

# OXIDATION OF AQUEOUS CORTICOSTEROID DEXAMETHASONE WITH PULSED CORONA DISCHARGE

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Anti-inflammatory drugs are frequently detected in waterbodies due to their large consumption and incomplete removal during wastewater treatment process. Dexamethasone (DXM) is most widely used corticosteroid, which in aquatic environment poses a threat to both human health as well as aquatic environment and animals [1,2].

The aim of this research was to study oxidation of dexamethasone using pulsed corona discharge (PCD). Experimental studies were undertaken with variation of pulse repetition frequency, pH, DXM initial concentration and addition of sodium dodecyl sulfate (SDS) surfactant and *tert*-butyl alcohol (TBA). Concentration of DXM was quantified using high performance liquid chromatography. Ion chromatography was used to quantify organic acids. Comparative study with ozonation was conducted.

Oxidation of dexamethasone was accelerated in acidic and alkaline media. Addition of SDS and TBA showed decrease in oxidation efficiency, indicating major role of surface borne •OH-radicals [3]. Fluoride and acetate were identified as the main by-products.

PCD proved to be promising method for oxidation of steroidal pharmaceutical dexamethasone with reliable performance in both acidic and alkaline media as well as in variety of initial concentrations. DXM oxidation efficiency with PCD surpassed ozonation 2 times.

## References

1. J. L. C. Ribas, A. R. Zampronio, H. C. Silva de Assis, 2016, *Environmental Toxicology and Chemistry*, 35 (4), 975-982
2. X. Yang, X. Li, D. Si, Z. Yang, Z. He, N. Zhang, Z. Zhang, Z. Shi, 2017, *International Journal of Clinical and Experimental Medicine*, 10(2), 2165-2172
3. S. Preis, I. C. Panorel, I. Kornev, H. Hatakka, J. Kallas, 2013, *Water Science and Technology*, 68(7), 1536-1542



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