

## **Spray Drying: Microencapsulation of polymers with the potential for controlled drug release in the gastrointestinal tract**

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### **ABSTRACT**

The development of drug delivery systems in the gut has received increasing attention due to its clinical importance. Efficient and targeted administration of drugs in the gastrointestinal tract is crucial for the treatment of various diseases, increasing therapeutic efficacy and minimizing side effects. The objective of this study is to evaluate the efficacy of the encapsulation of Guar Gum and Eudragit S100, aiming at the protection of the drug in the gastric juice and its controlled release in the intestine. Different concentrations of dry polymers were tested using the spray drying technique, with optimization of parameters such as temperature and air flow. The particles produced were characterized by Scanning Electron Microscopy (SEM), Fourier Transform Infrared Spectroscopy (FTIR), Thermogravimetric Analysis. The results showed that after the application of the spray drying technique, the particles presented standardized and spherical morphologies, with sizes between 3 and 9  $\mu\text{m}$ , the systems maintained their chemical characteristics, evidenced by the main bands in the FTIR, such as  $1420\text{ cm}^{-1}$ , corresponding to the bond of the esterified groups of Eudragit S100, and the range of  $744\text{-}1251\text{ cm}^{-1}$ , corresponding to the coupled elongation vibrations of C-O-C, C-C-O, and C-OH of Guar Gum. Thermal analysis confirmed increased thermal stability and system degradation after drying, with a maximum degradation peak at  $380\text{ }^\circ\text{C}$ . However, it is inferred that the encapsulation of Guar Gum + Eudragit S100, using the spray drying technique, has potential as an effective system for the release of drugs in the intestine. The protection conferred by polymers against gastric juice and controlled release in the small intestine represent a promising approach for the formulation of optimized pharmacological therapies. This technique can be applied in the development of new treatments for gastrointestinal diseases, contributing to the improvement of the efficacy and safety of drugs.

**Keywords:** Polymers, Spray Dryer, Encapsulation, Gastrointestinal tract, Drug delivery.

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