

Editorial

Advanced Studies on Drug Delivery Systems: Characterization and Their Impact on Pharmaceutical and Medicinal Areas

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This work shows some advanced studies in model pharmaceutical formulations that help to develop guidelines for the rational design of controlled release systems. Among them, it is worth mentioning the analysis of experimental transport coefficients because they are essential properties for designing, modeling, and scaling up rate-controlled processes.

Such systems are, at present, of significant importance for the reliable and safe delivery of precise dosages of drugs, and meaningful insights have been obtained by manipulating the rates of diffusion of carrier–drug complexes and thermodynamic binding constants.

This Special Issue (SI) includes two papers [1,2] focused on the characterization of aggregates of carrier–drug complexes using different techniques (e.g., Taylor Dispersion Analysis). In the first work [1], one important pharmaceutical target, chloroquine diphosphate (CDP), was chosen and β -cyclodextrin was the carrier. From the analysis of the behaviour of the diffusion and viscosity of these ternary systems and after obtaining the equilibrium constant of the complex of these components, a better understanding of the physical chemistry of carrier-mediated transport phenomena in this particular ternary system of controlled drug release was achieved.

In the second paper [2], the authors dedicated their research to the synthesis, characterization, and study of functional compounds for controlled drug delivery, using other carriers: resorcinarenes, macrocycles obtained by condensation reactions of resorcinol and aldehyde, and SBA-15, a mesoporous silica characterized by ordered pores in its structure and a large surface area. As a result of its properties, they can be used for several purposes, including absorbents, drug delivery, catalysis, and environmental processes.

Nano dispersions could also be considered as relevant carriers for the inclusion of unexplored medical oils and other phytoactives. In fact, Wael A. Mahdi et al. [3] concluded that one of the nanoemulsions studied (designated as CNE4) can be very useful for the promising delivery of CSO (that is, cranberry seed oil, used in various skin diseases because, possibly, of the presence of ω -3, ω -6, and ω -9 fatty acids).

In another Special Issue article [4], the importance of detailing and having accurate information about the diffusion of ethanol in supercritical CO₂ was addressed, considering its role in the rational design and efficient operation in the process of creating a controlled drug delivery device.

The supply and management of essential medicines is also a target of great interest at present. Once several obstacles are overcome, we should be able to maximize their availability and also increase access to patients who seek them. François Mbonyinshuti et al. [5], in the work presented in this Special Issue, developed three types of models (including Linear Regression, Random Forest, and Artificial Neural Network Models), with the objective of predicting future trends of essential drug consumption and avoiding its consequences in Rwanda.



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