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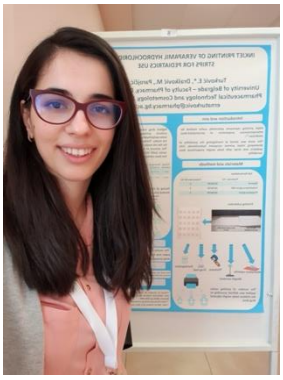

Application of artificial neural network analysis in understanding critical material properties governing orodispersible film disintegration

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Orodispersible films (ODF) are thin strips that are intended to disintegrate within seconds upon contact with liquid. Critical material properties (CMP) affect ODF disintegration, but due to complexity of data, film performance is difficult to predict. The aim of this work was to develop artificial neural network (ANN) model as tool for prediction of ODF performance based on its CMP.

Dataset values for building ANN model were based on the in-house experimental results and included following input parameters: concentration of active ingredient, its solubility, molecular weight and polymer ratio, ratio of superdisintegrants, plasticizers, film surface-area, weight, thickness, mechanical properties (Young's modulus, tensile strength, % elongation and complex modulus) and disintegration time as output. Preprocessing operators were applied to filter examples, select attributes and set roles of attributes. Split validation is performed to estimate how accurately model performs on unseen data. Root-mean-square error (RMSE) is used to compare prediction errors of data.

ANN model with one hidden layer showed accurate predictions, while higher number of layers led to overfitting therefore higher RMSE values for testing data. ODF mechanical properties as input are highly related with film disintegration as the selected performance indicator, accompanied with high predictability. ANN was able to perform prediction on ODF disintegration time with high accuracy characterized with RMSE 0.871 and 0.176 for training and testing set, respectively.

The results obtained indicate that it is possible to build predictive ANN which could lead to better understanding of complex relationship between ODF properties and their effect on film disintegration.

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