iron HEDTA

Review Date: 7/21/2010
CAS #: 17084-02-5

Type	Selective contact herbicide
Controls	Controls several broadleaf weed species in established turf (dandelion, daisy, thistles, chickweed, creeping buttercup, moss, algae, etc.)
Mode of Action	The exact mode of action is unknown, although, iron is a catalyst for oxygen reduction which produces reactive oxygen species that can cause cellular damage and cell death (Reference 2).

Thurston County Review Summary:

Herbicides containing iron HEDTA as a sole active ingredient pass Thurston County's review criteria. Iron HEDTA is not expected to move off the site of application unless it is washed off with excessive rain or irrigation water. Although the iron will remain in the soil where it is applied, the compound iron HEDTA is not expected to be persistent or bioaccumulate in animal or fish tissue. The risk for toxicity to humans from handling, applying or contacting treated (dry) vegetation is considered low. The risk to non-target birds, mammals, bees, and fish is considered low. Use of iron HEDTA herbicides around small shallow ponds should be avoided because it could result in concentrations in the water that may cause harm to amphibians (Reference 2).

MOBILITY

Property	Value	Reference	Rating
Solubility (mg/L)	Miscible	2	High
Soil Sorption (Kd=mL/g)	0.57	2	High
Organic Sorption (Koc=mL/g)	Not found		

Mobility Summary:

Iron HEDTA mixes well in water and can be expected to bind poorly to soil without organic matter. With respect to leaching, Health Canada made the following statement: "Based on proposed use pattern (mode of application, application rate and use area), the risk for potential leaching and exposure of FeHEDTA to drinking water (surface or ground water) will be low" (Reference 2). The hazard for iron HEDTA to move off the site of application is rated moderate for potential to wash off the application with excessive rain or irrigation water but low in hazard for leaching potential for all soil types except sand and gravel.

PERSISTENCE

Property	Value	Reference	Rating
Vapor Pressure (mm Hg)	Data not required by EPA		
Biotic or Aerobic Half-life (days)	<30 when pH >6.5	2	Moderate
Abiotic Half-life (days)	Not found		
Terrestrial Field Test Half-life (days)	"rapid transformation"	1	Low
Hydrolysis Half-life (days)	Not found		
Anaerobic Half-life (days)	"stable"	2	High
Aquatic Field Test Half-life (days)	<1	2	Low

Persistence Summary:

Although iron is an element and will remain in the soil, iron HEDTA undergoes rapid light degradation and biodegradation in both soil and water. The persistence hazard for the chemical iron HEDTA is low but is considered high for the iron component.

BIOACCUMULATION

Property	Value	Reference	Rating
Bioaccumulation Factor	Not found		
Bioconcentration Factor	Not found		
Octanol/Water Partition Coefficient	<0	2	Low

Bioaccumulation Summary:

Iron HEDTA is not expected to bioaccumulate.

ACUTE TOXICITY HAZARD - ECOTOXICITY

Test Subject	Value	Reference	Rating
Mammalian (LD50)	>5,000 mg/kg	1	Low
Avian (LD50)	>2,000 mg/kg	1	Low
Honey bee or insect (LD50)	83.68 ug/bee oral	2	Low
Annelida -worms (LC50)	Not found		
Fish (LC50)	>100 mg/kg	1	Low
Crustacean (LC50)	>100 mg/kg	1	Low
Mollusk (LC50)	Not found		
Amphibian (LD50 or LC50)	Not found		

Acute Toxicity Summary:

The EPA believes it is not likely that non-target organisms will be exposed to potentially toxic concentrations of iron HEDTA from the use of iron HEDTA herbicides (Reference 1). Health Canada performed non-target organism risk assessments and calculated that the level of concern for many non-target organisms (birds, small mammals, fish and aquatic invertebrates) were exceeded - but then stated that the use patterns of the herbicide products would likely result in neglible risk to these organisms (Reference 2). The risk is likely to be low because the areas the products would be used would not contain a large enough percentage of a non-target organism's diet. However, the level of concern is exceeded for amphibians living in a shallow water pond that is treated (intentionally or unintentionally), Health Canada did not state that the risk was negligible.

ACUTE TOXICITY - Risk Assessment

Subject and Scenario	Dose of Concern	Exposure	Margin of Safety	Route	Reference	Rating
Risk assessment requirement was waived by EPA						
Risk assessment requirement was waived by EPA						
Risk assessment requirement was waived by EPA						
Risk assessment requirement was waived by EPA						

Acute Toxicity Risk Assessment Summary

The EPA and Health Canada granted waivers for the requirement to assess short-term dermal toxicity, prenatal developmental toxicity, and reproductive toxicity due to low toxicity of iron HEDTA, low skin absorption rates, low application rates, and the strength of toxicological data available for the chemically similar iron EDTA (References 1 and 2).

Risk assessment for short-term exposures were not required by EPA and are considered to be low in hazard due to lack of a toxicological endpoint.

CHRONIC TOXICITY HAZARDS

Property	Value	Adverse Effect	Reference	Rating
Carcinogenicity	Unknown	"EDTA compounds are not carcinogenic"	2	Low
Mutagenicity	"not a mutagen"	- -	1	Low
Neurotoxicity - (NOAEL)	Not found			
Endocrine Disruption	Not listed	- -	3 and 4	Low
Developmental Toxicity (NOAEL)	<954 EDTA mg/kg/day	Skeletal & other malformations	2	Check risk
Reproductive Toxicity (NOAEL)	1% Na2EDTA diet by weight	No litters produced	2	Check risk
Chronic Toxicity (NOAEL)	iron = 45 mg/day (human adult)	none	2	Check risk

Chronic Toxicity Summary:

The EPA and Health Canada concluded that the biological effects of EDTA salts are likely to be similar to HEDTA salts and so data for the EDTA salts were used when HEDTA data was lacking. EDTA compounds were not carcinogenic, mutagenic or directly genotoxic. In developmental toxicity testing, high doses of EDTA produced malformations that occurred in conjunction with maternal toxicity.

CHRONIC TOXICITY - Risk Assessment

Subject and Scenario	Dose of Concern	Exposure	Margin of Safety	Route	Reference	Rating
Risk assessment requirement was waived by EPA						
Risk assessment requirement was waived by EPA						
Risk assessment requirement was waived by EPA						
Risk assessment requirement was waived by EPA						

Chronic Toxicity Risk Assessment Summary:

Risk assessment for long-term exposures were not required by EPA and are considered to be low in hazard due to lack of a toxicological endpoint. Risk of toxicity from exposures to iron HEDTA from herbicidal use is rated as low in hazard.

DegradationProducts:

ED3A, EDDA-N,N', EDDA-N,N, EDMA, IDMA, glycine and formaldehyde (Reference 1).

Comments:

Iron HEDTA is mildly irritating to the eyes (EPA Toxicity Category IV), non-irritating to skin and is not considered a skin sensitizer by the EPA, although, Health Canada states in more recent review, that iron HEDTA shows potential for skin sensitization with repeated contact and requires a precaution to be placed on product labels (References 1 and 2).

References

1. USEPA. Office of Pesticide Programs, Biopesticides and Pollution Prevention Division. Biopesticides Registration Action Document - Iron HEDTA.
2. Health Canada. Proposed Registration Decision PRD2010-03 FeHEDTA. 23 February 2010.
3. Illinois EPA. "Endocrine Disruptors Strategy" February 1997.
4. Scorecard - The Pollution Information Site. Health Effects / Endocrine Toxicants (Accessed 7/23/2010). http://www.scorecard.org/health-effects/