Interactions Between Polyethylene Water Pipes And Disinfectants Used In Water Treatments By Means Of A Field Study And A Bench Scale Testing Program

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Abstract

Some premature failures of polyethylene house connections occurred on some specific sites in France from 2003, especially where chlorine dioxide was used as final disinfection. In order to assess the risk for our business, Suez-Environnement have launched a 3-year R&D program for determining the reliability of plastic pipes in different operating conditions. Two approaches were defined: the set-up of a pilot testing facility and the analyses of field samples. The aims here are to understand oxidation mechanisms of plastic pipes in oxidative media such as chlorine dioxide, chlorine and monochloramines, and secondly find the suitable materials for the applications by means of a benchmarking between PE80, PE100, PVC, PE-X and PP pipes. The preliminary results presented here highlight the strong and fast attack of chlorine dioxide on standard PE80. The oxidation kinetic is slower with chlorine but the beginning of an oxidation have been observed on the pilot after a 7-month accelerating aging period at 40°C, 4 mg/L and 6 bar. Monochloramine treatment seems to be at this stage the least aggressive disinfectant for PE80. These results will be later confirmed at the end of the study. Finally, the comparison between some degradation levels of field samples and those from the pilot samples have allowed to validate the pilot as a reliable testing method for characterizing the plastic pipe aging.