



MASTER THESIS PROJECT

BIODEGRADATION OF EMERGING POLLUTANTS

AKINWALE ABIOLA SAHEED

**Institute of Analytical sciences and Physico-chemistry for the
Environment and Materials (IPREM). The University of Pau and Pays de
l'adour
Pau, France**

ABSTRACT

Emerging pollutants (EP) are chemicals of growing concerns recently identified in the ecosystems and for which no regulations are currently established. They are mainly organic compounds present as pharmaceuticals and personal care products, hormones, food additives, pesticides, plasticizers, laundry detergents, disinfectants, surfactants, flame retardants, generated mainly by human activities (Tang et al., 2019). EPs are of growing concern due to their potential impact on the human health and the environment. In a previous work, *Bacillus sp.* 35ODPABAG14 and *Rhodococcus sp.* 23AHTNG14 have shown potential for biodegradation of emerging pollutants and have degraded synthetic musks, UV filters (Azaroff et al., 2021). However, little is known about the mechanisms leading to this biodegradation. In this current study, we evaluated the ability of two bacteria strains *Bacillus sp.* 35ODPABAG14 and *Rhodococcus sp.* 23AHTNG14 to use four emerging pollutants: tonalide, ODPABA, galaxolide, octocrylene as carbon sources. We found that both strains used the pollutant as carbon source only after glucose supplementation. In addition, preliminary steps towards using *Bacillus sp.* 35ODPABAG14 bacterium as a genetic tool guided the selection of plasmid carrying antibiotics resistance gene pSEVA237R and pSEVA 531. The pSEVA237R (kanamycin resistance) was used to transform the *Bacillus sp.* 35ODPABAG14. This study revealed that electroporation method is ineffective for transformation of this strain of *Bacillus sp.* thus other transformation methods is suggested to be used in future research to incorporate exogenous plasmid DNA into the bacterium. The putative degradation pathways used by the *Bacillus sp.* 35ODPABAG14 was also investigated using bioinformatic analysis which enabled us to understand that the *Bacillus sp.* 35ODPABAG14 has several enzymes that are specific for different functional groups carried and can potentially degrade emerging the pollutants.

Keywords: Emerging pollutants, pharmaceuticals and personal care products, biodegradation, bioremediation