

PFOS对蚯蚓急性毒性和回避行为的影响

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Effects of perfluorooctane sulfonate on acute lethality and avoidance behavior of earthworm.

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摘要

全氟辛烷磺酰基化合物(PFOS)作为一种新型持久性有机污染物, 已经成为环境科学和毒理学的研究热点, 其对生态环境的影响值得深入研究. 本文采用OECD标准滤纸接触法、人工土壤法及自然土壤法研究了PFOS对蚯蚓急性致死作用及回避行为的影响. 结果表明: PFOS对蚯蚓的急性毒性作用与染毒时间和染毒浓度相关, 试验求得滤纸法48 h、人工土壤法14 d和自然土壤法14 d的LC₅₀值分别为13.64 μg · cm⁻²、955.28 mg · kg⁻¹和542.08 mg · kg⁻¹; 人工土壤和自然土壤中蚯蚓在PFOS的最大试验浓度组160 mg · kg⁻¹中均表现出显著的回避行为, 表明蚯蚓可以明显感知较高浓度PFOS污染土壤并作出回避反应. 与急性毒性试验的测试终点LC₅₀相比, 蚯蚓行为测试终点对PFOS的反应更为敏感. 自然土壤中PFOS对蚯蚓的急性毒性大于人工土壤, 相同浓度PFOS作用下, 蚯蚓于自然土壤中的回避行为较人工土壤明显.

关键词: 全氟辛烷磺酸 蚯蚓 急性毒性 回避行为

Abstract:

As a new kind of persistent organic pollutants, perfluorooctane sulfonate (PFOS) has become a research spot of environmental science and toxicology. Its impacts on ecological environment should be deeply studied. In this paper, standard contact filter paper test of OECD, artificial soil test, and natural soil test were adopted to study the effects of PFOS on the acute lethality and avoidance behavior of earthworm. The results showed that the acute toxicity of PFOS on earthworm was related to the toxicant exposure time and concentration. The LC₅₀, 48 h in filter paper test, LC₅₀, 14 d in artificial soil test, and LC₅₀, 14 d in natural soil test were 13.64 μg · cm⁻², 955.28 mg · kg⁻¹, and 542.08 mg · kg⁻¹, respectively. At the maximum test concentration of 160 mg · kg⁻¹, the earthworm in artificial soil and natural soil showed significant avoidance behavior, which proved that earthworm could perceive and avoid the soil contaminated by a higher concentration of PFOS. To assess PFOS-contaminated soils, the avoidance endpoint was more sensitive than the mortality endpoint. PFOS had higher acute toxicity on earthworm in natural soil than in artificial soil. Meanwhile, more significant avoidance reaction was observed in natural soil than in artificial soil at the same concentrations of PFOS.

Key words: perfluorooctane sulfonate (PFOS) earthworm acute toxicity avoidance behavior

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