

## Distribution of thiram between water and soil

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Thiram [tetramethylthiuram disulfide] is a fast moving dithiocarbamate fungicide, which has an LD<sub>50</sub> value between 620 and 1900 mg/kg in rats. Distribution of thiram between water and soil phases is of great significance in order to predict the levels of thiram in soil exposed to agricultural practices or in soil through which agricultural run-off water passes.

Detection of thiram in CHCl<sub>3</sub> is successfully achieved through absorbance measurements at 280 nm, which result in a linear calibration curve with the following analytical characteristics: A minimum detection limit of 0.170 mg dm<sup>-3</sup> based on the S/N ratio of 3, a linear dynamic range from 1.00 mg dm<sup>-3</sup> to 10 mg dm<sup>-3</sup>, and a sensitivity of 0.0860 mg<sup>-1</sup> dm<sup>3</sup>. This detection method, extended for the determination of the partition coefficient (K<sub>D</sub>) of thiram between CHCl<sub>3</sub> and H<sub>2</sub>O phases at ambient temperature, results in an average value of 6.58 ± 1.02 over 30 replicates. Subsequently, the above partition coefficient is used to determine the partition coefficient of thiram between sieved soil (pH = 7.28, diameter < 2.0 mm), used for agricultural practices, and water (K<sub>D</sub>'), where by the quantification of thiram in water after adsorption equilibrium with soil is achieved through a solvent extraction step of thiram-contaminated water into CHCl<sub>3</sub>. The K<sub>D</sub>' values determined for an initial thiram concentration range of 4.00 mg dm<sup>-3</sup> to 30.00 mg dm<sup>-3</sup> show a decreasing trend from 8.70 to 1.71, indicating the strong irreversible adsorption behavior of thiram on soil at low concentrations. However, variation of pH within the usual range of soil causes only a marginal effect on the magnitude of K<sub>D</sub>'. Adsorption of thiram on to soil in turn indicates the possibility of bioaccumulation through the food chain, if the agricultural run-off water is contaminated with thiram.

Such studies would easily be extended to determine the amount of thiram adsorbed to soil or present in water when thiram is introduced to soil systems for agricultural practices.

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