A Steady-state Model of Commercial Spheripol Polypropylene Process and Its Applications

박세호[*]

호남석유화학

(shpark72@hpc.co.kr[*])

Spheripol process is widely used to produce polypropylene. It uses both continuous-flow stirred-bed and fluidized-bed reactors. In this work, we present the development of steady-state model for this Spheripol process using fundamental chemical engineering principles and software tools, ASPEN Polymers Plus. Discussion focuses on polymerization kinetics, polymer properties, residence time distribution, and other modeling issues.

We characterize a Ziegler-Natta catalyst by assuming the existence of multiple catalyst site types. The model contains a single set of kinetic based on well defined reaction mechanism and thermodynamic parameters that accurately predicts the polymer production rate, molecular weight, polydispersity index, and composition, for both homopolymer and impact copolymer product grades. Residence time distribution (RTD) is also key parameter to determine polymer properties. It induces non-uniformity in polymer properties such as particle size and comonomer content. We simulated RTD and polymer properties using developed program. We validate the model using plant data from HPC Spheripol process and apply the validated model to investigate the effects of varying reactor conditions.