# Effects of Water Matrices on Removal of Pharmaceuticals by Advanced Oxidation Processes.

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The aquatic pollution with pharmaceutical residues has been recognized as an environmental concern. To deal with this problem, advanced oxidation processes (AOPs) are being considered as a promising technology because of their powerful oxidation property. However, complete mineralization by AOPs is generally a costly process. A combined AOPs and conventional biological process has therefore been investigated to reduce the cost. In case that AOPs are used as pretreatment, water matrices must be taken into account to select the optimum method and operating condition of AOPs, since most waters naturally contain co-existing substances which may affect the removal efficiency. Therefore, in this study, effects of water matrices on removal of pharmaceuticals (carbamazepine and diclofenac) by the three AOP processes; namely, the photo-Fenton process (Liquid-Liquid reaction), the $TiO_2$ photocatalytic oxidation process (Solid-Liquid reaction), the combination oxidation process of ozone and hydrogen peroxide ($O_3/H_2O_2$) (Gas-Liquid reaction) were investigated. Carbamazepine and diclofenac in pure water were quickly degraded by all the AOPs. In actual raw sewage sampled from a sewage treatment plant in Yokohama, Japan, degradations of carbamazepine and diclofenac were inhibited. Co-existing substances could depress the pharmaceutical removals. $O_3/H_2O_2$ process was the most inhibited process by co-existing substances among AOPs studied in this study.