Calcium pectinate beads formation: Shape and size analysis

Abstract

The aim of this study was to investigate the inter-relationship between process variables and the size and shape of pectin solution droplets upon detachment from a dripping tip as well as Ca-pectinate beads formed after gelation via image analysis. The sphericity factor (SF) of the droplets was generally smaller than 0.05. There was no specific trend between the SF of the droplets and the pectin concentration or the dripping tip radius. The SF the beads formed from high-concentration pectin solutions and a small dripping tip was smaller than 0.05. The results show that the Reynolds number and Ohnesorge number of the droplets fall within the operating region for forming spherical beads in the shape diagram, with the exception to the lower boundary. The lower boundary of the operating region has to be revised to Oh = 2.3. This is because the critical viscosity for Ca-pectinate bead formation is higher than that of Ca-alginate beads. On the other hand, the radius of the droplets and beads increased as the dripping tip radius increased. The bead radius can easily be predicted by Tate's law equation