Abstract Submission

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Impact Of Formulation And Process Parameters On Near-Infrared Spectra Application For Water Determination In Biopharmaceuticals

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What is your preferred presentation method?: Poster presentation

Abstract Body: Traditionally, the water content of freeze-dried biopharmaceuticals is determined by time-consuming methods such as Karl Fischer titration. As a fast and non-destructive method, many studies demonstrated the efficiency of Near-Infrared (NIR) spectroscopy for that purpose [1].

In this study, NIR was applied to different freeze-dried monoclonal antibody. The aim was to evaluate the robustness of a NIR model depending on formulation composition and process parameters of the lyophilization parameters, and the benefits of NIR when developing a freeze-drying cycle for a new pharmaceutical product.

A full Design of experiments (DoE) was established in order to produce materials with various formulations and various process parameters. As a first step, a calibration model was created and validated. The model creation was based on 4 target lyophilized cycles which were manufactured to obtain samples with different water content concentration. Then, 20 lyophilized cycles were produced according to the DoE. Two levels of protein and sucrose concentration, and two levels of pressure / primary drying temperature and process time were investigated. Furthermore, several samples of each experiment stored at different temperature and relative humidity conditions were evaluated.

Chemometrics using Principal Component Analysis (PCA) and Partial Least Squares (PLS) were used to evaluate the process variations and to determine the water content, respectively.

NIR is capable to differentiate between different lyophilization process conditions, based on chemometrics. Robust calibration NIR model for water determination was generated against KF independent on lyophilization process parameters and formulation composition. NIR is suitable and robust method for drug product development of freeze-dried formulation.

[1] Y. Roggo, P. Chalus, L. Maurer, C. Lema-Martinez, A. Edmond, N. Jent, A review of near infrared spectroscopy and chemometrics in pharmaceutical technologies, J. Pharm. Biomed. Anal., 44 (2007) 683-700.

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