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ELECTROCHEMICAL CHARACTERIZATION OF ISO-α-ACIDS FROM *Humulus lupulus*

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Humulus lupulus, commonly known as hops, is a climbing plant belonging to the Cannabaceae family. Commercial interest focuses on the lupulin glands, which produce a soft resin in their inflorescences containing the plant's specialized metabolites. Hops are grown mainly for beer brewing due to the presence of α acids, which after a high-temperature isomerization reaction produce iso-α acids, which are a mixture of compounds responsible for the bitterness of beer. The efficiency of this isomerization can be evaluated using Nuclear Magnetic Resonance (13C-NMR), a technique used to confirm the success of the isomerization of α-acid mixtures. Although highly effective, NMR is an expensive technique for routine batch analysis and quality control of these compounds in hops and, potentially, in finished products such as beer. In this regard, electroanalytical techniques offer sensitive and low-cost alternatives suitable for routine quality control applications. With the aim of further studying α-iso acids, we proposed to analyze their electrochemical behavior using a screen-printed electrode. Initially, plant material from Sabro variety hop pellets was purchased and hot extraction with hexane was performed for two hours, with a yield of 21%. The extract was then subjected to α-acid separation using a 4% (w/v) methanolic solution of lead acetate, yielding 32% α-acids. After separation, the isomerization process was carried out under reflux with heating for 1 hour in an inert atmosphere, followed by pH adjustment (~1) and extraction with ethyl ether, resulting in a yield of 43% iso-α-acids. The device consists of a cell containing a working electrode, which is a graphite foil (GF), and an auxiliary electrode (Ag|AgCl) and a counter electrode (Platinum wire). With this arrangement, an anodic process is observed at around 1.2 V (vs. Ag|AgCl), referring to the oxidation of alpha iso-acids. In addition, characterization by ^{13}C NMR showed chemical shifts at 87.6 and 90.6 ppm, attributed to the carbinolic carbon in the ring structure of the molecule, characteristic of alpha iso acids. The analytical parameters of the calibration curve constructed with GF revealed a linear range of 1,00 to 4.00 $mg \cdot L^{-1}$ (r^2 = 0.998), sensitivity of 0.0523 $\mu A \cdot L \cdot mg^{-1}$, detection and quantification limits of 0.09 and 0.30 $mg \cdot L^{-1}$, respectively. In summary, the results obtained were promising for future analyses, with the possibility of quantifying iso-α-acids in beer using the electroanalytical method. Acknowledgments: CAPES, CNPq, FAPEMIG.

Keywords: *Humulus lupulus*, ^{13}C NMR characterization, GF electrode, beer.