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Antibacterial Activity of N-Styryl alkylimidazolium Ionic Liquids

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Bacteria demonstrate impressive effectiveness in adapting to changing environmental challenges. In contrast to most drugs in other medical fields, antibacterial drugs aim at shifting targets and, hence, lose their effectiveness over time. A novel approach for antibacterial compounds is the utilization of ionic liquids, formerly known as molten salts, constitute one of the hottest areas in chemistry these days.

Different N-styryl imidazolium salts with different alkyl size chain (1, 6 and 8 carbon atoms) were synthesized using microwave radiation, under solvent-free condition. The resulting ionic liquids were cooled at room temperature and washed with EtOAc to remove the starting reagents and concentrated under high vacuum to afford N-styryl methyilimidazolium ([SMIM]Cl), N-styryl hexilimidazolium ([SHIM]Cl) and N-styryl octylimidazolium ([SOIM]Cl) chlorides.

The antibacterial activity was tested against S. aureus, E. coli, S. epidermidis and S. pyogenes bacterial strains, using a modified Kirby-Bauer method and the minimal inhibitory concentration (MIC) was determined using concentration of the ionic liquids ranging from 7.8 μM to 1 mM.

Motivated by secure and eco-friendly protocols we reported the synthesis of different N-styryl imidazolium salts employing microwave radiation under solvent-free condition as a Green Chemistry approach. The resulting ionic liquids were soluble in MeOH and H2O, showing a good antibacterial activity with MIC ranging from 62.5 μM to 15.6 μM depending on the bacteria studied, also a positive correlation was found between the large of the alkyl size chain (1 and 6 carbon atoms) and the antibacterial activity.

Bacteria as S. aureus, S. epidermidis, E. coli and S. pyogenes plays a widespread role in a variety of infections combined with accentuated antibiotic resistance, making these organism a significant threat to the industry and medical community, that is why that the antibacterial properties of the N-Styryl alkylimidazolium ionic liquids with specific properties as different alkyl size chain and the incorporation of a cation in the structure along with the utilization of eco-friendly synthesis, does to these compounds a promising tool for a new class of antibacterial agents.

Biography

Luis Guzman J., has worked in the area of natural products, especially in the Research and Development of Bioactive Products. He is a profesor at the Faculty of Health at the University of Talca, Chile and external consultant of Fraunhofer Chile Research in the area of Nanomedicine.

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