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Biopolymer Nanocapsule for Controlled Release of Bismuth (III) Complex with 4-(1H-Imidazole-1-yl)-benzaldehyde-thiosemicarbazone (BiTSB)

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The increase in the incidence of infectious diseases continues to be a global health concern, especially when it involves resistance mechanism of pathogens[1]. Bismuth (III) compounds are widely used in medicine because of their high effectiveness and low toxicity in the treatment of a variety of microbial infections, especially to treat gastrointestinal diseases, including infection of *Helicobacter pylori*[2]. In the last years, several studies have shown an increase in antibacterial activity for metallodrug of Bi, resulting from the Bi(III) coordination with thiosemicarbazones (BiTSB) (Figure 1) However, its solubility and bioavailability are low[3]. In this context, to increase its effectiveness, controlled drug delivery systems have been proposed as an alternative. Biopolymer nanocapsules offer a promising approach for the controlled release of BiTSB. These nanocapsules can provide targeted drug delivery, enhanced therapeutic efficacy, and reduced side effects, contributing the treatment of infectious diseases.

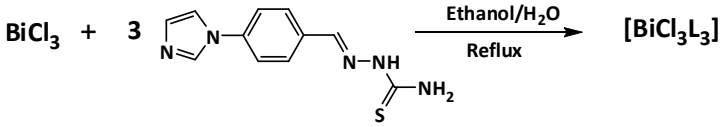

Figure 1. Synthesis scheme of Bismuth complex with 4-(1H-Imidazole-1-yl)-benzaldehyde-thiosemicarbazone

In this study, nanocapsules were prepared using the preformed polymer interfacial deposition technique. In this technique, poly-ε-caprolactone (PCL), Span, and Tween 80 were employed for the encapsulation of BiTSB. The obtained complex was characterized by FT-IR, NMR, and CHN, while the nanocapsules containing the complex were characterized using TEM, FT-IR, DRX, TGA, DSC, DLS, and Zeta potential. The results revealed the successful synthesis of the complex and its encapsulation. A spherical morphology with an size of 175. Additionally, the Zeta potential was measured to be approximately -30 mV, indicating the stability of the nanocapsules. In vitro studies to evaluate (i) drug loading capacity, (ii) controlled drug release, (iii) permeation and penetration of biological barriers, (iv) cytotoxicity, and (v) biological activity are underway and will be presented at the event.

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