

REMOVAL OF COLOR FROM THE RAW SUGAR MANUFACTURING PROCESS BY MEMBRANE TREATMENT

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ABSTRACT

Color removal from raw sugar was achieved through ultrafiltration (UF) membrane separation of color compounds from the juice exiting the mills, followed by batch crystallization of the purified juice to obtain raw sugar crystals. The process is a potential replacement for the lime/phosphoric acid/SO₂ coagulation and clarification section of the raw sugar process, which produces significant waste material (50 kg mud per ton of raw sugar), and also reduces sugar yield through sugar lost to the settled clarifier mud. It was seen that the process is very good at removing color compounds, with crystals produced from this technique having lower ICUMSA color readings than commercial raw sugar crystals, or raw sugar crystals produced from batch crystallizations of juice clarified by the traditional technique. The most suitable membranes were regenerated cellulose UF membranes with a molecular weight cut-off (MWCO) of 10,000 Daltons (Da), which had suitable permeate flux values and very good removal of color compounds. In the UF separations there was some change in flux due to fouling of the pores of the membrane over a period of about 8 h. Fouling could be reduced in an industrial process by increasing liquid flow velocities over the surface of the membrane using a cross-flow UF membrane.

Keywords: Ultrafiltration, raw sugar, color removal