

## Assessing bioaccumulation potential of sediment associated fipronil degradates in oligochaete *Lumbriculus variegatus* based on passive sampler measured bioavailable concentration

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### ABSTRACT

The degradates of fipronil have equivalent or even more toxicity to non-target aquatic invertebrates. To assess their environmental risks, information of bioaccumulation is required. Currently, little is known about the bioaccumulative property of fipronil degradates in sediment, while it is well known that passive sampler may measure bioavailable concentration ( $C_{free}$ ) which links with the environmental effect more tightly than the total environment concentration. The goal of the present study was to characterize bioaccumulation potential in oligochaete *Lumbriculus variegatus* for a fipronil degradate sulfide. The sediment organic carbon-water partition coefficient (KOC) was measured with polymethyl methacrylate (PMMA) film passive sampler, and KOC was used to bridge the gap between biotasediment accumulation factor (BSAF) and bioconcentration factor (BCF). The bioavailable concentration ( $C_{free}$ )-based KOC values were  $5371 \pm 152$  and  $5013 \pm 152$  (mL/g OC) for fipronil sulfide (FSI) and sulfone (FSO), respectively. Since the two fipronil degradates were produced continuously in sediment by the parent compound, the time-weighted-average (TWA) concentration of FSI in the sediment was estimated from a bioassay with *L. variegatus* to calculate BSAF value ( $0.581 \pm 0.211$  g OC/g lipid) and BCF ( $3046 \pm 1103$  or  $\log 3.48 \pm 0.16$  mL/g). This approach is able to estimate the  $C_{free}$ -based KOC and BCF values of fipronil degradate in sediment with ongoing degradation of the parent compound.

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