Determination of Degradation Intermediates of Propham with Chromatographic and Mass Spectrometric Analysis

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Propham is a carbamate herbicide for the control of weeds in alfalfa, clover, flax, lettuces, aflow, spinach, sugar beets and peas. It prevents cell division and act on meristematic tissues. It is also an acetylcholinesterase inhibitor and could be degraded into aniline metabolites [1]. To avoid the dangerous accumulation of these kinds of pollutants in the aquatic environment, research efforts are underway to develop more powerful oxidation methods. Recent progress in this field has led to the development of advanced oxidation processes (AOPs). The principal active species in such systems is the hydroxyl radical, 'OH, a highly oxidizing agent of organic contaminants [2-4]. These radicals react with organics and thus lead to their degradation by hydrogen abstraction reaction, redox reaction or electrophilic addition to π systems [3]. As a result of these reactions, organics were converted to several intermediate species. In most cases, the degradation intermediates may be more dangerous than the initial molecule. Therefore, the identification of these intermediates is very important. Their evolutions have also great importance in respect to process efficiency.

In this study, we identified the degradation intermediates of propham formed during the anodic oxidation process using some chromatographic and mass spectrometric methods [5]. High performance liquid chromatography (HPLC), gas chromatography-mass spectrometry (GC-MS) and liquid chromatography-mass spectrometry (LC-MS) were used in the determination of the aromatic intermediates. The derivatization process was also employed for the GC-MS analysis. The formed short chain carboxylic acids and inorganic ions were determined by HPLC and ion chromatography (IC), respectively.

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References