

Abstract Submitted
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Chemical kinetics of the sterilization by peroxyntic acid (HOONO₂) in plasma-treated water¹ KATSUHISA KITANO, Eng., Osaka Univ., SATOSHI IKAWA, YOICHI NAKASHIMA, ORIST, YUSUKE KAWASHIMA, Pharm. Osaka Univ., TAKASHI YOKOYAMA, Eng., Osaka Univ., ATSUSHI TANI, Human Dev. Env., Kobe Univ. — For the disinfection of human body, plasma-treated water (PTW) has unique characteristics. While many types of PTWs have been studied in plasma medicine, we found that PTW had strong bactericidal activity at acidic pH (the reduced-pH method) and its bactericidal activity could be kept by cryo-preservation. Although PTW contains many chemical components, key bactericidal component was confirmed to HOONO₂ (PNA: peroxyntic acid) from the analysis of ion chromatography. Bactericidal activity of PNA has not been known so far. Based on chemical kinetics, several properties of PNA in PTW would be discussed. Since PNA is chemically synthesized efficiently if pH < 2, PNA in PTW would be formed only in the thin plasma-liquid interface layer where pH locally decreases during plasma irradiation. Lower temperature brought longer half-life of PTW bactericidal activity with first-order reaction. Activation energies of decomposition with PTW and chemical-synthesized PNA solution are almost same (110 kJ/mol). Bactericidal activity was proportional to PNA concentration in PTW (Chick-Watson law). Higher temperature brought higher bactericidal activity, and activation energies of the reaction with PNA and bacteria depend on kind of bacteria. This suggests that the reaction sites of bacteria depend on the type of bacteria.

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