



## Effects of nitrate on the advanced UV photolysis of di(2-ethylhexyl) phthalate degradation in aqueous solution

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### ABSTRACT

One of the objectives of this study was to delineate the effect of nitrate on the oxidation of di(2-ethylhexyl) phthalate (DEHP) by conducting bench-scale UV/H<sub>2</sub>O<sub>2</sub> operations under a variety of UV doses and initial concentrations of H<sub>2</sub>O<sub>2</sub> and NO<sub>3</sub><sup>-</sup>-N. Also, this study evaluated the two processes, UV alone and UV/H<sub>2</sub>O<sub>2</sub>, for DEHP oxidation. DEHP separation and quantification were performed using liquid chromatography–electrospray ionization tandem mass spectrometry system (LC-ESI-MS/MS). It was found that the UV photolysis of H<sub>2</sub>O<sub>2</sub> is a more effective method of DEHP oxidation than the direct UV photolysis. It was observed that the DEHP oxidation efficiency of about 85.0% or higher could be achieved at a UV dose of 800 mJ/cm<sup>2</sup> with an initial H<sub>2</sub>O<sub>2</sub> concentration of more than 30 mg/L in the absence of nitrate. Nitrate hindered the DEHP oxidation by acting as 'OH scavengers. The adverse effect by nitrate in the UV/H<sub>2</sub>O<sub>2</sub> process was significantly greater than that in the UV oxidation-alone, and its oxidation was almost reduced to half by nitrate under some operating condition. However, it is noted that the DEHP oxidation efficiency of more than 70% could be expected at a UV dose of 600 mJ/cm<sup>2</sup> with an initial H<sub>2</sub>O<sub>2</sub> concentration of 50 mg/L while considering the nitrate scavenging effect.

*Keywords:* DEHP; Hydroxyl radical; Nitrate; Scavenger; UV/H<sub>2</sub>O<sub>2</sub>

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