

石油污染土壤中多环芳烃分析及生态风险评价

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Analysis on Polycyclic Aromatic Hydrocarbons in Petroleum Contaminated Soils and Its Ecological Risk Assessment

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摘要

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摘要 对中原油田石油污染土壤中多环芳烃(PAHs)的残留量进行了调查。结果表明, PAHs总残留量范围为70.8~5013.2 $\mu\text{g}\cdot\text{kg}^{-1}$, 且以3环以上多环芳烃组分为主。其中, 苯并[a]芘检出率为100%, 采油树前地表土壤苯并[a]芘检出量极高, 最高可达996.9 $\mu\text{g}\cdot\text{kg}^{-1}$ 。参考加拿大农业区域土壤 PAHs的治理标准值, 采用内梅罗综合指数法进行评价的结果表明: 运行中和停产时间较短的油井周围土壤的生态风险较高; 油井运行状态、停产时间及距采油树(污染源)的距离对土壤的生态风险都有影响, 油井停产时间越长, 其周围土壤的生态风险随之降低, 距污染源越远, 土壤生态风险越低。

关键词: 石油 土壤 多环芳烃生态风险

Abstract: Polycyclic aromatic hydrocarbons (PAHs) residue in petroleum contaminated soils around Zhongyuan Oilfield was investigated. Results showed that residue of PAHs in the soils ranged from 70.8 to 5013.2 $\mu\text{g}\cdot\text{kg}^{-1}$ and was mainly composed of multi-ring(over 3 rings) PAHs, of which high concentration of benzo(a)pyrene (BaP) was detected in all the soil samples with the highest being 996.9 $\mu\text{g}\cdot\text{kg}^{-1}$, in the surface soils in front of the christmas trees. By referring to the standard Canada uses in controlling PAHs contamination in the soils of its agricultural zones, Nemerow composite index method was applied to the assessment of ecological risk of the contamination. Results show that the ecological risk of the soils around the wells, either in operation or recently closed, was quite high, and closely related to the working state and downtime of the wells and the distance from the christmas trees. The longer the downtime of a well, the lower the ecological risk of the soil around it, and the further to the well, the lower the risk.

Keywords: petroleum soil polycyclic aromatic hydrocarbons(PAHs) ecological risk

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