

THE USE OF SEPARATION PROPERTIES TO DESCRIBE RHEOLOGICAL BEHAVIOUR OF CONCENTRATED DISPERSIONS

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The flow behaviour of concentrated suspensions is mostly characterized by viscometric approaches. The interpretation of the results, especially at low shear rates, is often difficult due to sedimentation and particle migration within the viscometric gap. But studying separation processes can give information about the viscosity behaviour of such suspensions, because of the close connection between sedimentation kinetics and rheology. In general particles separate slower with increasing concentration. The behaviour can be characterized by so called hindrance functions which are often common power law type. This type of hindrance functions are easily transformed into viscosity functions. Moreover the information can be used to determine the particle size distributions from separation velocity measurements of more concentrated dispersions.

In this paper analytical centrifugation was used to determine the viscosity functions depending on volume concentrations, particle size and distribution type. The measurement device - a multisample analytical centrifuge - LUMiSizer (LUM, Berlin Germany) measures the light extinction as function of time and position over the entire sample length simultaneously. From this data the particle velocity distributions were obtained and so values of the hindrance function at different initial volume concentrations and for different particle fractions determined. The approach was applied to monodisperse particles having different sizes, bidisperse and polydisperse suspensions and a creaming emulsion.