

Responding to humidity: Measuring the hygroscopicity of large molecule microdroplets

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Cyclodextrin derivatives, such as 2-hydroxypropyl- β -cyclodextrin, are pharmaceutical excipients thought to help alleviate symptoms of Niemann-Pick disease on inhalation due to improved water solubility and bioavailability over the parent compound. However, the physicochemical properties of cyclodextrins and their derivatives in bulk solution and when aerosolised are ill-defined or unknown. Individual droplets of aqueous HP- β -CD are measured using Raman tweezers to retrieve size and refractive index and determine hygroscopic growth response. Measurements of bulk solution refractive index and density allow prediction of solute properties and super-saturated concentrations of relevance to aerosol. Quantifying physical properties of aerosolised HP- β -CD allows conversion between mass and radius based hygroscopic growth factors and comparison with dynamic vapour sorption measurements and AIOMFAC modelling.