

Abstract

Currently, one of the main problems in health is related to the large number of cancer cases that exist in the world. This situation opens the possibility of studying treatments that are more effective and cheaper. One of the most common cancers around the world is the breast cancer, which requires mastectomy (the partial or total removal of one or both breasts) as initial treatment. Consequently, reconstruction options such as augmentation mammoplasty are usually performed, which helps reduce the sequelae of mastectomy. However, due to the postoperative risks' treatment in mammoplasty local drug delivery systems are mandatory. In the breast implants is possible to carry out a polymerization coating to load different molecules that can reduce the postoperative risks of that surgery. In that sense, this work is about a mathematical model based on Fick's Second Law, formulated for the controlled diffusion of drugs (in this case, the anticancer rose Bengal and the antimicrobial peptide KR-12) in mammary implants polymerized by cyclodextrins. This mathematical model was solved by an analytical solution using partial differential equation tools and also a numerical solution using the orthogonal placement method. By means of these solutions, the drug release profiles and drug diffusion profiles through the polymer coating on breast implants were obtained. As part of the study, it was sought to analyze by means of graphs if the mathematical models fitted the experimental data or if there may be certain factors that did not allow the drug to be released in the expected manner. Finally, a study of the diffusivity of the drug in the different types of analyzed samples was carried out.