Figure 1. Beading system for cellulose solutions.
Figure 2. Relationships between volume % cellulose, viscosity and wt. % solids. Cellulose solutions and bead particles: CF11 (Whatman: degree of polymerization ~ 200) and T679 (Weyerhauser: degree of polymerization ~ 2,000) cellulose powder was dissolved in 8.5 (w/v) % lithium chloride in DMAC at 80 °C and beaded according to standard procedures and specifications as described in the text. (a) Viscosities were determined using a Brookfield LV viscometer and drum spindle. (b) % Solids-content was determined by lyophilization. (c) (---) indicates the experimental limits within which spherical and uniform beads may be made with CF11 cellulose powder alone.
Figure 3. Fluidized bed column setup.
Figure 4. Expanded bed fluidization system for cellulose beads. Deionized water is pumped through the system with a peristaltic pump, ascending through the cellulose beads at linear flow rates from 5 to 45 cm/min depending upon the % solids-content specified. As the flow rate is increased, the water carries increasingly larger diameter beads into the collection net column. After the fluidized bed is expanded to the point at which the target beads are at the top, they are collected from the side port into the collection vessel. Column dimensions: $75 \times 7.5$ cm ($L/D = 10$). Effective flow rate range: 5 – 45 cm/min.
Figure 5. Expanded bed fluidization of beaded cellulose supports in screening for % solids-content and particle diameter.