STUDY OF FILLER FLOCCULATION MECHANISMS AND FLOC PROPERTIES INDUCED BY POLYETHYLENIMINE

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Abstract

The research on filler flocculation and floc properties induced by polyethylenimine was carried out by monitoring the particle chord length distribution during the flocculation, deflocculation, and reflocculation processes for different polymer doses. Results show that there are two PEI doses that produce a maximum flocculation due to different flocculation mechanisms. Low PEI doses induce a fast flocculation through bridge formation, but high PEI doses induce a slow flocculation by charge neutralization. The proposed flocculation mechanisms, presented in this paper, explain the observed floc properties and their dependence on the polymer dosage. As the flocculation mechanism determines the floc properties and, therefore, the nature of the retention and drainage processes, the findings may allow papermakers to improve the optimization of the wet-end processes by controlling the PEI dosage more accurately. The study of flocculation kinetics and floc stability showed that the optimal dosage point depends strongly on the PEI dosage used.