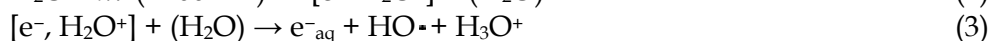
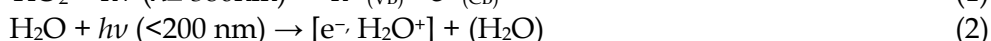
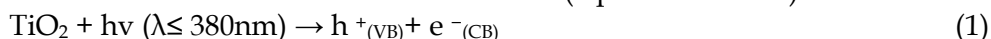




The efficiency of UV-V/UV/TiO₂ to treat natural organic matter (NOM) could be reduced by recombination of charge. As a remedy to this problem, the effect of oxygen, hydrogen peroxide, nitrogen oxide and peroxodisulfate have been investigated.

Importance

During the excitation of TiO₂, charges are formed on the valance and conduction band (equation 1). In addition, the vacuum UV photolysis of the water creates electrons which are solvated (equation 2 and 3).



Therefore recombination of electrons with positive holes and with hydroxyl radical could occur and reduce the amount of hydroxyl radical available to oxidize NOM. Consequently, investigation of ways to avoid recombination is desired.

Approach

One technique to avoid such recombination is to scavenge the electrons formed before their recombination by adding compounds which acts like acceptor of electrons. We have investigated and compared three different electron scavengers to prevent the recombination: O₂, H₂O₂, and S₂O₈²⁻.

Result

After 150 min of treatment, an average removal of 75% for UV-absorbance at 254 nm (UV₂₅₄), 84% for color, and 70% for dissolved organic carbon was obtained treating NOM containing surface water. The electron scavengers O₂, H₂O₂, or S₂O₈²⁻ have been added in order to limit or avoid recombination of charges which are responsible for lowering the number of hydroxyl radicals available for degradation of NOM. Addition of oxygen increased the degradation rate by a factor 2, H₂O₂ by a factor 3 and S₂O₈²⁻ by a factor 4 opposed to the rate without any addition. Although S₂O₈²⁻ has shown to be the most effective electron scavenger, its costs are high and it releases sulfate ions to the solution.

More information

The results of this study have been submitted for publication under the title: "NOM removal by an UV-V/UV/TiO₂ reactor assisted by different electron scavengers", and the link to the published paper will be given as soon as it is accepted. However for further information contact:

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