

The ToxGuide™ is developed to be used as a pocket guide. Tear off at perforation and fold along lines.

Sources of Exposure

Toxicokinetics and Normal Human Levels

Biomarkers/Environmental Levels

ToxGuide™

for

Acrolein

CH2=CH-CHO

CAS# 107-02-8

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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

- Exposure may occur through inhalation, ingestion, and dermal contact.
- Environmental tobacco smoke (ETS) is the primary source of exposure for many individuals.
- Widespread exposure occurs due to the formation of acrolein during the heating of fats.
- The general population may also be exposed to high concentrations from vehicle exhaust (for example, parking garages and/or heavy traffic).
- Acrolein is also present in certain foods such as raw cocoa beans, chocolate liquor, fried potatoes and onions, raw and cooked turkey, heated animal fats and vegetable oils, and roasted coffee.

Occupational Populations

- Potential for exposure may occur during the combustion and pyrolysis of materials such as wood, petrochemical fuels, and plastics.
- Workers involved in the production of acrylates, methionine, perfumes, plastics, refrigerants, rubber, or textile resins may be exposed to acrolein.
- Workers involved in welding or heating painted metal may be exposed to acrolein.
- Firefighters are at risk of exposure to acrolein from house fires and wild fires.

Toxicokinetics

- Based on animal data, approximately 80–90% of inhaled acrolein is absorbed; most in the upper respiratory tract.
- *In vitro* studies suggest that acrolein will form conjugates with glutathione.
- Following oral exposure in animals, approximately 30% of the initial dose is expired as carbon dioxide and 50–60% is excreted in the urine.

Normal Human Levels

- No data available

Biomarkers

- No biomarkers of exposure or effect have been identified for acrolein.

Environmental Levels

Air

- Acrolein levels in outdoor air averaged from 0.5 to 3.186 ppb.
- Acrolein in indoor air ranged from <0.02 to 12 ppb in residential homes.

Sediment and Soil

- No data are available on actual measurements of acrolein in soil.

Water

- Acrolein has not been found as a contaminant of drinking water.

Reference

Agency for Toxic Substances and Disease Registry (ATSDR). 2007. Toxicological Profile for Acrolein. 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)

Acrolein is a liquid

- Acrolein is a colorless or yellow liquid with a disagreeable odor.
- Acrolein is primarily used as an intermediate in chemical manufacturing and as a biocide.
- Acrolein can be formed in burning tobacco, wood, plastics, gasoline and diesel fuel, paraffin wax, and in the heating of animal and vegetable fats and oils at high temperatures.
- Acrolein is also found naturally in the body in very small amounts.

- Inhalation – The predominant route of exposure for the general population and workers.
- Oral - Small amounts of acrolein may be found in certain foods (fried foods, cooking oils, and roasted coffee), but the amount in the food you eat is not known. No significant acrolein exposure is expected from ingestion of drinking water.

- Dermal – Minor route of exposure.

Acrolein in the Environment

- Acrolein in air is rapidly removed by reacting with photochemically generated hydroxyl radicals.
- Acrolein is expected to volatilize rapidly from surface water and soil. Degradation in water, soil, and air occurs quickly. Thus, environmental persistence 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

- An MRL of 0.003 ppm has been derived for acute-duration inhalation exposure (≤ 14 days).
- An MRL of 0.00004 ppm has been derived for intermediate-duration inhalation exposure (15-364 days).
- No chronic-duration inhalation MRL was derived for acrolein.

Oral

- No acute-duration oral MRL was derived for acrolein.
- An MRL of 0.004 mg/kg/day has been derived for intermediate-duration oral exposure (15-364 days).
- No chronic-duration oral MRL was derived for acrolein.

Health Effects

- Nasal irritation appears to be the most sensitive respiratory effect.
- Acrolein may affect the entire respiratory tract, from the nasal epithelium to the alveolar spaces.
- In general, individuals with emphysema or allergic conditions such as asthma will be at a higher risk of developing adverse respiratory responses when exposed to a strong respiratory irritant such as acrolein.
- Irritation of gastrointestinal mucosa appears to be the primary effect of oral exposure to acrolein.
- Oral acrolein exposure may result in gastrointestinal discomfort, vomiting, and stomach ulceration and/or hemorrhage.

Children's Health

- In general, children are not likely to be affected by acrolein more than adults.
- Largest source of acrolein exposure for children living with individuals who smoke is through inhalation of environmental tobacco smoke (ETS).
- For children without exposure to ETS, their main exposures to acrolein are expected to be similar to the general population.