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Using liquid droplet penetration experiments to determine wetting properties of powders GERARDO CALLEGARI, ZHANJIE LIU, YIFAN WANG, FERNANDO MUZZIO, GERMAN DRAZER, Rutgers, The State University of New Jersey — We show that the spontaneous penetration of droplets on a powder bed provides a simple way to characterize the wetting properties of a test liquid. Specifically, we demonstrate that calculating the appropriate dimensionless penetrating volume and time, and performing supplementary experiments with a reference liquid, it is possible to obtain the contact angle between the test liquid and the powder. Interestingly, the proposed analysis lets us calculate the contact angle without having to compute the solution to the 3D penetration problem. This approach is valid when the contact area between the droplet and the powder bed remains constant, which is a good approximation in many powder systems. We first test the validity of our approach by studying droplets of different sizes and show that the non-dimensional penetration curves are independent of the initial volume and contact radius of the drops, as predicted. We then use a reference liquid (silicone oil) to measure the contact angle of water on three powder systems with increasing number of pharmaceutical components and different processing conditions known to affect blend wettability. We show that the proposed method is able to capture the *overlubrication* of the blend, a well-known effect in pharmaceutical manufacturing.

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