

ECOSORB[®] Products for Sugar Processing



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ECOSORB S series (Food Grade) products are a group of multi-functional adsorption filtration media used in the purification of sugar liquors and other food ingredients. Unlike powdered activated carbon (PAC), ECOSORB products are dust-free, have substantially higher adsorption capacity and can be used in either batch or precoat operations. On a dry weight basis ECOSORB products remove 3–10x more color with similar gains in volume processed per filter cycle. For sugar polishing operations designed to operate with PAC substituting ECOSORB products provides a substantial increase in capacity and offers a buffer during periods of high color and turbidity.

The purpose of this bulletin is to show information from a variety of commercial applications allowing readers to assess the potential benefits of ECOSORB products in their individual operations. Pilot data is also presented showing the performance of a new ECOSORB product being evaluated for cane pan liquor polishing applications.

ECOSORB S-426 in Soft Drink Bottling Operations

When mill grade (white) sugars are used for the production of simple syrups the process normally includes a polishing step to remove color, odor and turbidity. ECOSORB S-426 was developed for simple syrup polishing where the starting sugars contain higher amounts of un-dissolved solids and color. The data in the table to the right is from a Latin American soft drink bottling company that has successfully used ECOSORB S-426 for more than seven years. The higher capacity and dust free nature of ECOSORB S-426 has greatly simplified the polishing filtration operation and associated house keeping requirements in this and numerous other soft drink operations.

ECOSORB S-405 for Liquid Sugar Processing

Because liquid sugar is less stable than crystalline forms refineries and melt stations often use a polishing step to meet their customers' high quality standards after shipping and storage. The data in the table to the right is from a US refinery producing 65,000 metric tons of liquid product(s) annually. By switching from batch PAC to precoat operation with ECOSORB S-405 the refinery was able to streamline its liquid sugar operation by eliminating the surge tanks and manpower needed for PAC and filter aid additions. Compared to the 4 to 5 hour filter cycles with PAC the 12-hour-plus filter cycles with ECOSORB S-405 have provided reliable and continuous service in this operation for more than ten years.



ECOSORB products keep liquid sugar operations running smoothly and efficiently.

ECOSORB S-426 Performance Data

	Before With PAC	After With ECOSORB S-426
m ³ Produced/Filter Cycle	20	50
Filter Aid (kg)/m ³ (Precoat)	1.1	0.45
Filter Aid (kg)/m ³ (Body Feed)	4.0	–
PAC (kg) m ³	2.13	–
ECOSORB (dry wt.) (kg)/m ³	–	0.4

Note(s): In the case shown the company uses a 2 to 1 mixture of standard (mill grade) to refined sugars to meet the specification for soluble ash. An effective way of producing very low color simple syrups for clear beverages is to use ECOSORB S-426 as a precoat and batch contact combination.

Process Description: Simple Syrup–Batch-Contact time 45 minutes

Filter Equipment: 20 m² Horizontal Leaf Filter

Feed Liquor: Conc-60 brix, Temp-70°C, Turbidity-42NTU, Color-132RBU

Final Simple Syrup: Conc-60 brix, Temp-70°C, Turbidity-3-4NTU, Color-≤35RBU

ECOSORB S-405 Performance Data

	Before With PAC	After With ECOSORB S-405
m ³ Produced/Filter Cycle	50	130
Filter Aid (kg)/m ³ (Precoat)	2.2	0.09
Filter Aid (kg)/m ³ (Body Feed)	2.6	–
PAC (kg) m ³	1.3	–
ECOSORB (dry wt.) (kg)/m ³	–	0.5

Process Description: Liquid Sugar–Precoat Method

Filter Equipment: 2 x 50 m² Vertical Leaf Filter

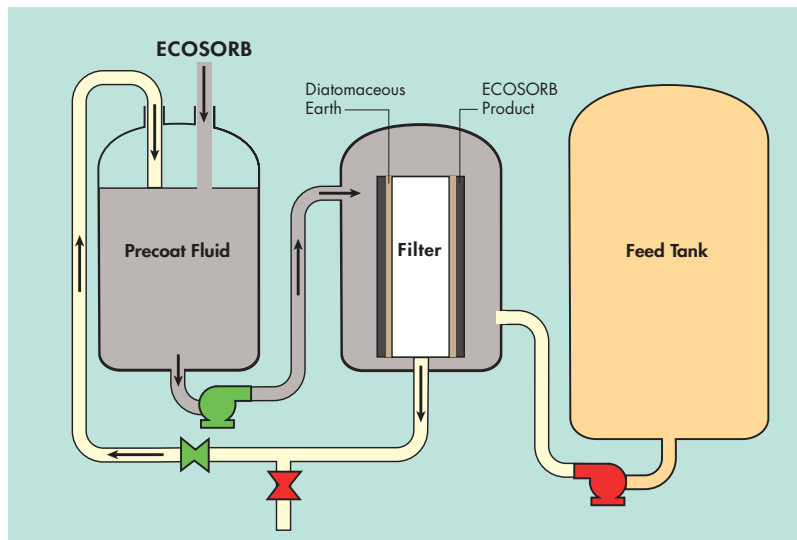
Feed Liquor: Conc-65 brix, Temp-80°C, Turbidity-10 NTU, Color-≤80-ICUMSA

Filtered Liquor: Conc-65 brix, Temp-80°C, Turbidity-2-3NTU, Color-≤20-ICUMSA

ECOSORB S-429 for Starch Based Sweetener

The production of glucose-fructose liquors produced from tapioca starch routinely includes a polishing step to remove color, odor, turbidity and proteins found in starch based sweeteners. When our client in South East Asia reported their improvements by switching from PAC to ECOSORB S-429 even we were pleasantly surprised at the results. As the table on the right shows by changing to ECOSORB S-429 our client saw a 2.5x increase in the throughput for his polishing filtration step along with a significant decrease in filter aid. What the chart does not show is that by adding the spent filter cake from this polishing filtration step back to the saccharified starch clarification step the client also gained a 50% throughput bonus at the front end of his process.

ECOSORB Precoat Formation & Operation



A precoat is a layer or filter medium applied to a filter surface. Precoats are formed by re-circulating a slurry of filter medium through the filter until it deposits evenly across the filter septum. The typical thickness for precoats ranges from 3mm to 18mm.

A New ECOSORB Product for Refinery Applications

ECOSORB S-488 was developed for the higher color and turbidity applications encountered in refineries and mills. Target applications include replacing and or supplementing PAC and IEX in the polishing operations for pan liquor. Graver's R&D Department has done extensive pilot testing to evaluate the benefits of replacing PAC for the polishing of cane pan liquor. The data from these tests have been extrapolated to full scale and compared to the current PAC operations used by a Southern US cane refinery. The before and after performance comparison is shown in the table on the right. In addition to the significant reduction in filter cycles there is also anecdotal evidence suggesting that the S-488 product removes a higher percentage of those color bodies that become part of the final crystalline sugar color. When full scale refinery tests are completed to evaluate this supposition Graver will publish the findings in one or more Sugar publications.

ECOSORB S-429 Performance Data

	Before With PAC	After With ECOSORB S-429
m ³ Produced/ Filter Cycle	120	300
Filter Aid (kg)/m ³ (Precoat)	0.25	0.1
Filter Aid (kg)/m ³ (Body Feed)	0.5 – 1.0	–
PAC (kg) m ³	0.5 – 1.0	–
ECOSORB (dry wt.) (kg)/m ³	–	0.11 – 0.2

Process Description: Simple Syrup – Batch Method

Filter Equipment: 20 m² Horizontal Leaf Filter

Feed Liquor: Conc-40 brix, Temp-70°C, Turbidity-42NTU, Color-132RBU

Filtered Liquor: Conc-40 brix, Temp-70°C, Turbidity-3-4NTU, Color- ≤35RBU



Refinery operator adding ECOSORB product into the Precoat Tank.

ECOSORB S-488 Projected Performance Data

	Before With PAC	After With ECOSORB S-488
m ³ Produced/ Filter Cycle	175	540
Filter Aid (kg)/m ³ (Precoat)	2.2	0.6
Filter Aid (kg)/m ³ (Body Feed)	2.4	–
PAC (kg) m ³	1.2	–
ECOSORB (dry wt.) (kg)/m ³	–	0.13

Process Description: Clarified Liquor Polishing–Batch-Contact time 45 minutes

Filter Equipment: 2-50 m² and 1-90 m² (Primary Vertical Leaf Filters in Parallel)

Feed Liquor: Conc-65 brix, Temp-80°C, Turbidity-21NTU, Color-500 ICUMSA

Polished Liquor: Conc-65 brix, Temp-80°C, Turbidity-3-4NTU, Color- ≤250 ICUMSA



Graver Technologies' packaging operation for ECOSORB products.

ECOSORB Product Selection Guide

Product	Application	Sugar Source	Typical Feed Color (ICUMSA)
S-426	Soft Drink - Simple Syrup	Mill Grade Sugars & Mixtures	≤ 150
S-429	Glucose/Fructose	Tapioca Starch	≤ 120
S-405	Liquid Sugar	Cane, Beet, Sugar Alcohols	≤ 100
S-488	Crystalline Sugar	Clarified Liquor	≤ 550
S-489	Liquid Sugar	Mill Grade Sugars	≤ 250

Summary Features & Benefits

- Increased Productivity
- Lower Operating Costs
- Improved Worker Safety
- Cleaner Work Environment
- Reduced Solid Waste and Sweet-Water
- Easily Cleaned Filters
- No Carbon Bleed-Through

ECOSORB products are manufactured in our state-of-the-art manufacturing facility in Glasgow, DE. Graver Technologies follows GMP procedures and is ISO 9001 certified. ECOSORB S-series products are Kosher and Halal certified and comply with all applicable US Food CODEX requirements.

To request a sample or to discuss your application with a technical representative contact: Graver Technologies by phone 800-249-1990 in USA only, outside USA +302-731-1700 or info@gravertech.com



Graver Technologies

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Graver Technologies, LLC is a member of The Marmon Group of companies, an international group with more than \$6 billion in annual sales. Graver Technologies is a fast-growing company with the technical resources and financial strength that make us the perfect partner for your business.

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