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Decontamination of Waste water from Emerging Organic Micropollutants through Oxidoreductase – A holistic approach in Green biotechnology

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In present century, due to stricter environmental legislation, pharmaceutical industries are pointed about disposal of effluent to aquatic system. Effluents from pharmaceutical industries have high value of chemical oxygen demand due to presence of emerging organic micropollutants, however they are present in ppm level. In the platform of green-biotechnology, laccase and tyrosinase, member of oxidoreductase family, have a great contribution in waste water treatment and to generate portable water. Multicopper oxidases laccase (EC 1.10.3.2) contributes in several biochemical reaction, including cross-linking of monomers, degradation of polymeric hydrocarbons and cleavage of aromatic ring (both homocyclic and heterocyclic aromatic compounds). Binuclear copper enzyme tyrosinases (EC 1.14.18.1) participates in conversion of di-phenoles to o-quinones and hydroxylation of mono-phenols to o-diphenols. However, plethora of research articles are published in this direction, in industrial scale, their applications are scanty. In this review, different approaches of laccase and tyrosinase for decontamination of waste water from emerging organic micropollutants are portrayed.

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Performance comparison of microwave cavities used for extraction operations

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In the agri-food industry world, considering only main productions such as winemaking, sugar refining, meat preparation and the dairy industry, billions of tons of waste are produced every year. These wastes represent both a direct loss (due to the failure to exploit their potential value, and their nutritional and energy content) and indirect, due to their necessary treatment and/or disposal. The potential value of food waste could be discussed in terms of its energy potential (for the possibility of obtaining energy from their post-processing) and in terms of the substances of interest that the waste contains. Some of these substances, of potential high value, can be recovered by means of extraction. Conventional extraction processes involve the use of solvents, which end up requiring an additional process of separation from the solute identified as the desired product. In recent years, extraction techniques have been proposed without the use of solvents. In this work, a performance comparison of microwave cavities used for extraction operations is presented. Particularly, the work addressed two cavities, of which one used a magnetic stirrer to homogenize the distribution of the electromagnetic field within the cavity, both working at 2.45 GHz. A calorimetric analysis performed by following the heating rate and temperature evolution in rack of 25 beakers filled with 25 ml of water, placed in both cavities, coupled with the solution of the heat transfer balance in the system, allowed to build the spatial distribution of the electromagnetic power dissipated as heat in each of the beakers. Fluid-dynamics aspects related to the recovery of the vapour phase produced during the extraction were also analyzed, with particular emphasis to the mean residence time of the vapour fraction in the extraction chamber (and thus on the exposition to microwaves) as a function of the extraction chamber configuration.