

Development of an unseeded crystallization equation

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An equation for unseeded crystallization without aggregation and breakage is developed. The equations obtained by solving conservation of mass and the growth kinetic of particles resulted in average size of particles as a function of time. From the conservation of mass, the nucleation kinetics is dependent of both growth kinetics and the supersaturation. For integer order of the growth kinetics, analytical equations can be obtained. By measuring total mass as a function of time, induction time, size of nucleus, nucleation and growth kinetics can be estimated. The crystal size distribution for batch unseeded crystallization can be estimated numerically from the equations. The equation can be applied to any unseeded crystallization processes, regardless of types of materials such as ionic, organic, and metallic particle.