



REMOVAL OF TOLUENE FROM AN ALKALINE AND ARABLE SOIL

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Introduction. Soil pollution caused by hydrocarbons, such as benzene, toluene, ethylbenzene and xylene (BTEX) is of worldwide interest. They are present in fossil fuels (1), and highly toxic to living organisms. BTEX cause mutations, cellular anomalies and cancer (2).

Because toluene (C₇H₈) is the more soluble compound in BTEX (3), we investigated the removal of this compound from an alkaline and an arable soil with no history of contamination. Concentrations of toluene in soil and emissions of CO₂ were monitored for 20 days.

Methods. Soil was collected from Lake Texcoco in the valley of Mexico City and Otumba in the State of México and characterized (4). The details of the sampling site and soil characteristics can be found in (5).

Soil was pre-incubated at 40% water holding capacity (WHC) for 7 days. Sub-samples of soil were spiked with 0, 100, 200 or 500 mg C₇H₈/kg dry soil. The soil was incubated aerobically in closed vials for 20 days and the C₇H₈ measured in the headspace and soil while the CO₂ emitted was trapped in 2 M NaOH solution. Soil tyndallized, i.e. sterilized on three alternating days, was contaminated in the same way and served to determine the amount of C₇H₈ lost through abiotic processes.

C₇H₈ was extracted from soil with a modified Song technique (6). C₇H₈ was measured in the headspace and soil extract by gas chromatography (Agilent 4890D) using a flame ionization detector (FID) with a HP-5 column (cross linked 5% PH ME Siloxane) 15 m x 0.53 mm length I. D. x 1.5 µm film thickness.

Results. The emission of CO₂ increased with increased application of C₇H₈ and was larger from the alkaline than from the arable soil. In the sterilized soil the concentration of C₇H₈ did not change significantly over time. In the unsterilized soil, the C₇H₈ was removed nearly completely from the alkaline soil within

2 days and mostly within 3 days from the arable (figure 1).

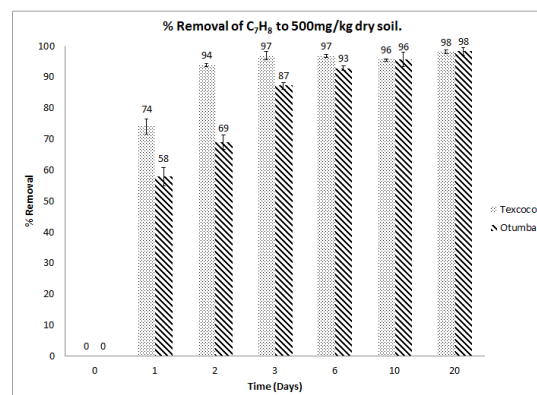


Fig.1 Percentages of removal versus time for degradation dynamics C₇H₈ 500 mg/kg dry soil.

Conclusions. The removal of C₇H₈ was different between the arable and alkaline soil and can be related to difference in soil characteristics and /or microorganisms responsible for their degradation.

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