

Antimicrobial activity of nanoparticles from solid phase supramolecular assemblies based on stereoisomers of p-tert-butyl thiacalix [4] arene with silver cations

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Abstract

© 2016, International Journal of Pharmacy and Technology. All rights reserved. Discovering and using so-called "smart" nanomaterials with unique properties have been actively developing areas of research. This is because nanomaterials often exceed their conventional analogues in many parameters. However, new methods are required for estimation of properties of new nanomaterials. In this study, a modified bacterial growth bioassay was suggested for the assessment of antimicrobial properties of nanoparticles from solid phase supramolecular assemblies with silver cations. Previously, the properties of silver nanoparticles have been well-studied for the water phase but not for the solid phase supramolecular assemblies. The new method suggested was used to investigate the antimicrobial activity of nanoscale particles based on p-tert-butyl thiacalix[4]arene, functionalized with tertiary amide groups at the lower rim in three conformations - cone, partial cone and 1,3-alternate with silver ions, which were assigned on the films' surface. It was shown that nanofilms possessed bacteriostatic properties towards gram-negative *Pseudomonas aeruginosa* and did not cause negative effects on gram-positive *Bacillus pumilus*. Nanoparticles of morpholine in cone conformation and AgNO₃ had the greatest antimicrobial effect, which can be explained by the highest ratio between surface area and volume of this nanoparticle in comparison with other nanoparticles or silver ions.

Keywords

Antimicrobial properties, Gram-negative and gram-positive bacteria, Nanoparticles, p-tert-butyl thiacalix[4]arene, Silver