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DECADIC DELIVERED O_3 DOSES OF 50 APIS FROM WWTP EFFLUENTS

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EXECUTIVE SUMMARY

The presence of active pharmaceutical ingredients (APIs) in municipal wastewater treatment plants (WWTPs) is considered to be the main source of contamination of water resources. The potential side effects that APIs can cause to wild life and humans from chronic exposure, necessitates their efficient removal from wastewater effluents prior discharge. With APIs being found at very low levels (μg/L-ng/L) compared to the remaining matrix components, select chemical oxidation such as ozonation is currently been tested. This study determined the decadic delivered O_3 doses (mg/L O_3 per order of API removal) of 50 APIs commonly found in wastewater effluents from 5 different WWTP effluents of Sweden. The effluents were chosen so that they differ in TOC, COD, pH, and alkalinity in order to investigate the matrix effects on each API removal. Based on the results on Figure 1, the removal of APIs for a specific effluent varies significantly and it is directly related to the chemical structure of the compound. The DDO_3 of Table 1, prove that there is indeed an effect of the wastewater matrix (though previous studies have stated otherwise) and easily degraded compounds such as citalopram in one wastewater (WW3) can be difficult to remove in other (WW5).

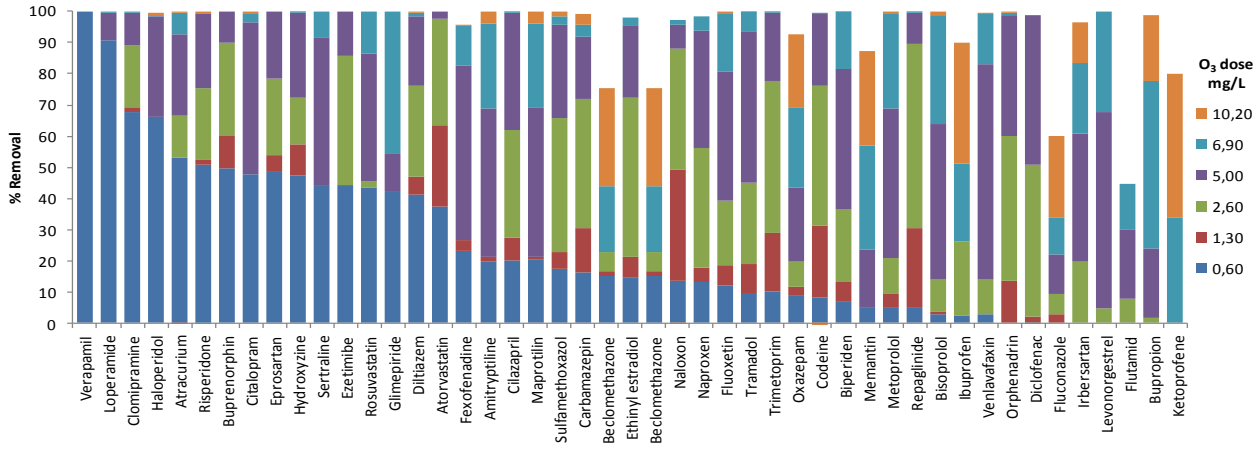

Figure 1: Removal of APIs per O_3 dose from WWPT effluent from Källby (TOC= 7.5 mg/L; COD= 29.0 mg/L; Alkalinity= 244.0 mg/L; pH= 6.6; $N\text{-}NH_4^+$= 1.4 mg/L)

Table 1: Decadic delivered O_3 doses for the removal of select pharmaceuticals in 6 WWTP effluents

	DDO_3 (mg O_3/L)					
WWTP	**Källby 1**	**Källby 2**	**Björnstorp**	**Öresundsverket**	**Sjölunda**	**Nykvarnsverket**
APIs	**WW1**	**WW2**	**WW3**	**WW4**	**WW5**	**WW6**
Citalopram	5.0	8.0	2.0	6.3	11.9	5.0
Diclofenac	4.7	5.9	n.d.	3.6	9.2	n.d.
Eprosartan	3.2	4,6	1.9	4.2	7.8	3.9
Ibuprofen	11.5	10.5	6.1	10.4	19.4	8.4

Levonorgestrel	6.7	7.0	6.1	5.4	16.8	7.0