodiphenylamine indicate that biomagnification in the aquatic food chain is not expected.

Health effects are determined by the dose (how much), the duration (how long), and the route of exposure.

### Minimal Risk Levels (MRLs)

#### *Inhalation*

- No acute- ( $\leq 14$  days), intermediate- (15–364 days), or chronic ( $\geq 365$  days) duration inhalation MRLs were derived for *N*-nitrosodiphenylamine.

#### *Oral*

- No acute- ( $\leq 14$  days), intermediate- (15–364 days), or chronic ( $\geq 365$  days) duration oral MRLs were derived for *N*-nitrosodiphenylamine.

### Health Effects

- There is no information regarding health effects of *N*-nitrosodiphenylamine in humans.
- In rats and mice, epithelial hyperplasia of the urinary bladder was reported after acute, intermediate, and chronic oral exposure.
- Increased incidence of urinary bladder cancer has been reported in rats after chronic oral exposure to *N*-nitrosodiphenylamine.
- The EPA has classified *N*-nitrosodiphenylamine as a probable human carcinogen (Group B2), IARC has classified it in Group 3, not classifiable as to its carcinogenicity to humans and the Department of Health and Human Services (HHS) has not classified *N*-nitrosodiphenylamine as to its carcinogenicity.

### Children's Health

- It is not known if children are more sensitive to *N*-nitrosodiphenylamine exposure than adults.