On-line estimation of solids concentrations and mean particle size using a turbidimetry method

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Abstract
On-line measurement of solids concentrations was performed using a turbidimetry method. Four different samples (PVC, sand, protein and KCl particles) with solids concentrations up to 10 wt.% were used in this study. At higher solids concentrations the measured light intensity approached zero. The extrapolated Beer-Lambert's equation in polynomial form, ln (transmission) as a function of ln(solids concentration), was found to best fit the experimental data. For protein particles with mean sizes less than 50 μm the fifth or sixth order polynomial equation was required to give the best fit (regression coefficient greater than 0.98). Whereas, larger particles were best fit using Beer-Lambert's equation with the mean particle size as one of the parameters. Transmission data from samples with unimodal particle size distribution (KCl samples) were used to estimate the optical parameters of the KCl suspension. With known optical parameters and on-line turbidity and solids concentrations the mean particle size of the flowing suspension was estimated. The calculated and experimental mean particle sizes are within ± 10%.

Keywords
Solids concentration measurement;
Mean particle size
Tarbidimeter;
Beer-Lambert equation