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BIODEGRADATION OF PHARMACEUTICALS BY ACTIVATED SLUDGE AND PURE CULTURES

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The occurrence of pharmaceuticals in the environment has been a topic of increasing concern. Most of the pharmaceuticals are not completely mineralized in the human body and are released on the sewage systems as the pharmaceutical itself and as their "biologically active" metabolites through excretion, as well as by improper elimination and disposal. As conventionalwastewater treatment plants (WWTPs) are not designed to remove these emerging pollutant, they are easily released into the environment. The effects of halogen on biological properties of molecules have had a marked impact on various fields such as pharmacology. Stability, bioavailability and interactions with the biological target can be improved, however the recalcitrance of those molecules to biotic and abiotic degradation increases. Ciprofloxacin (CPF) and diclofenac (DCF) are two widely used halogenated pharmaceuticals, commonly found in the environment in concentrations ranging from ng L^{-1} to mg L^{-1}. CPF is a common human and veterinary broad-spectrum fluoroquinolone antibiotic. DCF is a non-steroidal anti-inflammatory drug (NSAID), also used as analgesic and antithermic treatment. In the present study, biodegradation of CPF and DCF was assessed by selective enrichements with actived sludge and with pure cultures of three different strains – *Labrys portucalensis* (F11) and two *Rhodococcus* spp. (FP1 and S2) – which have previously demonstrated capacity to degrade a range of halogenated compounds. For CPF selective enrichments, degradation of 100% was achived after ca. 6 months, although without fluoride release. These findings indicate that these selective enrichments are good candidates to find a bacterial strain able to biodegrade CPF. Regarding the pure cultures, F11 exhibited the highest degradation capacity, but no defluorination was observed. Concerning DCF selective enrichments, removal and liberation of chloride occurred after ca 4 months. Bacterial strains F11 and S2 were able to stoichiometrically dechlorinate the compound. These results indicate that these two strains are promising for DCF biodegradation.

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