PHOTOCATALYTIC DEGRADATION OF CHLORINATED ORGANIC COMPOUNDS USING NEWLY-DEVELOPED NANOPOROUS ZINC OXIDE-LAPONITE COMPOSITES

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The removal efficiency of trichloroethylene (TCE) in aqueous phase was evaluated through photocatalytic decomposition using newly-developed nanoporous zinc oxide-laponite composites (NZL) as a function of initial concentration of TCE, pH of aqueous solution, wavelength and time of UV irradiation. The experiments were performed using only TCE solution (control test), TCE solution with NZL, TCE solution with UV irradiation, and TCE solution with both NZL and UV irradiation in batch photo reactor. Sorption of TCE to nanoporous composites was found to be dominant at relatively low aqueous concentration of TCE (i.e., $\leq$ 10 mg/L), whereas photocatalysis was found to be dominant at relatively high aqueous concentration of TCE. As pH increased, the removal efficiency of TCE increased due to the greater hydroxyl radicals enhancing the reactivity and rate of photocatalysis. Removal efficiency of TCE by UV-C irradiation was greater than that by UV-A irradiation, however, the TCE removal efficiency increased with UV irradiation time, irrespective of UV wavelength. Based on these results, the application of NZL as a possible alternative to TiO2 through photocatalytic decomposition of recalcitrant chlorinated organic compounds may be feasible with low costs and effort.