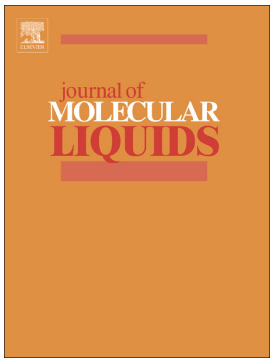

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Silver (I) complexes of Imidazolium Based N-heterocyclic Carbenes for antibacterial applications

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Abstract

Imidazolium-based novel ionic liquids (ILs) and their silver complexes were synthesized and evaluated for antibacterial properties. In current endeavor, we have designed novel ILs and prepared their neutral and ionic silver complexes where their formation is influenced by the polarity of solvent as evidenced by NMR, FT-IR, and EI-MS data followed by investigating the antimicrobial activity, MIC determination and stability studies against microbial growth. The most potent compound **NS-11** and **IS-11** inhibited the microbial growth with MIC value of 6.25 µM against *S. aureus* and **NS-11** displayed MIC of 25 µM against *S. enterica* showing an efficient growth inhibition even up to 21 d. The relative potency amongst the test compounds was assigned using optical density measurement at 600 nm. The cell morphology when monitored with SEM, showed the rupture of bacterial cell wall and thereby indicating cell wall as a site of action resulting in the ceasing of bacterial growth. The side chain in ligands as well as metal complexes was varied as biphenyl carbonitrile, benzyl, butyl and methyl in order to investigate the effects of steric properties and hydrophobicity on biological activity reflecting a direct correlation. The variation of side chain gives clear insight into the essence of substitutions to contribute towards enhanced stability against bacterial growth.

Keywords

Antimicrobial, Cell Wall Rupture, Minimum Inhibitory Concentration, N-Heterocyclic Carbenes, Silver