



Supplementary Figure 1. LC-MS spectrum of 3-chloro-CPA.

The LC-MS spectrum of the additional peak detected in CPA solutions treated with hypochlorous species showed a molecular ion at m/z 295 ($[M + H]^+$), consistent with 3-chloro-CPA ($C_7H_{14}Cl_3N_2O_2P$). The isotope distribution pattern showed a 3:1 ratio corresponding to chlorine atoms, and major fragment ions were observed at m/z 261 (loss of one Cl). These findings confirm the presence of 3-chloro-CPA rather than other oxidation or hydrolysis products.