P-C-590

SPRAY DRYING OF PITAHAYA MUCILAGE AND THE EFFECT ON THEIR RHEOLOGICAL PROPERTIES

E. E. García Cruz[1], J. Rodríguez-Ramírez[1], F. Calderas[2], J.A. Gallegos-Infante[3], O. Manero[2], A. Román Guerrero[4], L. Medina-Torres[2*]

*[1] CIIDIR-IPN-Oaxaca. Hornos No.1003, Col. NocheBuena, Santa Cruz Xoxocotlán, 71230 Oaxaca, Mexico, e-mail: elenagarciacruz@hotmail.com; jrodrigr@hotmail.com, [2]*Facultad de Química, E, Universidad Nacional Autónoma de México, México., D.F., email: almotasim@hotmail.com; manero@unam.mx;*luismt@servidor.unam.mx ,[3]Departamento de Ing. Química y Bioquímica, Instituto Tecnológico de Durango., Blvd. Felipe Pescador 1830 Ote., 34080 Durango, Dgo., México., email: jinfante@itdposgrado-bioquimica.com.mx and [4]UniversidadAutonómaMetropolitana – Iztapalapa, México D.F. México*

The biopolymer from of the Pitahaya mucilage powders were produced by spray drying at a pilot scale without the use of carrier agents. The effects of drying conditions on percent yield, moisture content and rheological properties (elastic and viscous properties) as well as the particle size distribution of mucilage reconstituted solutions were evaluated. Samples of aqueous extracts of mucilage with a constant total solids concentration (6.75g/L) were used on the spray dryer. A 2^3 factorial design with three central points was used to evaluate the influence of the following parameters inlet air temperature (130-170 °C), air pressure (3.8-4.8 Bar), and atomization speed (16,000-22,000 rpm). Steady-shear viscosities were measured in a range of shear rate from 1 to 600 s^{-1} with concentrations 3 and 6% (w/v). Moisture content and yield of spray-dried powder had an inverse relation to the inlet air temperature. The dehydrated samples had a mean particle diameter ranging from 1 μm to 20 μm. In general, the mucilage reconstituted solutions exhibited a non-Newtonian shear thinning behavior, with important viscoelastic properties at high concentration. An increase in pseudoplasticity (n<1) due to increase in the mucilage concentration was showed. Cross model was found to be the most appropriate (r^2> 0.95) to fit the flow curves of mucilage reconstituted solutions. The values from “m” varied between 0.35 and 0.88 and for “k” between 0.001 y 0.06 s.The shear viscosity decreased with increasing the inlet air temperature, speed atomization and air pressure. The mechanical spectra in the linear viscoelasticity range were obtained at a frequency range from 1 to 100 rad/s where G´´>G´. The dynamic response and steady-shear measurements suggested a random coil configuration. The best spray drying conditions founded for the production of the biopolymer(high yield, low moisture content and acceptable rheological properties) were with inlet temperature of 130 °C, an air pressure 3.8 Bar, and speed atomizer of 22000 rpm.