

Sources of Exposure

Toxicokinetics and Normal Human Levels

Biomarkers/Environmental Levels

ToxGuide™

for

Diazinon

$C_{12}H_{21}N_2O_3PS$

CAS# 333-41-5

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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

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General Populations

- The general population may be exposed via diazinon-contaminated air, water, or food, but there is little potential for high level exposure because home and garden uses for diazinon have been banned.
- Significant inhalation exposure is likely only near areas where diazinon is produced or used as a restricted pesticide.
- Oral exposure may occur by drinking contaminated water or eating foods containing diazinon residue.
- Significant dermal exposure is likely only near areas where diazinon may be used as a restricted pesticide.

Occupational Populations

- Occupational exposure may occur at facilities that produce diazinon or in working environments where diazinon is used as a pesticide.

Toxicokinetics

- Diazinon is readily absorbed from the gastrointestinal system. It is poorly absorbed through the skin.
- No information is available regarding absorption following inhalation exposure, although diazinon is expected to be readily absorbed through the lungs.
- Absorbed diazinon is rapidly distributed throughout the body, but does not accumulate significantly in body tissues.
- Diazinon is rapidly metabolized by oxidation, hydrolysis, desulfuration, and deoxygenation to form the metabolites 2-isopropyl-4-methyl-6-hydroxy-pyrimidine (IMHP), diethylthiophosphate (DETP), and diethylphosphate (DEP), which are excreted in the urine.

Normal Human Levels

- No data available.

Biomarkers

- Biomarkers of recent exposure to diazinon may include plasma and erythrocyte cholinesterase activity levels and urinary levels of metabolites IMHP, DETP, and DEP; only IMHP is unique to diazinon.

Environmental Levels

Air

- Up to 0.002 ppb in ambient outdoor air; up to 13 ppb in indoor air when diazinon was registered for home use.

Sediment and Soil

- Mean soil concentrations of 13–268 ppb; up to 38 ppb in sediment.

Water

- Generally less than 0.02 ppb in surface water; higher levels have been measured near application sites.
- Not typically detected in drinking water sources, but was found at an average concentration of 0.02 ppm in 5 of 53 residential drinking wells.

Reference

Agency for Toxic Substances and Disease Registry (ATSDR). 2008. Toxicological Profile for Diazinon. Atlanta, GA: U.S. Department of Health and Human Services, Public Health Services.

Chemical and Physical Information

Routes of Exposure

Relevance to Public Health (Health Effects)

Diazinon is a Liquid

- Pure diazinon is a clear oil with a faint ester-like odor; commercial grade diazinon is a pale to dark brown liquid.
- Diazinon is an organophosphate pesticide produced in formulations that include granules, wettable powder, emulsifiable solution, dust, seed dressing, impregnated materials, and microencapsulated forms.
- Diazinon was formerly used as an insecticide in many home and garden applications, but is currently limited to restricted use in agriculture.

- Inhalation – Predominant route of exposure for workers during production, handling, and application.
- Oral – Predominant route of exposure for the general population ingesting contaminated drinking water and food containing diazinon residue.
- Dermal – Predominant route of exposure for workers during production, handling, and application.

Diazinon in the Environment

- Diazinon can be released into the environment during its production and use as a pesticide.
- Diazinon is found in all environmental compartments with no pronounced tendency to partition to a particular compartment.
- Diazinon is moderately persistent and mobile in the environment.
- In air, diazinon is relatively quickly transformed into diazoxon; the estimated half-life for this reaction is 4 hours.
- Diazinon released to surface water or soil is subject to volatilization, photolysis, hydrolysis, and biodegradation.
- The half-life of diazinon ranges from approximately 70 hours to 12 weeks in surface water and 10 to 200 days in soil.
- Diazinon does not bioaccumulate in aquatic organisms.

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

Minimal Risk Levels (MRLs)

Inhalation

- An acute-duration inhalation MRL was not derived for diazinon.
- An MRL of 0.01 mg/m³ has been derived for intermediate-duration inhalation exposure (15–364 days).
- A chronic-duration inhalation MRL was not derived for diazinon.

Oral

- An MRL of 0.006 mg/kg/day has been derived for acute-duration oral exposure (≤14 days).
- An MRL of 0.002 mg/kg/day has been derived for intermediate-duration oral exposure (15–364 days).
- An MRL of 0.0007 mg/kg/day has been derived for chronic-duration oral exposure (≥1 year).

Health Effects

- The primary target of diazinon toxicity is the nervous system.
- Low-level exposure to diazinon may result in acetylcholinesterase (AChE) inhibition in the absence of clinical signs of toxicity. At higher levels of exposure AChE inhibition may result in cholinergic signs and symptoms including impaired respiration, abnormal heart rate, muscle twitching, anxiety, drowsiness, confusion, and coma; these are typical signs of organophosphate and carbamate pesticide poisoning.

Children's Health

- In general, children are expected to be affected by diazinon poisoning in the same manner as adults.
- Limited animal data indicate that gestational exposure to diazinon may impair neurological, immunological, and reproductive development.