Effect of Chlorinated hot water on Pipes Alpha and Beta Polypropylene.

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Water disinfection by chlorine is widely practiced and may lead to degradation of pipes made of polyolefins. The effect of chlorinated water in pressure testing according to ASTM F 2023 on pipes made from alpha and beta nucleated random polypropylene (PP-R) was examined. Infrared microscopy (µFT-IR) was used to monitor the extraction of primary antioxidants during the testing, and by selecting characteristic absorptions in the IR-spectra, the formation of degradation products of AO-13 and AO-18 could be profiled for the first time. Fig. 1 shows the time and space resolved content of AO in the pipe wall. The results from µFT-IR were supported by analyzing the profiles of the Oxidative Induction Time across the pipe wall, as well as by extraction→HPLC. Evaluating the time and space resolved contour plots obtained from µFT-IR enabled to calculate the loss coefficients of AO-13 and AO-18 for testing under conditions according to ASTM F 2023 with chlorinated water as inner medium.

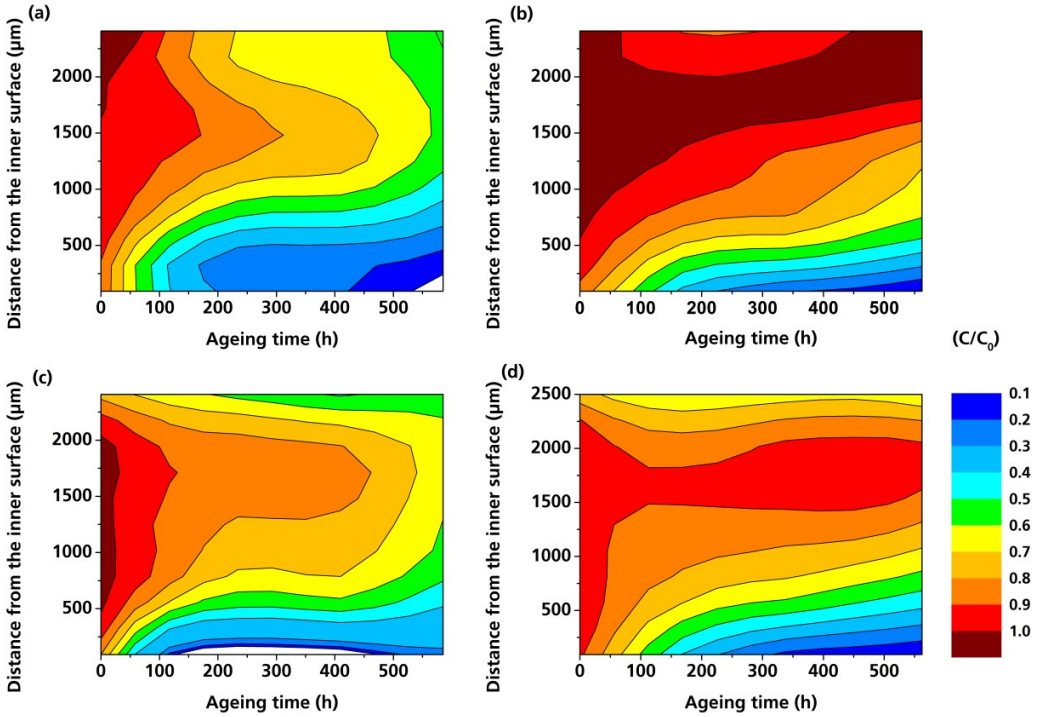

Figure 1: Time and space resolved contour plots showing the content of AO-18 in (a) α-PP-R (b) β-PP-R and AO-13 in (c) α-PP-R (d) β-PP-R.