

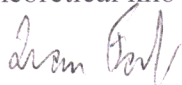
Review of PhD thesis “Rheology of Dispersive Polymeric Systems“

PhD thesis written by M. Krácalík deals with topical and environmentally important problem: processing of polymer waste – PET bottles. The basic problem concerning enhancement of processing and utility properties of recycled polymers is investigated on the basis of the knowledge obtained from the mentioned literature and using deep theoretical understanding in the field of thermodynamics and rheology. The entirely new information related to the behaviour of suspensions of rigid particles (in particular nano- and microparticles) in polymer melt was introduced as well. The particles in original state were subjected to chemical treatment, which led to further improvement of investigated product properties. The evaluated PhD thesis aimed at basic research possesses fundamental importance for the subsequent engineering research. The proposed study is written clearly, in fact without formal errors; only the absence of a list of the used symbols sometimes makes difficult the orientation in symbols and terms used by the author.

PhD thesis of M. Krácalík presents definitely a scientific contribution with original results related to the possibility of practical industrial applications. The author has shown the ability of individual inventive work and the evaluated PhD thesis can be definitely recommended for defence.

The critical view of the reviewer is focused on the fact that the results of the evaluated thesis will be used as the basis for subsequent engineering research resulting in the determination of process parameters and machinery for production of recycled polymers. The industrial or pilot scale equipment requires quantification of certain characteristics, which were only marginally (or qualitatively) mentioned in the original work. First of all, quantitative determination of dispersion level (dispersion homogeneity) of solid phase particles (e.g. on p. I:4 and I:5, II:14 – II:17) or, better, the permitted limit of “inhomogeneity” to achieve uniform properties in the bulk product volume would be a useful subject to deal with. Although the Δd_{001} value (on p. III:8, etc.) introduces an average characteristic, the value of statistic variation (dispersion) is not known. The tested microparticles in the form of glass or basalt fibers are characterized by concentration of solid particles in suspension, but estimation of concentration variance in tested suspensions is not presented. The used “microextruder” (p. V:3) is practically described only once in the evaluated study. For the subsequent engineering research, it would be useful to describe the used equipment (in the case of difference in other experiments) in an analogous way. Concluding these remarks it is necessary to mention that nanoparticles (also in the dry state) form agglomerates, which must be dispersed into the original (reactive) size before the main process of their suspending in the liquid phase. The author did not mention this problem in his thesis.

In conclusion of this review, I would like to express that the critical remarks to the PhD thesis of M. Krácalík do not lower its importance and contribution in the field of basic research, which are indisputable. The purpose of these remarks is only (on the basis of experimental experience of a postgraduate student gained during his work) to contribute to faster and more successful subsequent development of industrial equipment that will practically utilize the theoretical knowledge from the PhD thesis.



Dr. Ivan Fořt, DrSc.
Associated Professor
Department of Process Engineering
Faculty of Mechanical Engineering
Czech Technical University in Prague

Prague, July 27, 2006