

The Effect of Polymer Compatibility on the Binder Migration during Spray Drying and Compaction Behavior

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Abstract

Granular feedstock for dry pressing is prepared by spray drying ceramic powders with polymeric additives. The interactions between polymeric additives in suspensions or during drying are usually considered negligible. However, recent studies demonstrate that interactions between polymers usually do occur and can adversely affect product performance. Flory-Huggins calculations predict phase separation of Na-PMAA and Na-PAA with PVA and homogeneous mixing of Na-silicate with PVA. Light scattering studies on polymer solutions and morphology studies on dried polymer solutions confirm these predictions. This reveals that the interaction between polymers can lead to either a homogeneous or phase-separated solution depending on the functional groups and chain length of polymers. PVA binder in spray-dried granules can be stained and its location within the spray dried granule observed verifying the effect of other polymers on binder migration and case-hardening of spray dried granules. The results indicate polymeric additives that prevent binder migration, potentially eliminating case-hardening in spray dried granules and the subsequent problems observed during compaction.