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

Sources of Exposure

General Populations

- The diet is the main source of exposure for the general population.
- Breathing contaminated air or ingesting contaminated water are also potential routes of exposure.
- Exposure also can occur via dermal contact with contaminated soil or plants or fruits that have been sprayed with endosulfan.
- Living in proximity to sites where endosulfan was produced or disposed.

Occupational Populations

- Exposure of workers can occur during the manufacture of endosulfan.
- Pesticide applicators can be exposed by inhalation or skin contact if they do not wear proper protection.
- Farm workers may experience latent exposure in fields that were previously sprayed (occupational re-entry).

Toxicokinetics and Normal Human Levels

Toxicokinetics

- There is indirect evidence that humans absorb endosulfan by the inhalation and/or dermal routes. There is conclusive evidence of gastrointestinal absorption, but the extent of absorption is not known.
- In humans, endosulfan appears to accumulate in the liver, kidney, and brain, at least in the short term.
- In animals, endosulfan is transformed predominantly to polar and nonpolar metabolites by liver microsomal enzymes.
- Endosulfan and metabolites have been detected in the urine of humans after ingestion of the chemical.
- In animals, endosulfan and metabolites are excreted mainly in the feces within a few days or weeks.

Normal Human Levels

- No data are available.

Biomarkers/Environmental Levels

Biomarkers

- The primary biomarkers for endosulfan exposure include tissue and excreta concentrations of endosulfan and its metabolite, endosulfan sulfate.

Environmental Levels

Air

- From 3.3 to 8.3 picograms per cubic meter (pg/m^3) in remote Arctic air. From 18 to 82 pg/m^3 in rural areas, with spikes during growing seasons.

Sediment and Soil

- A national monitoring program reported that sediment samples obtained between 2005 and 2009 contained levels of endosulfan from 0.08 to 12.59 nano-grams per gram (ng/g) dry weight. The percent detection was 5.3%.

Water

- Endosulfan has low rates of detection in groundwater.

Reference

Agency for Toxic Substances and Disease Registry (ATSDR). 2013. Toxicological Profile for Endosulfan (Draft for Public Comment). Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service.

$C_9H_6Cl_6O_3S$

ToxGuide™ for Endosulfan

$C_9H_6Cl_6O_3S$

CAS# 115-29-7

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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

Contact Information:
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1-800-CDC-INFO
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www.atsdr.cdc.gov/toxpro2.html

ATSDR
AGENCY FOR TOXIC SUBSTANCES AND DISEASE REGISTRY

Chemical and Physical Information

Endosulfan is a Solid

- Endosulfan is a cream-to-brown colored solid that may appear crystalline or in flakes. It is sold as a mixture of α- and β-endosulfan isomers.
- Endosulfan is a restricted-use pesticide that is applied to crops by aerial or ground-level foliar spray.
- It is particularly effective against aphids, fruit worms, beetles, leafhoppers, moth larvae, and white flies on a wide variety of crops.
- The use of endosulfan is being restricted to certain crops and is scheduled to be canceled for all uses by 2016.

Routes of Exposure

- Inhalation – Significant potential route of exposure for pesticide applicators and crop pickers, particularly if the former do not use protective gear.
- Oral – Predominant route of exposure for general population through ingestion of contaminated food.
- Dermal – Important route of exposure for pesticide applicators and crop pickers.

Endosulfan in the Environment

- Endosulfan can travel long distances by air. Levels in air depend on location; they are usually higher in rural areas.
- Endosulfan can be broken down in air by chemical reactions. Endosulfan sulfate may be broken down by sunlight.
- In water, endosulfan changes to a less toxic chemical, endosulfan diol. Endosulfan sulfate is more resistant to break down in water.
- In soil, endosulfan attaches to soil particles, which limits its movement towards groundwater.
- Endosulfan breaks down in soil; endosulfan sulfate is more resistant.
- It can build up in animals living in contaminated water.

Relevance to Public Health (Health Effects)

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-, intermediate-, or chronic-duration inhalation MRLs were derived for endosulfan.

Oral

- An MRL of 0.007 mg/kg/day has been derived for acute-duration oral exposure (≤14 days).
- An MRL of 0.005 mg/kg/day has been derived for intermediate-duration oral exposure (15–364 days).
- The intermediate-duration oral MRL was adopted for chronic-duration oral MRL (≥365 days).

Health Effects

- The main target of endosulfan toxicity is the nervous system.
- Exposure to high amounts of endosulfan induces hyperactivity and convulsions, regardless of the route of exposure. Severe poisoning may result in death.
- Studies in animals have shown that swallowing endosulfan in contaminated food for long periods of time affects mainly the kidneys.
- There is no conclusive evidence that endosulfan can cause cancer. Endosulfan did not cause cancer in animal studies.
- The Department of Health and Human Services (DHHS), the International Agency for Research on Cancer (IARC), and the EPA have not classified endosulfan as to its ability to cause cancer.

Children's Health

- Children exposed to high amounts of endosulfan have shown the same neurological effects seen in poisoned adults.
- Endosulfan has been detected in human breast milk; therefore, it can be transferred to babies by nursing.
- Exposure of pregnant animals resulted in abnormalities in the skeleton and organs from the offspring. This often occurred with doses that were also toxic to the mothers.