Supplementary Information

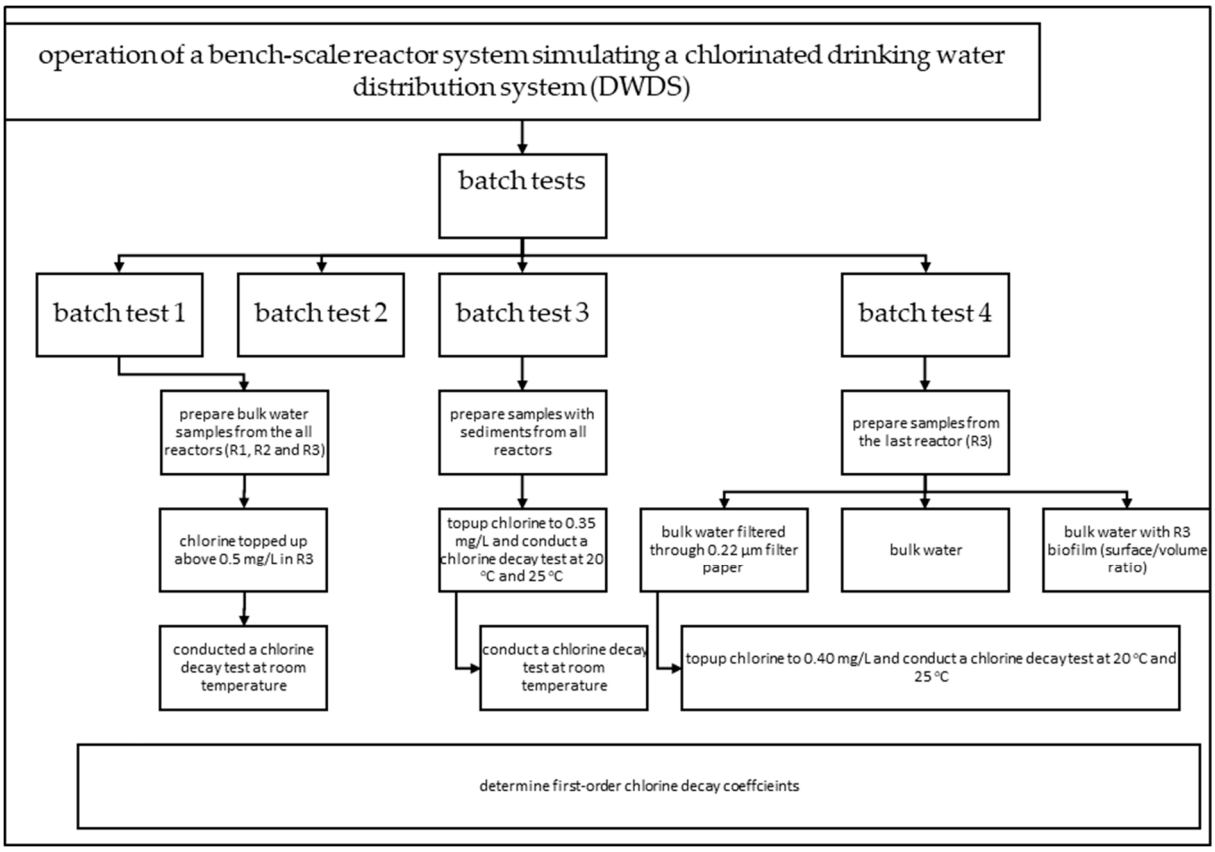


Figure S1: Experimental protocol for batch tests—determining impact of microbes, biofilm, and bulk water for the accelerated chlorine decay in R3, which is at a lower residual chlorine level.

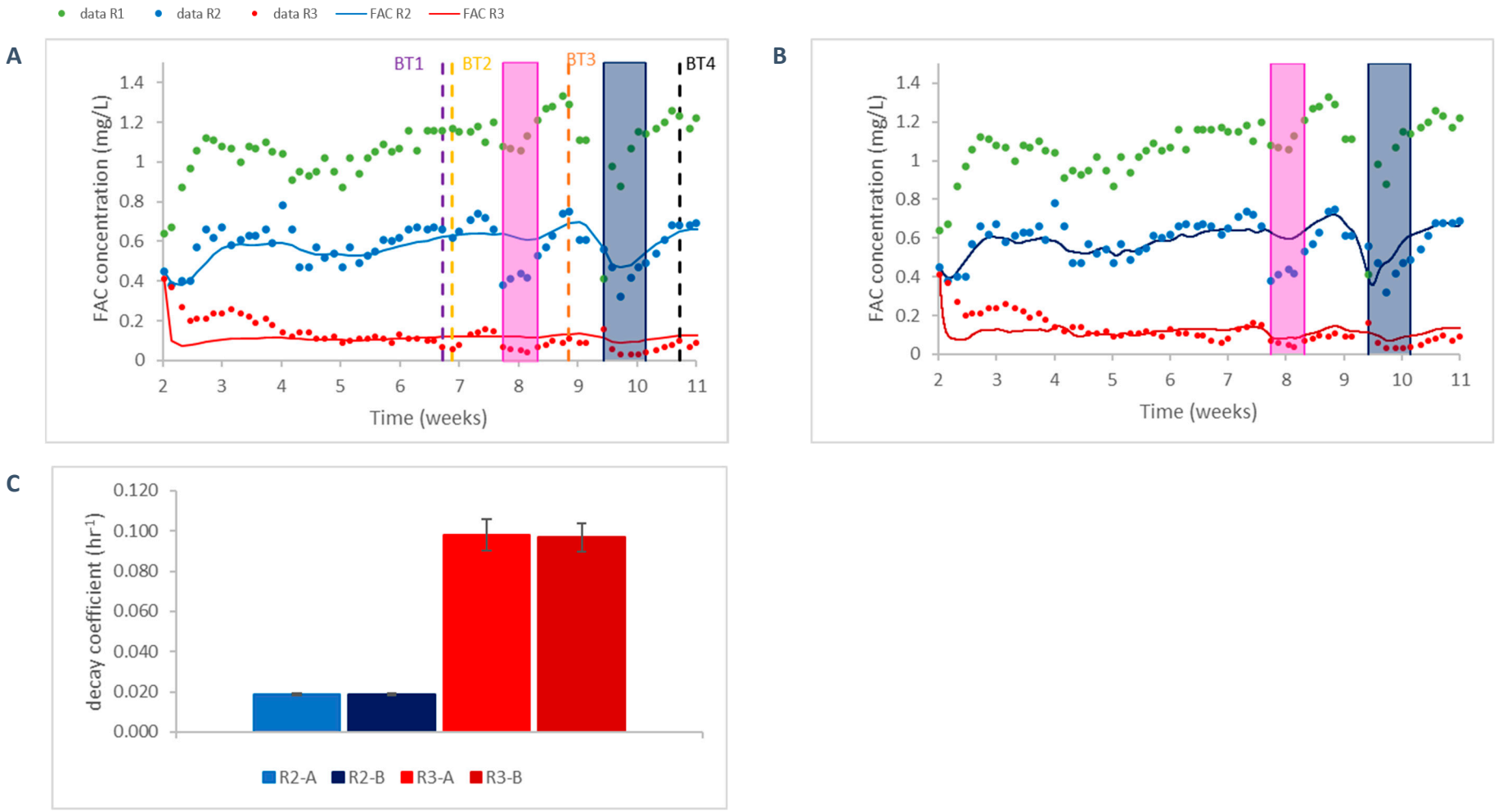


Figure S2: Plots of reactor data (marker) and model (line). Two models were tested (A and B). A: used the measured R1 chlorine concentrations as the input with a constant decay coefficient assumed in R2 and R3. B: used the measured R2 (converted to FAC concentrations) with a constant decay coefficient for R3. C: shows first-order decay coefficients from both tested models A and B. BT1, BT2, BT3, and BT4 are batch tests 1, 2, 3, and 4, respectively. Shaded pink and blue areas show the operational interruptions and recovery.

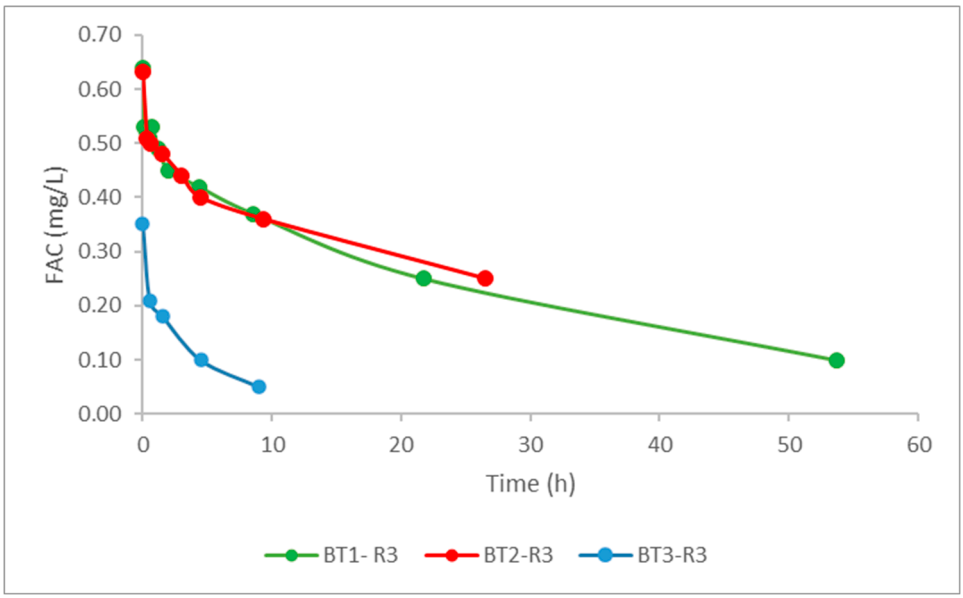


Figure S3: Chlorine decay characteristics of R3 from BT1, BT2, and BT3.