

A fast and accurate method of measuring swelling profile

David Mastropietro, Srinath Muppalaneni M S and Hossein Omidian

Nova Southeastern University, USA

Water-swallowable polymers are used in pharmaceutical dosage forms as superdisintegrants and ion-exchange resins in addition to the hygiene industry as super water-absorbents. Performance and therapeutic effectiveness of the tablets containing such materials are critically dependent on the swelling rate and capacity of the water-swallowable polymer particularly when used as a functioning excipient or controlled delivery platform. However, accurate measurement of the swelling profile of such materials remains challenging in pharmaceutical formulation and development. The objective of this study was to investigate the use of a mechanical tester to monitor the swelling pressure of a water-absorbent polymer. Briefly, this method uses a commercially available texture analyzer CT3 (Brookfield Engineering, Middleboro, MA) outfitted with an acrylic cylindrical probe (12.7 mm diameter). With the probe touching a weighted amount of sample, swelling medium is added and the force upwards caused by imbibition is recorded 10 times per second. From the swelling force/time profile, the initial rate of swelling (corresponding to initial force change), and ultimate swelling capacity (corresponding to ultimate swelling force) were calculated using various ethanol-water solutions. The standard deviation of this method was found very low compared to conventional gravimetric and volumetric measurements. With small sample size, single testing, and high accuracy, this technique can effectively expedite the quality control and formulation development of the products containing water-swallowable materials.

Biography

David Mastropietro received his B.S. in Pharmacy from Massachusetts College of Pharmacy in 1999. He is completing his Ph.D. in Pharmaceutics at Nova Southeastern University (NSU) with dissertation work focused on abuse-deterrent dosage-forms. Srinath Muppalaneni earned a B.S. in Pharmacy from Andhra University (2008) and a M.S. in Pharmaceutical Sciences from Campbell University (2010). Srinath is currently a second year Ph.D. student at NSU in Pharmaceutics. Hossein Omidian has a M.Sc. in Chemical Engineering and a Ph.D. in Polymer Science. He is currently an Associate Professor at NSU where David and Srinath are both part of his research group.

dm1627@nova.edu