RAMBOLL Bright ideas. Sustainable change.

Adverse ecological effects are unlikely in aquatic species based on recent and projected future chloroxylenol use.

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Environmental Risk Assessments for Topical Antiseptic Ingredients: Chloroxylenol

american cleaning institute®

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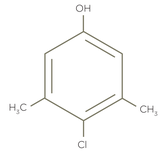
INTRODUCTION

Since withdrawal of triclosan and triclocarban, chloroxylenol is one of several replacement compounds being used in topical antimicrobial products.

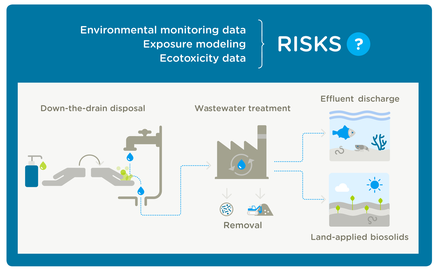
Chloroxylenol is a non-surfactant compound with a high pKa (9.21).



Objectives

- Identify and compile choloroxylenol occurrence, fate and effects data
- Develop hazard and risk profiles for surface water, sediment and soil for 2 scenarios:
  - Recent past
  - Future where chloroxylenol replaces triclosan use
- Identify uncertainties and options to refine assessment

CONCEPTUAL MODEL

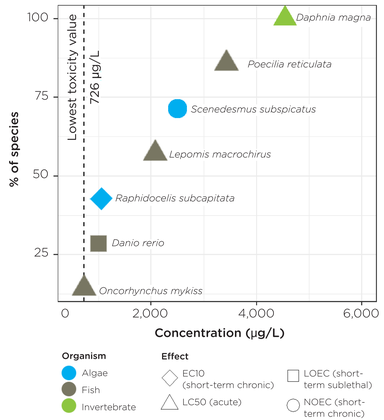


EFFECTS

- Toxicity data for chloroxylenol are limited to short-term aquatic toxicity studies for algae, invertebrates and fish
- The LTV was 726 µg/L, based on the rainbow trout (*O. mykiss*) 96-hour LC50
- LTVs for sediment and soil were determined using equilibrium partitioning with Koc of 800
  - Organic carbon fraction of 0.01 in sediment
  - Organic carbon fraction of 0.047 in soil

$$726\ \tfrac{\mu g}{L} \times 800\ \tfrac{L}{kg} \times 0.01 \times \tfrac{mg}{1000\ \mu g} = 5.8\ {}^{mg}/_{kg}\ (sediment)$$

$$726\ \tfrac{\mu g}{L} \times 800\ \tfrac{L}{kg} \times 0.047 \times \tfrac{mg}{1000\ \mu g} = 27.3\ {}^{mg}/_{kg}\ (soil)$$



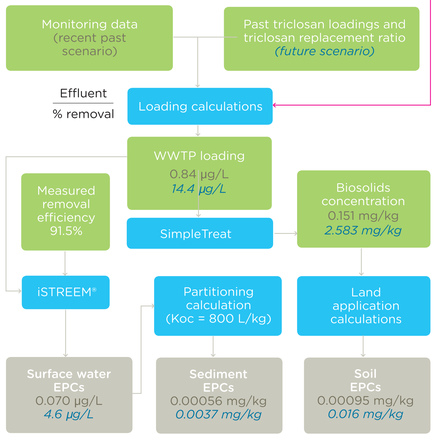
O. mykiss (rainbow trout)

EXPOSURE ASSESSMENT

Chloroxylenol monitoring data were mainly available for surface water and effluent data. Because influent data were sparse (n=1), WWTP loading was estimated based on effluent and removal data.

Matrix	Units	Frequency of detection	Estimate	Value
Surface water	µg/L	31 / 132	95th pctl	0.070
Effluent	µg/L	14 / 14	95th pctl	0.77
Influent	µg/L	1 / 1	Median	0.35
Removal	%	NA	Median	91.5

Figure 1. Exposure modeling approach for recent past and future scenarios.



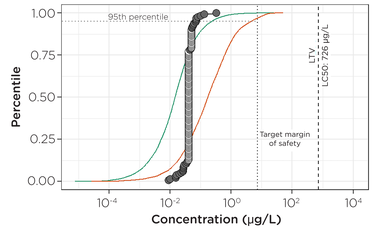
Because sufficient surface water data were available, the recent past surface water EPC is the 95th percentile of monitoring data. Additionally, the 95th percentile of effluent concentrations is used in the loading data used to calculate recent past soil concentrations.

In the future scenario, a central tendency loading estimate is used based on the conservative assumption that chloroxylenol will replace all triclosan use. The 95th percentile of modeled surface water concentrations is used to determine future scenario surface water and sediment EPCs. Because the soil EPC is calculated directly from the same loading, it is a conservative central tendency estimate.

RISK EVALUATION

Surface water

- Because only acute data are available for the most sensitive trophic group, the target margin of safety is 100
- No risk to aquatic species in recent past or at the 95th percentile in the future scenario



Soil and sediment

No risk based on conservative soil or sediment exposure in recent past or future scenarios.

Scenario	Medium	EPC (mg/kg)	LTV (mg/kg)	Margin of safety	Target margin of safety
Recent past	Sediment	0.00056	5.81	10,400	100
	Soil	0.00095	27.3	28,700	
Projected future	Sediment	0.037	5.81	157	
	Soil	0.016	27.3	1,710	

KEY FINDINGS

Confident in low-risk conclusion	High margins of safety iSTREEM model output is conservative (model is inherently conservative (Kapo et al 2016); in-river loss mechanism not accounted for).
Chronic toxicity data: potential for refinement	No chronic toxicity data for fish – weak endocrine toxicity shown *in vitro*, but none in *in vivo* mammalian studies. Endocrine toxicity in fish unlikely, but data would help resolve uncertainty.
Soil/sediment occurrence data	Lack of soil or sediment monitoring data not a major uncertainty, because low Koc suggests low occurrence of chloroxylenol in soil and sediment.

Acronym key: EPC: Exposure point concentration; LOEC: Lowest observed effect concentration; LTV: Lowest toxicity value; NOEC: no observed effect concentration; WWTP: Wastewater treatment plant