DEGRADATION OF ORGANIC MICROPOLLUTANTS IN WASTEWATER BY FERRATE-ZEOLITE PELLETS

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The content of various organic and inorganic pollutants in water has increased over the years. In recent years, the occurrence of micropollutants in water and their removal processes are widely discussed. Commonly used oxidants are effective in removing contaminants, but they can produce toxic byproducts during disinfection. Comparatively, ferrates can directly oxidize wide range of micropollutants and at the same time can be reduced to the non-toxic oxides and hydroxides. This multimodal action and environmental-friendly feature are their key advantages. Chemically, ferrates are compounds with iron in high oxidation state +IV. With the reductional potential +2.2 V at acidic environment, ferrates are the most powerful oxidizing agents of all oxidants. Therefore, they are considered as an universal green oxidizing, disinfecting and coagulating agent. However, due to their high reactivity, they are characterized by low stability. A promising method for increasing their stability appears to be their encapsulation by zeolites. Zeolites are an excellent natural sorption material that can enhanced decontamination efficiency of ferrates.

Pellets with different ratios between ferrate and zeolite were prepared by electromechanical press. These pellets with various concentrations of electrochemically prepared potassium ferrate (K_2FeO_4) with high purity were applied to real wastewater samples from the effluent of a medical facility. The visual and odor changes were observed after pellets application. The degradation efficiency was evaluated by LC-MS analysis. The results showed that the ferrate-zeolite tablets are able to degrade a wide range of micropollutants bellow the detection limit. This implies that the ferrate encapsulated with natural zeolite in tablet form seem as an effective and available possibility for micropollutants degradation with high efficiency.

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