

copper octanoate (copper salt of fatty acid)

Review Date: 07/29/2011

CAS #: 20543-04-8

Type	Fungicide
Controls	Fungal and disease control (mildew, leaf spots, blights, and apple scab).
Mode of Action	The copper (cupric ion) denatures cell proteins and causes "cell leakage" (Reference 1).

Thurston County Review Summary:

There is very little chemical data specific to copper octanoate available in literature but there is enough information to identify the potential hazards and complete this review. Copper octanoate will degrade to a copper ion (cupric ion), the cupric ion (copper II) is the common chemical of toxicological interest for a number of copper compounds used in pest control, including copper octanoate. There are no exposures of concern expected from the use of fungicide products with copper octanoate as a sole active ingredient. Copper octanoate fungicide products pass Thurston County's review criteria.

Copper is listed by the EPA as one of the priority pollutants and regulates the discharge of these pollutants into water bodies. So, although copper octanoate and many other copper based pesticides are considered low in hazard by Thurston County, they can contribute to the overall copper content in our water bodies which has already been identified as a concern.

MOBILITY

Property	Value	Reference	Value Rating
Water Solubility (mg/L)	"dispersable in water"	10	Low
Soil Sorption (Kd=mL/g)	Value not found		
Organic Sorption (Koc=mL/g)	Value not found		

Mobility Summary:

Copper octanoate is not very soluble in water but is expected to degrade in the environment to the cupric ion which adheres strongly to most soil surfaces and will be incorporated into the soil matrix (Reference 9). The hazard for copper octanoate to move off the site of application is rated low.

PERSISTENCE

Property	Value	Reference	Value Rating
Vapor Pressure (mm Hg)	0.0000000000000025	3	High
Biotic or Aerobic Half-life (days)	10,000	3	High
Abiotic Half-life (days)	Value not found		
Terrestrial Field Test Half-life (days)	1,600	3	High
Hydrolysis Half-life (days)	Value not found		
Anaerobic Half-life (days)	Value not found		
Aquatic Field Test Half-life (days)	Value not found		

Persistence Summary:

Copper octanoate is expected to dissociate to free copper which is not expected to degrade. The hazard for persistence of copper octanoate and its degradation chemical (copper) is rated high.

BIOACCUMULATION

Property	Value	Reference	Value Rating
Bioaccumulation Factor	Value not found		
Bioconcentration Factor	10 - 100	5	Low
Octanol/Water Partition Coefficient	log Kow = 0.44	3	Low

Bioaccumulation Summary:

Copper is an essential trace element in our bodies, but for most people only limited amounts are able to be stored. The EPA stated that copper has a low potential to accumulate in fish but there is a high potential for accumulation in mollusks (Reference 4). The hazard for bioaccumulation is rated moderate due to the potential for accumulation in shellfish and because people with Wilson's disease, chronic liver disease, or haemodialysis patients may be more sensitive to excess copper.

ACUTE TOXICITY HAZARD - ECOTOXICITY

Test Subject	Value	Reference	Value Rating
Mammalian (LD50)	>2,000 mg/kg	2	Moderate
Avian (LD50)	Value not found		
Honey bee or insect (LD50)	Value not found		
Annelida -worms (LC50)	Value not found		
Fish (LC50)	Value not found		
Crustacean (LC50)	Value not found		
Mollusk (LC50)	Value not found		
Amphibian (LD50 or LC50)	Value not found		

Acute Toxicity Testing and Ecotoxicity Summary:

Single-dose toxicity testing indicates that copper octanoate is low in toxicity to mammals. No other toxicity testing data could be located specifically for copper octanoate. The risk of toxicity to non-target organisms is expected to be from the cupric ion and not copper octanoate (because it will dissociate to the cupric ion and remain in that form).

"The screening-level ecological assessment indicated that copper can pose acute risks to various organisms, with the greatest risk to aquatic organisms resulting from direct water applications and runoff from fields adjacent to water bodies" (Reference 1). The application rates for copper octanoate (residential) products have an application rate of about 0.2 pounds of copper/acre. The risk assessments evaluated for aquatic organisms, from runoff at application rates of 1 pound of copper/acre, are rated low in hazard so, the copper octanoate applications are also rated low in hazard. Risk assessments for agricultural use is not evaluated in this review.

Residential uses of copper octanoate products for fungus control is not expected to create exposures of concern for non-target organisms. The risk of adverse effects to non-target organisms, from expected County or residential uses of fungicide products containing copper octanoate as the sole active ingredient, is rated low in hazard.

ACUTE TOXICITY - Risk Assessment

Subject and Scenario	Route	Dose of Concern	Exposure	Margin of Safety	Reference	Value Rating
Short-term risk assessments were not calculated						
Short-term risk assessments were not calculated						
Short-term risk assessments were not calculated						
Short-term risk assessments were not calculated						

Acute Toxicity Risk Assessment Summary:

The EPA concluded that there are no residential or occupational risks of concern resulting from short-term exposures to copper-based pesticide products (Reference 1). Acute dietary (food and drinking water) risks from copper-based pesticides are not of concern to the EPA (Reference 2).

The risk of toxicity from post-application exposures to copper octanoate from fungicide use is rated low in hazard.

CHRONIC TOXICITY HAZARDS

Property	Value	Adverse Effect	Reference	Rating
Carcinogenicity	Not listed	- -	5, 6	Low
Mutagenicity	Value not found	"micro-organism mutations"	7	Low
Neurotoxicity - (NOAEL)	Value not found			
Endocrine Disruption	Not a known endocrine disruptor	- -	11 and 12	Low
Developmental Toxicity (NOAEL)	Value not found			
Reproductive Toxicity (NOAEL)	Value not found			
Chronic Toxicity (NOAEL)	11.7 mg/kg-bw	Reduced survivorship of offspring	1	Check risk

Chronic Toxicity Hazard Summary:

"Copper is ubiquitous in nature and is a necessary nutritional element for both animals and plants. It is 1 of 26 elements found to be essential to life. The copper ion is present in the adult human body at levels of 80-150 mg. Oral ingestion of excessive amounts of the copper ion from pesticidal uses is unlikely; copper compounds are irritating to the gastric mucosa and emesis usually occurs promptly, thereby reducing the amount of copper ion available for absorption into the human body. Only a small percentage of ingested copper is absorbed, and most of the absorbed copper is excreted. In view of the facts that the copper ion occurs naturally in most foods and the metabolism of copper is well understood, there is no reason to expect that long-term exposure to the copper ion in the diet is likely to pose the risks of chronic or sub-chronic adverse effects." (Reference 7).

Copper octanoate is not listed by OSHA, NTP, or IARC as a potential or known carcinogen. Mutagenicity testing with copper sulfate caused mutations in microorganisms but the evaluation of the testing indicated that the effects are not expected in humans under normal circumstances (Reference 7).

CHRONIC TOXICITY - Risk Assessment

Subject and Scenario	Route	Dose of Concern	Exposure	Margin of Safety	Reference	Value Rating
Long-term risk assessments were not calculated						
Long-term risk assessments were not calculated						
Long-term risk assessments were not calculated						
Long-term risk assessments were not calculated						

Chronic Toxicity Risk Assessment Summary:

The EPA believes that there are no residential or occupational risks of concern resulting from long-term exposures to copper from pesticide products (Reference 1). Chronic dietary (food and drinking water) risks from copper-based pesticides are not of concern to the EPA (Reference 2).

The risk of toxicity from long-term exposures to copper octanoate from fungicidal use is rated low in hazard.

Metabolites and Degradation Products:

Copper octanoate is expected to dissociate to the cupric ion and octanoic acid.

Comments:

Copper octanoate is not considered a skin sensitizer or a skin irritant (EPA Toxicity Category IV), but it is a mild eye irritant (EPA Toxicity Category IV).

References

- USEPA. Office of Prevention, Pesticides, and Toxic Substances. Reregistration Eligibility Decision for Coppers. EPA 738-R-06-020. July 2006.
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