MCKEE, MARIANNE[1]*, SARA MOORE[1], RONNIE TRICHE[1], CHARLEY RICHARD[1], MARY AN GODSHALL[1] and ROBERT HATCH[2], [1]Sugar Processing Research Institute, Inc., 1100 Robert E. Lee Boulevard, New Orleans, LA 70124 and [2]American Charcoal Company LLC, 403 Stampede Circle, Cheyenne, WY 82009. **Laboratory Studies on Polyaluminum Coagulants in Sugarbeet Juice and Molasses.**

ABSTRACT

There has been some interest in polyaluminum coagulants (PACs) currently used in water treatment as processing aids in sugar products. We have conducted several laboratory studies using these PACs in the clarification of sugarbeet thick juice, and decolorization of beet molasses. Five polyaluminum coagulants were tested with two composed of only aluminum compounds while three were composed of a blend of cationic aluminum polymers with polyquaternaryamine. All showed significant removal of color, polysaccharides, and turbidity when compared to control samples with no PAC added.

An aliquot of diffusion juice was heated to about 80°C, limed to approximately pH 7.3, treated with a commercial polyacrylamide flocculant and about 150ppm PAC added. The five PACs tested on the diffusion juice included PAC-A, PAC-B, PAC-C, PAC-D, and PAC-E. The clarified juice was then tested for removal of turbidity, color, total polysaccharides; aluminum carryover, and destruction of sucrose and invert. Beet molasses was diluted ten fold and heated to approximately 80°C and 1000ppm PAC added. The samples were allowed to settle and the molasses was analyzed for turbidity, color, and total polysaccharides.

A control sample was prepared for the diffusion juice experiments which consisted of juice, heat, lime, and flocculant heated to 80°C. The samples containing the PAC were then compared to this control sample to determine the percentages removed for each component. The control sample removed 27.7% color while the PAC treated samples removed 42.7% to 56.7% color. PAC-C was the most effective at removing color with 56.7% removal and 92.8% turbidity removal. The other PAC treated samples had 75.0% to 89.8% turbidity removed compared to only 73.9% in the control sample. Polysaccharide analysis showed 3.3% removal by the control sample and up to 21.6% removal with PAC-E. Testing of the treated juice with ICP-MS showed no carryover of aluminum. An approximate two point rise in purity was observed after treating diffusion juice with PACs. Based on the results obtained in these experiments, it is believed that the polyaluminum component is responsible for removing the turbidity while the polyquarternary amine component removes color from these samples.

For the molasses experiments, a control was prepared by heating the diluted molasses to 80°C. The control sample showed a slight increase in color (0.2%) and turbidity (5.5%) and a slight decrease in polysaccharides (0.25%). The color removal for PAC treated samples ranged from 9.9% with PAC-F to 26.2% with PAC-D. The polysaccharides removal varied from 3.4% with PAC-F to 10.0% with PAC-C. PAC-D was the only one to remove turbidity (51.4%) from the molasses solutions. All the other PACs tested increased the turbidity as did the heated control.