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Modeling enzymatic reaction in sequential injection analysis

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Sequential injection analysis (SIA) could be use to determine on-line enzymatic activity such as lipase/esterase decreasing the repetitive and time-consuming activities. Lipases are produced commonly in fermentation process, where it is desirable to monitor the process on-line. The factors that modify the mixing of reagent in a detector in a SIA are often unknown or dificult to determine, since the reagents concentration change due to the dispersion (degree of dissociation of the reagents in the carrier). Thus a model identifying the peak´s components in a SIA assay; peak height, peak area, time to maximum peak height and statistical moments can be used to numerically evaluate and predict the dispersion and gradient concentration in enzymatic reactions. The Taylor´s model, the tank´s in series model and mixing chamber models only expose the peak´s behavior in a flow injection analysis system. Therefore in this manuscript we present a model based on the modification of the convolution model. The model fits the experiments measuring enzymatic activity of lipase CALB using p-nitrophenyl butyrate (p-NPB) as substrate performed to wavelength lamda=415 nm. The model explains the behavior of the peaks at different times of reaction. This model is helpful to predict the behavior of enzymatic reaction and to improve the conditions applied in the experiments.
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