



V. Symposium of Young Researchers on Pharmaceutical Technology, Biotechnology and Regulatory Science

January 18-20 2023 - Szeged, Hungary

OP-28

DOI: [10.14232/syrptbrs.2023.50](https://doi.org/10.14232/syrptbrs.2023.50)

Preparation and optimization of hydrophobic ion pairing complex of lysozyme

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Hydrophobic ion pairing (HIP) has emerged as an approach to enhance the encapsulation and loading of water soluble peptides/proteins in their micro and nanocarriers. The hydrophobicity of these molecules is increased through a reversible electrostatic complexation with an oppositely charged amphipathic molecule at suitable pH [1,2].

This work aims to investigate different factors that affect the preparation of HIP of lysozyme (LYZ) with the surfactant sodium dodecyl sulphate (SDS). Based on the literature and previous experience, risk assessment as one of the quality by design tools has been employed to explore a variety of process parameters and material attributes that affects the formation of such complex. This initial assessment shows that the pH and molar ratio of the SDS:LYZ are the highly ranked influential factors. In this study, optimum molar ratios were determined for this complexation at selected pH values by titration using particle charge detector (PCD). The titration experiment revealed variable optimum of SDS:LYZ molar ratios at different pH environment which was confirmed by series of complexation experiments that showed high yield of the hydrophobic complex. Furthermore, the integrity of the peptide was successfully reserved as it remained biologically active after complexation and drying process.

Acknowledgement: Funding: Project no. TKP2021-EGA-32 has been implemented with the support provided by the Ministry of Innovation and Technology of Hungary from the National Research, Development and Innovation Fund, financed under the TKP2021-EGA funding scheme.

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