

## Sources of Exposure

## Toxicokinetics and Biomonitoring

## Biomarkers/Environmental Levels

### General Populations

- The general population can be exposed to N-nitrosodi-n-propylamine in sodium nitrite-treated foods (e.g., certain cheeses, cured meats and fish) and certain alcoholic beverages.
- Exposure can also occur from *in vivo* generation during digestion of nitrite- or secondary amine-containing foods or drugs.
- Low level exposure may occur through inhalation of cigarette smoke.
- There is no evidence of general population exposure through ingestion of contaminated drinking water or through dermal contact.
- Typical N-nitrosodi-n-propylamine exposure levels have not been quantified.

### Occupational Populations

- Occupational exposure may occur in industries involved in the production and use of N-nitrosodi-n-propylamine, such as the rubber-processing industry.
- Workers at hazardous waste sites could potentially be exposed to this compound by inhalation and dermal contact.

### Toxicokinetics

- N-Nitrosodi-n-propylamine is absorbed following oral and dermal exposure, and presumably following inhalation exposure; however, no data are available on the extent of absorption (bioavailability).
- There are limited data on the distribution of N-nitrosodi-n-propylamine. Studies of related nitrosoamines suggest that it would be widely distributed.
- The primary pathway of metabolism of N-nitrosodi-n-propylamine is hydroxylation at the  $\alpha$  carbon. This pathway ultimately results in the formation of propionaldehyde, 1-propanol, and 2-propanol metabolites.
- N-Nitrosodi-n-propylamine is primarily excreted in the urine as metabolites.

### NHANES Biomonitoring

- There are no data regarding levels of N-nitrosodi-n-propylamine in the general population.

### Biomarkers

- No biomarkers of exposure have been identified for N-nitrosodi-n-propylamine.

### Environmental Levels

#### *Air*

- There are no recent monitoring data for air levels of N-nitrosodi-n-propylamine in the United States.

#### *Water*

- There are no recent monitoring data for water levels of N-nitrosodi-n-propylamine in the United States.

#### *Sediment and Soil*

- There are no monitoring data for levels of N-nitrosodi-n-propylamine in the sediment or soil in the United States.

### Reference

Agency for Toxic Substances and Disease Registry (ATSDR). 2019. Toxicological Profile for N-Nitrosodi-n-propylamine. Atlanta, GA: U.S. Department of Health and Human Services, Public Health Services.

# ToxGuide™ for N-Nitrosodi-n-propylamine



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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-Nitrosodi-n-propylamine belongs to a group of chemicals referred to as nitrosoamines.
- It is a yellow liquid at room temperature.
- N-Nitrosodi-n-propylamine is produced in small, laboratory-scale quantities for research purposes.
- It is also produced inadvertently during certain manufacturing processes, occurring as an impurity in some dinitroaniline pesticides and during manufacture of some extruded rubber products.

- Inhalation – Likely route of exposure for the occupational populations and general population.
- Oral – Likely route of exposure for the general population.
- Dermal – Possible route of exposure for occupational population.

### N-Nitrosodiphenylamine in the Environment

- N-Nitrosodi-n-propylamine should exist almost entirely in the vapor phase in the atmosphere.
- If N-nitrosodi-n-propylamine were applied to warm, moist soil surfaces, most of the nitrosamine would be expected to volatilize.
- In soil, N-nitrosodi-n-propylamine is expected to be highly mobile and it has the potential to leach into shallow groundwater.
- In the atmosphere, N-nitrosodi-n-propylamine vapor would be rapidly degraded by direct photolysis and/or reaction with photochemically-generated hydroxyl radicals.
- In soil and water, degradation of N-nitrosodi-n-propylamine likely occurs by photolysis on the surfaces and by microbes below the surface.
- Bioaccumulation in aquatic organisms 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-nitrosodi-n-propylamine.

#### Oral

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

### Health Effects

- There is little information regarding health effects of N-nitrosodi-n-propylamine in humans.
- Evidence of liver damage, including necrosis and increased pentobarbital-induced sleep time, have been observed in laboratory animals following acute-duration exposure.
- Forestomach, nasal, lung, and liver tumors have been observed in laboratory animals following intermediate-duration oral exposure.
- The U.S. Department of Health and Human Services categorized N-nitrosodi-n-propylamine as reasonably anticipated to be a human carcinogen, the U.S. Environmental Protection Agency (EPA) categorized it as a probable human carcinogen (Group B2), and the International Agency for Research on Cancer categorized it as possibly carcinogenic to humans (Group 2B).

### Children's Health

- It is not known if children are more sensitive to N-nitrosodi-n-propylamine exposure than adults.