

## **INVESTIGATION OF THIRAM - Cu<sup>2+</sup> INTERACTIONS**

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Toxic effects of pesticides are caused by different reactions associated with them. The investigation of such reactions provides information on the activity of a pesticide, which in turn is supportive in monitoring the toxicity and pollution problems of the pesticide. Interaction of pesticides with metallic species is an important source of the toxicity of fungicides. Thiram chelates with Cu<sup>2+</sup> ions present in fungal cells, forming two thiram-Cu<sup>2+</sup> complexes in the molar ratio of 1:1 and 2:1 in thiram and Cu<sup>2+</sup> in composition. In this communication, we report some electrochemical and spectrophotometric investigation to understand the interaction between Cu<sup>2+</sup> and thiram.

Cyclic voltammetric investigation reveals that both thiram and Cu<sup>2+</sup> are electroactive in 0.1 M KCl. More importantly, cyclic voltammetry of mixtures of thiram and Cu<sup>2+</sup> provides evidence on bonding between the two species. Due to electron donation of thiram to Cu<sup>2+</sup>, thiram becomes electron deficient, showing a decrease of its ability towards electrochemical oxidation, which would otherwise occur as an intense peak at +0.75 V vs. SCE. In contrast, Cu<sup>2+</sup> shows more favorable oxidation as its electron density is increased due to bonding.

UV-Visible spectrophotometric measurements confirm the complexation of thiram and Cu<sup>2+</sup> ions, where thiram shows a  $\lambda_{\text{max}}$  at 289 nm and Cu<sup>2+</sup> at 808 nm in their individual spectra. In the mixtures of the two species, a new spectral peak appears at a  $\lambda_{\text{max}}$  of 415 nm corresponding to the 1:1 complex.

Further it is conclusively demonstrated that thiram interacts with Cu containing enzymes such as polyphenol oxidase (PPO) causing enzyme inhibition.

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