

Fundamentals of Population Balance Based Crystallization Process Modeling

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2.1 Introduction

Crystallization modeling and its pertinent areas, including the model based analysis, optimization, design and control, have been intensively investigated in the past decades from the academic perspective, starting from the famous work of Hulburt and Katz,¹ with the recent increasing attention from the pharmaceutical and food industries. In addition to the process analytical technology (PAT) based crystallizer analysis, the model based investigation and *in silico* design of crystallization systems is a major trend in the crystallization community.² The principal crystallization process development objectives are generally related to a combination of crystal purity, size, shape, polymorphic form and yield. Since the population balance model (PBM) framework is able to consider all these properties,^{3,4} it has become an