



DOWEX OPTIPORE Adsorbent

Decolorization Applications in Beet Sugar Processing

Decolorization of molasses extract boosts sugar purity and processing efficiency

Recent commercial experience has demonstrated that using DOWEX* OPTIPORE* adsorbent is a practical way to reduce the color load in the beet sugar factory. In this application, DOWEX OPTIPORE polymeric adsorbent is used to treat the sucrose fraction stream from the molasses desugaring plant. DOWEX OPTIPORE adsorbent removes 70-80% of the incoming color which ranges from 14,000 to 25,000 ICUMSA (Figure 1). DOWEX OPTIPORE adsorbent also removes viscosity precursors. During crystallization, the reductions in color and viscosity give a number of processing benefits, including better exhaustion of molasses.

The DOWEX OPTIPORE adsorbent system is full-scale, treating a 25 m³/hr (110 gpm) stream. The system is double pass. Three vessels are used, with one always in regeneration or standby mode.

The system has proven easy to operate. The countercurrent regeneration sequence (Table 1) has been programmed to operate automatically. Also, the round shape of the DOWEX OPTIPORE beads and the low swell of the adsorbent result in a low pressure drop across the beds.

Table 1: Regeneration sequence of DOWEX OPTIPORE adsorbent

- 1) Sweeten-off
- 2) NaOH for chemical desorption
- 3) Hot water for thermal desorption
- 4) Acid neutralization
- 5) Water rinse

DOWEX OPTIPORE adsorbent is regenerated using dilute chemicals. The sequence can easily be programmed because it is the same every cycle. Our Technical Service and Development team will work with you to determine specific regeneration details.

DOWEX OPTIPORE adsorbent yields many downstream processing benefits

By reducing color and viscosity precursors, DOWEX OPTIPORE adsorbent allows easier and more efficient downstream operations. In addition, during evaporation there is less foaming in streams treated by DOWEX OPTIPORE adsorbent.

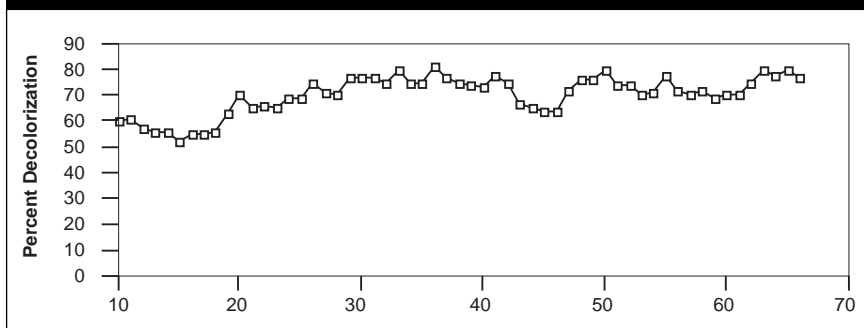
After crystallization, the run-off separation is easier. Both the purity and the quantity of the run-off are lower. These reductions are due to fewer occlusions in the crystals because of the reduced color and viscosity in the feed to crystallization.

Again because of the resulting better crystals, DOWEX OPTIPORE adsorbent allows lower operating costs at the centrifugals. The amount of centrifugal wash required is up to 20% less than without DOWEX OPTIPORE adsorbent.

Additionally, up to 20% higher yields on the massecuite were observed.

Better crystallization and washes result in a lower-purity molasses being formed. Less sucrose in the molasses means direct savings for the factory.

Figure 1: Decolorization of raw sugar beet juice (diffuser juice) with DOWEX OPTIPORE adsorbent



DOWEX OPTIPORE adsorbent successfully removes color from the sucrose fraction from stored molasses. The two declines in performance were corrected with changes in operating parameters and special cleanups of the adsorbent. With DOWEX OPTIPORE adsorbent on-line, crystallization of white sugar was easier.

Other uses for DOWEX OPTIPORE adsorbent in beet sugar processing

DOWEX OPTIPORE adsorbent has also been tested on a pilot scale to treat thick juice. The juice was taken between evaporator stages, so it was at 40 Brix. The reductions in color and viscosity precursors have a significant impact on subsequent crystallization and processing. The observed benefits are:

- Stream usage reduced 3% on beets
- Molasses purity reduced 3 points
- Molasses quantity reduced significantly
- Sugar-end recovery increased 2%

*Trademark of The Dow Chemical Company

DOWEX OPTIPORE ADSORBENTS

For more information about DOWEX OPTIPORE adsorbents, call Dow Liquid Separations:
North America1-800-447-4369
Latin America(+55) 11-5188-9345
Europe(+31) 20-691-6268
Japan(+81) 3-5460-2100
Australia(+61) 2-9776-3226
<http://www.dow.com/liquidseps>

There are numerous other potential uses for DOWEX OPTIPORE adsorbent in sugar beet processing. Any point where it would make sense to reduce color is a likely candidate. Dow Liquid Separations would welcome the opportunity to work with you in determining where DOWEX OPTIPORE adsorbent would be most cost-effective in your system.

Recent laboratory work at Dow indicates that DOWEX OPTIPORE adsorbent may also play an important role in a new process which could replace the conventional liming/ carbonation purification in sugar beet processing. This new process also uses clarification of raw sugar beet juice by FILMTEC® SELECTFLO™ capillary microfiltration elements. For more information about this process, contact your Dow representative.

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[57] **Abstract**
A process for decolorizing an aqueous sugar solution by contacting the solution with an absorbent resin, wherein the adsorbent resin is a macroporous copolymer being post-crosslinked in a swollen state in the presence of a Friedel-Crafts catalyst and functionalized with hydrophilic groups prior to contact with the aqueous sugar solution.

[75] **Inventors:**
Richard T. Springfield,
H. Robert Goltz, Seth I. Norman,
Upen J. Bharwada, Robert L.
LaBrie, all of Midland, Mich.

[73] **Assignee:**
The Dow Chemical Company
Midland, Mich.

Warning: Oxidizing agents such as nitric acid attack organic ion exchange resins under certain conditions. This could lead to anything from slight resin degradation to a violent exothermic reaction (explosion). Before using strong oxidizing agents, consult sources knowledgeable in handling such materials.

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