Compositions and characteristics of PAHs in crude oil during vertical migration in soil

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Purposes and Methods

When crude oil is in contact with soil, it forms films of hydrocarbons on top of soil grains, thereby posing a serious threat to human health. Aromatics in crude oil are highly toxic, especially PAHs. Most studies have been conducted on saturates and aromatics in the surface of oil-contaminated soils [1,2]. However, few studies reported the vertical migration process of hydrocarbons after crude oil get into soils. Sixteen priority PAHs in crude oil were taken as object, five groups of leaching stimulation experiment of soil column were carried out in this study to analyze the composition characteristics of PAHs in crude oil during vertical migration in soil and to discuss the effect of TOC on vertical migration of PAHs. Among five groups, 3 groups were filled with nature soil profiles with different TOC, and 2 groups were filled with surface soil with the same TOC. Crude oil was spiked into 0~5 cm soil column and leached at the rate of 1mL/min by deionized water for 30d.

Discussion of Results

The results showed that PAHs were mainly accumulated in the surface soils, both total and individual content of PAHs were sharply decreased with the depth increasing. The content of pheanthrene, chrysene and benzo[b]fluoranthene were dominant comparing with other PAHs. In the column which vertical TOC was the same, the column with higher TOC could absorb higher content of PAHs than those with lower TOC. In addition, PAHs with different rings exhibited different distribution characteristics. The content of 2-and3-ring PAHs decreased in the surface (0~25cm), and increased in the layer 25~100cm; 4-ring PAHs slowly increased with the depth increasing; 5-and6-ring PAHs first increased with the depth in the layer 0~25cm, then decreased in the deeper layers(25~100cm). It indicates that PAHs with lower rings have a higher migration ability than PAHs with higher rings. PAHs with the same ring also have different distribution characteristics after leaching 30d.

[1] Sloot et al. (2016). Waste Manag, 63-74. [2] Wang et al.(2007).Chemosphere, **68**, 965-971