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Evaluation of Eletroceramics for the Epoxidation Catalytic of α-Bisabolol

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Brazil is the only country that markets derivatives of the candeia tree, with well-established plantations [1], making it a renewable raw material suitable for the principles of Green Chemistry. Its essential oil has a high content of α-bisabolol, a sesquiterpene associated with various therapeutic properties such as anti-inflammatory, antimicrobial, and antitumor actions, as reported in the literature [2]. Thus, the technological development of new products derived from candeia oil is desirable from a commercial and therapeutic standpoint, which can be achieved by enhancing this substrate. Thus, this study aimed to oxidize α-bisabolol via heterogeneous catalysis, targeting its structural unsaturations, and obtaining an epoxide derivative as the product (Scheme 1). Eletroceramics were evaluated as heterogeneous catalysts, including: $CeSbO_4$, $CuMoO_4$, $NiMoO_4$, $MnMoO_4$, $CoMoO_4$, $ZnMoO_4$, $TbSbO_4$, $TbNbO_4$, $TbTaO_4$, $EuNbO_4$, $EuTaO_4$, $EuSbO_4$, $BaZrO_3$, $SrZrO_3$, $MnV2O_6$ and $ScLaGe_2O_7$. These materials were previously prepared by different methods such as hydrothermal synthesis, solid-state synthesis, and microwave synthesis. The reactions were carried out in a round-bottom flask, using a green organic solvent, isobutyraldehyde as a sacrificial reagent, and molecular oxygen (O_2) as the oxidizing agent, under mild heating up to 40 °C. After adequate quantification, it was determined that complete conversion of α-bisabolol is achieved within up to 8 hours of reaction for 9 out of the 17 reactions performed with different electroceramics. The catalysts $CeSbO_4$, $CoMoO_4$, $ZnMoO_4$, $BaZrO_3$, and $SrZrO_3$ showed the best results, with 100% conversion and selectivity above 50%. In this class, the $CoMoO_4$ material proved to be the most active, with complete substrate conversion in 2 hours of reaction at room temperature, being selected for reuse tests and demonstrating high stability, achieving more than 4 cycles without loss of activity.

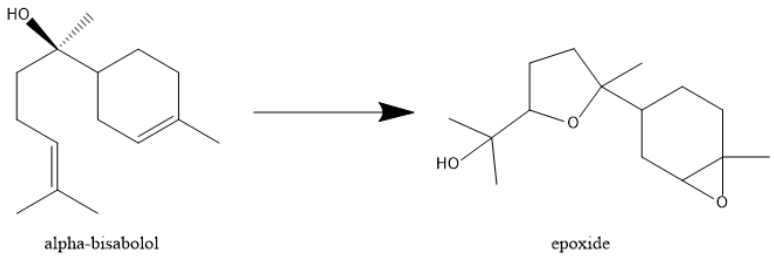

Figure 1. Epoxidation reaction of α-bisabolol

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