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Simultaneous Redox Conversion of Chromate and Arsenite in the UV/Acetylacetone Process

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Combined pollution is ubiquitous in aquatic environment. Great efforts have been made to the simultaneous redox conversion of different heavy metals, such as arsenite and chromate.[1-3] Chromate is a strong oxidant and reacts with numerous reducing agents.[1] The E^0 (standard reduction potential) of As(V)/As(III) is much lower than that of Cr(VI)/Cr(III). Therefore, direct oxidation of arsenite with chromate is thermodynamically favorable. However, the direct abiotic oxidation of arsenite by chromate in diluted solutions is very slow. The addition of a third redox-active substance, such as H_2O_2, could significantly accelerate the simultaneous redox conversion of the toxic As(III) and Cr(VI) to low or nontoxic As(V) and Cr(III).[2]

Here we found that the UV/Acetylacetone (AA) process was highly efficient for the reduction of Cr(VI) and the co-presence of As(III) significantly enhanced the reduction of Cr(VI) (Figure 1). The results demonstrate that AA has great application potentials in water treatment as well as in some other cases that concerted redox conversion is needed in one process.

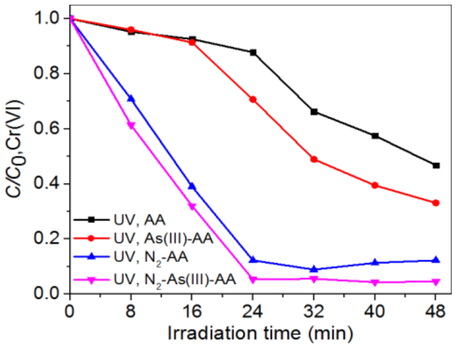

Figure 1. The concentration evolution of chromate in the UV/AA process in the absence and presence of arsenite.

(1) Kim, K.; Choi, W. *Environ Sci Technol* **2011,** *45*, 2202.
(2) Wang, Z.; et al., *Environ Sci Technol* **2013,** *47*, 6486.
(3) Sun, M.; et al., *Environ Sci Technol* **2015,** *49*, 9289.