Evaluation of the Biocatalytic Potential of Agroindustrial Residues by Employing the Orange Peel Residue as a Biocatalyst in the Asymmetric Bioreduction Reaction of the Acetophenone Substrate to 1-Phenylethanol

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Asymmetric synthesis is an organic chemistry field directed to the production of chiral molecules with high optical purity which constitute a large part of the drugs and agrochemicals because they have biological activities. Thus, specific chemical catalysts are used to carry out processes of synthesis. However, most catalysts are composed by heavy metals and when they are improperly disposed of, they may cause serious environmental impacts. In addition, toxic solvents that belong to the Volatile Organic Compounds group are still used. Hence, biocatalysis is established as a promising area in green technologies for the synthesis of compounds with added value. Therefore, the objective was to develop alternative and sustainable ways for the realization of chemical synthesis through the employment of biocatalysts. In view of that, the object of study was to employ the agroindustrial residues (orange peel) as biocatalysts, in order to use the biochemical composition of these residues as a source of bioreducing agents, such as nicotinamide adenine dinucleotide (NADH) in the bioreduction reaction of the acetophenone substrate to 1-phenylethanol. I divided the methodology into three stages: synthesis, which was based on biochemical reactions utilizing water as solvent; characterization, consisting of the infrared spectroscopy method to identify the functional groups of the analyzed compound; quantification by the chiral column chromatographic method to analyze the chemical yield. In general, the residue employed has shown promising results in the production of chiral molecules from biocatalytic synthesis since it has obtained the bioreduction of the substrate and with enantiomeric excess.

Awards Won:

Spectroscopy Society of Pittsburgh: Third Award of $750.00

American Chemical Society: Certificate of Honorable Mention