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Modeling of film coating thickness with use of artificial neural networks

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The thickness of the coating uniformity depends on the properties of the coating solution (e.g., solid content, viscosity, and surface tension), and a multitude of process parameters (e.g., spraying rate, air temperature, pan speed, atomization and air pressure pattern, nozzle orientation, and distance from the gun to the tablets) [1,2].

Our study decided to use the new and revolutionary approach in the field of pharmaceutical coating processes called the artificial neural network (ANN) by using the neural networks toolbox derived from the Matlab software. The experiments were performed using tablets of Alfuzosin Chlorhydrate as a model filler and an aqueous solution of Surelease as a polymer with different contents. The various parameters that can affect coating thickness, such as spray rate, air pressure, solid content, speed of the drum, pan loading, and time of coating, were studied. The properties of the coated tablets were evaluated using the ANN, and both the parameters of the coating process and the properties of the coated tablets were used as the basis for optimization, as well as the choice of the optimal structure of the ANN model. It was found that the best neural network architecture had 18 neurons in the hidden layer with a mean square error of 6.131 $*10^{-3}$ and a determination coefficient of nearly 1. The relative importance of each independent variable was quantified using the Garson equation. In this study, the spray rate was found to have the highest impact on the properties of tablets.

References:

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