

# Isoxaflutole, Diketonitrile and Water

Isoxaflutole is an herbicide used to control weeds in corn and soybean fields that has been detected in Minnesota waters. Diketonitrile (DKN) is a major degradate of isoxaflutole. Detections of both substances in Minnesota waters have been below the guidance value developed by MDH, and drinking water is unlikely to be a main source of exposure. Minnesotans are not likely to experience health effects from the low levels of isoxaflutole or DKN found in water or food.

The Minnesota Department of Health (MDH) Risk Assessment Unit evaluates health risks for contaminants in drinking water and develops health-based guidance values for groundwater. The toxicological summary for isoxaflutole can be found at the MDH Human Health-Based Water Guidance Table website.<sup>1</sup> MDH works in collaboration with the Minnesota Pollution Control Agency (MPCA) and the Minnesota Department of Agriculture (MDA) to understand the occurrence and environmental effects of these contaminants.

## Isoxaflutole in Minnesota Waters

MDA has tested groundwater and surface water for isoxaflutole and DKN since 2012. In groundwater, isoxaflutole has not been detected and DKN has been detected a few times at up to 0.315 parts per billion (ppb). Both isoxaflutole and DKN have been detected in surface water at up to 0.26 and 0.34 ppb, respectively.<sup>2</sup>

## MDH Guidance Value

Based on available information, MDH developed a health-based guidance value (HBV) of 7 ppb for isoxaflutole in drinking water. Risk assessment advise (RAA) of 7 ppb was developed for DKN based on data from isoxaflutole, as there was limited data available for DKN. A person drinking water at or below these guidance values would have little or no risk for health effects.

## Potential Health Effects

In animal studies, isoxaflutole was associated with changes in the liver, ocular, adrenal, thyroid, and nervous systems, impacts on reproductive and developmental processes, and increased risk of cancer.<sup>1</sup> The U.S. Environmental Protection Agency has classified isoxaflutole as likely to be a human carcinogen.<sup>1</sup> Humans are not likely to experience health effects from exposure to isoxaflutole or DKN at levels currently found in Minnesota waters.

## Potential Exposure to Isoxaflutole and DKN

People are most commonly exposed to small amounts of isoxaflutole through their diet, but these exposures are well below the threshold for health concerns. Exposure to isoxaflutole and DKN may also occur through drinking contaminated water. The available data suggest that this is not common.

Farmworkers may also be exposed directly to isoxaflutole during its application in fields. Follow precautions listed for products containing isoxaflutole, use personal protective equipment (PPE) as necessary, and limit use of the product to only what is required and not in excess.

Isoxaflutole belongs to a class of herbicides that work by blocking an enzyme found in plants and animals, 4-hydroxyphenyl-pyruvatedioxygenase (HPPD). People may be co-exposed to multiple herbicides from this class through their diet, by drinking contaminated water, or applying and coming into contact with treated lawn.<sup>4</sup>

## Isoxaflutole in the Environment

Isoxaflutole can enter the environment when it is produced, transported, stored, or applied to crops. Isoxaflutole will degrade to DKN and other degradates in the environment within days. Both isoxaflutole and DKN can move from the soil into groundwater or surface water and travel with the flow of water, but they will not likely evaporate into the air. DKN is stable in soil and water and may persist and accumulate.<sup>5</sup>

## References

1. Minnesota Department of Health (MDH). (April 2024). Human Health-Based Water Guidance Table. "Toxicological Summary for: Isoxaflutole."  
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<https://www.mda.state.mn.us/pesticide-monitoring-reports>. Accessed 17 April 2024.
3. National Library of Medicine. PubChem. Isoxaflutole.  
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4. U.S. Environmental Protection Agency. 2021. P-Hydroxyphenyl-Pyruvate Dioxygenase (HPPD) Inhibitors Cumulative Risk Assessment.  
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