Effect on Mixing Performance due to Rotating Cylinder in a Cylindrical Double-Ribbon Mixer

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Abstract:

Adopting a non-sampling mixing index method and to ensure a uniform mixing is highly essential in food manufacturing, pharmaceutical, chemical, and cement industries. However, based on the necessity of the mixing levels, these industries use different mixers to achieve their commercial outputs. Most of these industries rely on sample-based verification of the mixing index, which may not produce accurate results. In this study, we considered a discrete element method (DEM) for simulating the mixing of multi-components that are included in a typical commercial whey protein mixture. Then an effective non-sampling mixing index i.e., subdomain-based mixing index (SMI) has been incorporated for assessing the mixing levels. The main motive of this study is to acquire a high mixing index in the least possible mixing time so as to boost the manufacturing rate. For this purpose, a half-filled cylindrical double ribbon mixer has been employed and the SMI outputs have been presented in graphical format for the following four cases: 1) Ribbon rotational effect 2) Cylinder rotational effect without ribbon 3) Cylinder rotational effect with static ribbon 4) Cylinder and ribbon rotational effect respectively. For the given simulation conditions, the SMI values ranged between SMI = 0 to 0.94 confining to time range of t = 0s to t = 60s.

References

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