



Study on the degradation of tetramethyl ammonium hydroxide using ultrasonic and ozone procedures

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Received 10 June 2018; Accepted 23 December 2018

ABSTRACT

Tetramethyl ammonium hydroxide (TMAH) is a corrosive and toxic chemical with a stable structure. Therefore, it is important to check whether surface water or wastewater contains TMAH. In addition to using ultrasound and ozone procedures to degrade TMAH in wastewater, in this study, the effects of TMAH degradation were explored by combining the two procedures while varying the reaction conditions. According to the experimental results, the degradation efficiency of TMAH by the single ultrasonic process was un-satisfactory, and the highest degradation ratio was only 8.4% after for 60 min, while the highest total organic carbon (TOC) mineralization ratio was only 7.1%. Ozonation is more effective for the degradation of TMAH, where the highest TMAH removal rate and mineralization rate can reach 58.4% and 21.8%, respectively. As the ultrasound is combined with the ozone procedure (named as sonozone) at the optimal condition, the TMAH removal ratio reaches 89.5% following by mineralization ratio of 77.5%. The toxicity test performed using the cell survival rate showed that ozonation and sonozone have better effects for improving the cell viability and reducing the toxicity of the water sample, and the sonozone process proves that the combination of two procedures indeed has synergistic oxidation efficiency.

Keywords: Ultrasound; Ozonation; Sonozone; TMAH; Degradation; Mineralization

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