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How Fast Should Polymer/Drug Nanocrystal Dispersions Be Frozen? JONGHWI LEE, Chung-Ang University, Dept. of Chemical Engineering and Materials Science, Seoul, Korea, CHUL HO PARK, Chung-Ang University — Recent advances in nanoparticle technologies have significantly enhanced the oral and parenteral delivery of poorly water-soluble active pharmaceutical ingredients (APIs). However, reports have been limited on the various drying procedures to convert a liquid nanocrystal dispersions into solid dosage forms. The solid dosage form should consist of nanocrystals that can readily reconstitute into their original size upon dissolution in water. Herein, the freeze drying process of nanocrystal dispersions was examined at varying freezing rates (speed of freezing interface). As freezing rate decreases, more particle-particle aggregation developed. A critical freezing rate, below which the dried nanocrystals cannot be re-dispersed, was identified based on the plot of the particle size of reconstituted nanocrystals versus freezing rate. Freeze drying at a freezing rate near the critical value produces dry powders of bimodal particle size distribution after re-dispersion. In addition, API concentration was found to significantly affect the critical freezing rate and therefore the re-dispersibility of dry powders. The concept of critical freezing rate is critical for the development of solid dosage forms of liquid nanocrystal dispersions. [1] J. Lee, Drug nano- and microparticles processed into solid dosage forms: physical properties, *J. Pharm. Sci.*, 92(10) (2003) 2057-2068.

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