

Designing Robust Process Analytical Technology (PAT) Systems for Crystallization Processes: A Potassium Dichromate Crystallization Case Study - DTU Orbit (09/11/2017)

Designing Robust Process Analytical Technology (PAT) Systems for Crystallization Processes: A Potassium Dichromate Crystallization Case Study

The objective of this study is to test and validate a Process Analytical Technology (PAT) system design on a potassium dichromate crystallization process in the presence of input uncertainties using uncertainty and sensitivity analysis. To this end a systematic framework for managing uncertainties in PAT system design is used. For uncertainty analysis the Monte Carlo technique is used, while for the sensitivity analysis both Standardized Regression Coefficients (SRC) and Morris methods are employed. The analysis performed under open-loop condition shows that the input uncertainties in the nucleation and crystal growth parameters affect the product-process performances (e.g. crystal size distribution (CSD)). Analysis of the proposed PAT system design (closedloop), on the other hand, shows that the effect of the input uncertainties on the outputs (product quality) is minimized, and the target specifications are achieved, thus ensuring that the PAT system design is reliable under the considered uncertainty ranges.

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