



Candidate: Mgr. Julie Maruška

Thesis: Theory and applications of DoE (Design Of Experiments) in pharmaceutical technology

Ph.D. THESIS REPORT

The thesis focuses on the application of DoE techniques in pharmaceutical technology. It outlines the challenges faced in pharmaceutical technology, such as complex formulations, robustness in manufacturing, and resource limitations. The primary objectives of the thesis include reviewing modern DoE techniques, applying them in pharmaceutical development, evaluating results statistically, and providing recommendations for implementation. The thesis discusses the theoretical background of DoE, including factorial designs (full and fractional), screening designs, optimization approaches, and mixture designs. Practical examples of DoE techniques in pharmaceutical technology are explored, emphasizing the importance of identifying critical process parameters to enhance product quality and consistency while reducing risks. The author's contribution to four articles, two of them being first author ones, are highlighted, showcasing author's skills in mathematical modeling, data analysis, interpretation of results, and article writing. Overall, the thesis serves as a very clearly written and comprehensive guide for practitioners in pharmaceutical technology.

Regarding the work, I have only a few questions and comments.

1. Could the author explain the practical implications of her work in improving product quality and consistency in pharmaceutical technology through the implementation of selected DoE techniques? How does the author envision the future integration of these methods in the industry to address ongoing challenges?
2. Page 35, Table 11. The note states that the experiments were replicated 10x. What exactly is meant by this, how were the replicates distributed (I assume randomly), and what Y values, in relation to replicates, are given in the Table 11?
3. In her work, the author used a variety of experimental designs. Were these designs orthogonal in all cases, and if not, what was the impact of non-orthogonality on the results of the analyses?
4. The work states that all analyses were conducted in MS Excel. However, its basic version has limited capabilities regarding DoE. Were any third-party macros used, or how exactly were the calculations performed? Wouldn't it be more appropriate to choose the free R system, which is very flexible, albeit at the expense of user-friendliness?

In conclusion, I recommend this dissertation for acceptance and endorse the candidate for the awarding of the PhD degree.

Prague, February 27, 2024

Prof. Daniel Svozil, Ph.D.