

Type	Insect repellent / protectant
Controls	Kaolin clay helps to minimize damage by insects, mites, fungi, and bacteria.
Mode of Action	Creates a protective barrier on plants.

**Thurston County Review Summary:**

Kaolin is a naturally occurring mineral consisting of aluminum silicate. Kaolin is rated low in hazard to humans, pets, and wildlife from potential exposures from pesticidal use; products containing kaolin as the sole active ingredient pass Thurston County's pesticide review criteria. Some kaolin products are recommended to be mixed with methanol and water; this review does not include the potential hazards of methanol (or water).

## MOBILITY

Property	Value	Reference	Value Rating
Water Solubility (mg/L)	"Insoluble"	1	Low
Soil Sorption (Kd=mL/g)	Value not found		
Organic Sorption (Koc=mL/g)	Value not found		

**Mobility Summary:**

Kaolin is a naturally occurring mineral that is not soluble in water and is already a component of soil (References 1 and 3). Because kaolin is not soluble in water and is already a soil component, the hazard for mobility is rated low. However, kaolin can travel with excessive rain or irrigation water in areas that are poorly vegetated and where erosion is likely to take place (steep slopes, bare ground, etc).

## PERSISTENCE

Property	Value	Reference	Value Rating
Vapor Pressure (mm Hg)	Not applicable - mineral	1	High
Biotic or Aerobic Half-life (days)	>60	1, 3	High
Abiotic Half-life (days)	>60	1, 3	High
Terrestrial Field Test Half-life (days)	>60	1, 3	High
Hydrolysis Half-life (days)	>60	1, 3	High
Anaerobic Half-life (days)	>60	1, 3	High
Aquatic Field Test Half-life (days)	>60	1, 3	High

**Persistence Summary:**

Kaolin is a naturally occurring mineral and is expected to persist for a long time in the environment. The hazard for persistence is high.

## BIOACCUMULATION

Property	Value	Reference	Value Rating
Bioaccumulation Factor	Value not found		
Bioconcentration Factor	Value not found		
Octanol/Water Partition Coefficient	Value not found		

**Bioaccumulation Summary:**

No information was found for the metabolism of kaolin (References 1, 2, and 3). In humans, the rate in which aluminosilicate particles were cleared or removed from the lungs depends greatly on particle size. The larger particles (6.1 um in diameter) are over 50% removed from the lungs within 30 days and smaller particles (1.9 um) can take over 300 days for 50% removal. If this accumulation was in the tissue or fat of an animal the bioaccumulation hazard would likely be rated high due to the retention time within the body, but since the retention is within the lungs and it is not accumulated in tissue, the hazard is rated low.

# ACUTE WILDLIFE TOXICITY VALUES and Risk Assessment

Test Subject	Value	Reference	Value Rating
Mammalian (LD50)	>5,000 mg/kg/bw	1	Low
Avian (LD50)	Data requirement waived by EPA	1	
Honey bee or insect (LD50)	>100 ug/bee	1	Low
Annelida -worms (LC50)	Value not found		
Fish (LC50)	Data requirement waived by EPA	1	
Crustacean (LC50)	Data requirement waived by EPA	1	
Mollusk (LC50)	Value not found		
Amphibian (LD50 or LC50)	Value not found		

## Acute Toxicity Testing and Ecotoxicity Summary:

The EPA determined that kaolin is practically nontoxic to birds and freshwater fish, but it may be slightly toxic to aquatic invertebrates. The EPA believe that risk to nontarget species from kaolin pesticides is minimal due to the expected uses, application methods, and mitigation of nontarget aquatic organism toxicity with precautionary label statements (Reference 1).

# ACUTE HUMAN TOXICITY - Risk Assessment

Subject and Scenario	Route	Dose of Concern	Exposure	Margin of Safety	Reference	Value Rating
Risk evaluation was not required by EPA						
Risk evaluation was not required by EPA						
Risk evaluation was not required by EPA						
Risk evaluation was not required by EPA						

## Acute Toxicity Risk Assessment Summary:

Kaolin is used as a direct and indirect food additive (used in food packaging material) and is classified by the Food and Drug Administration as GRAS (Generally Recognized as Safe). The EPA concluded that; "The overall toxicological risk from human exposure to kaolin is considered negligible" (Reference 1). The EPA waived all human risk assessment requirements for kaolin pesticide active ingredient registration. Therefore, the risk of toxicity to humans from potential short-term exposures to kaolin from pesticidal use is rated low in hazard.

# CHRONIC HUMAN TOXICITY HAZARDS

Property	Value	Adverse Effect	Reference	Rating
Carcinogenicity	Not classified by EPA or IARC	--	1 and 4	N/A
Mutagenicity	Data requirement waived	--	1	Low
Neurotoxicity - (NOAEL)	Value not found			
Endocrine Disruption	Data requirement waived	--	1	Low
Developmental Toxicity (NOAEL)	Data requirement waived	--	1	Low
Reproductive Toxicity (NOAEL)	Data requirement waived	--	1	Low
Chronic Toxicity (NOAEL)	No toxicological endpoint found	--	1	Low

## Chronic Toxicity Hazard Summary:

The EPA waived the data requirement for mutagenicity and developmental toxicity evaluation (Reference 1). Because kaolin is not suspected to cause potential tumor forming toxicity, the EPA did not require long-term toxicity testing to evaluate the potential for reproductive toxicity, endocrine disruption, or other long-term exposure toxicity (Reference 1). The EPA has made the determination that no harm is expected to infants, children, or the general US population from pesticidal uses of kaolin (Reference 1). Carcinogenic evaluation of kaolin included testing by inhalation and injection, neither of which produced tumors in animals (Reference 3). Kaolin and other clays can contain quartz, which is known to cause silicosis and lung cancer (not attributable to kaolin itself). Kaolin testing does not indicate a potential high hazard toxicity.

# CHRONIC HUMAN TOXICITY - Risk Assessment

Subject and Scenario	Route	Dose of Concern	Exposure	Margin of Safety	Reference	Value Rating
Risk evaluation was not required by EPA						
Risk evaluation was not required by EPA						
Risk evaluation was not required by EPA						
Risk evaluation was not required by EPA						

## Chronic Toxicity Risk Assessment Summary:

The risk of toxicity to humans from potential long-term exposures to kaolin from pesticidal use is rated low in hazard because other known human exposures, that are much larger, have not resulted in known toxicity.

## Metabolites and Degradation Products:

Kaolin usually contains kaolinite, quartz and mica but may also contain smaller amounts of feldspar, illite, montmorillonite, ilmenite, anastase, haematite, bauxite, zircon, rutile, kyanite, silliminate, graphite, attapulgitite, and halloysite (Reference 3).

## Comments:

Kaolin is considered mildly irritating to the eyes (EPA Toxicity Category III) but is not considered a skin irritant (EPA Toxicity Category IV). Dermal sensitization evaluation was waived by the EPA (Reference 1).

## References

1. USEPA. Office of Prevention, Pesticides and Toxic Substances. Kaolin (100104) Registration Eligibility Document. 4/2000.
2. International Union of Pure & Applied Chemistry. Pesticide Properties Database. Kaolin. Data accessed 12/27/2012.
3. World Health Organization. Environmental Health Criteria 231, BENTONITE, KAOLIN, AND SELECTED CLAY MINERALS. 2005.
4. International Agency for Research on Cancer. Agents Classified by the IARC Monographs, Volumes 1-102. (Accessed 12/27/2012). [Http://monographs.iarc.fr](http://monographs.iarc.fr)