



Graver Technologies

ECOSORB[®]

MULTI-FUNCTIONAL PURIFICATION MEDIA

Adsorption

Filtration

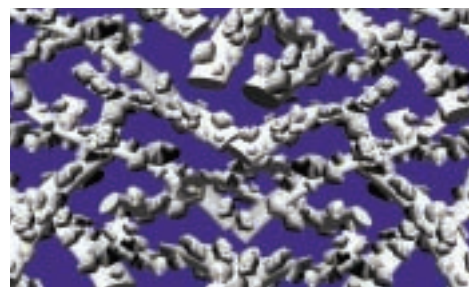
Ion Exchange

ECOSORB® is a multi-functional purification media that combines adsorption, filtration and ion exchange in a single product.

When it comes to superior purification media, you won't find a product that outperforms the multiple functions and benefits of ECOSORB.

A family of simple cost-effective products that remove a wide range of organic and inorganic contaminants, ECOSORB combines adsorption, ion exchange and filtration capabilities in a single product.

Graver Technologies provides a wide range of products that meet the needs of the food and beverage, pharmaceutical, chemical, plating, power generation and water treatment industries. Our well staffed research facility also custom formulates new products for special applications and process requirements.



ECOSORB uses technologies to immobilize fine particles of powdered activated carbon, ion exchange resins, and other active media on an inert support. By combining the superior kinetics of fine particles with excellent flow characteristics, purification processes run longer and deliver better quality effluents than standard treatment methods. ECOSORB is the multi-functional media of choice to maximize quality and productivity while minimizing operating costs.



ECOSORB PRODUCTS	
FEATURES	BENEFITS
Combines adsorption, ion exchange and filtration media	<ul style="list-style-type: none"> ◆ Provides maximum process flexibility ◆ Eliminates multiple treatments, easy to use
Dust free media	<ul style="list-style-type: none"> ◆ Provides cleaner, safer working conditions ◆ Reduces housekeeping ◆ Avoids problems with sensitive electronics
Highly permeable precoat	<ul style="list-style-type: none"> ◆ Increases overall productivity by extending cycle times ◆ Reduces labor requirements ◆ Maximizes adsorption efficiency
Compatible with standard filtration systems	<ul style="list-style-type: none"> ◆ Minimizes capital investment ◆ Simplifies design and implementation
Custom formulations available	<ul style="list-style-type: none"> ◆ Provides products to meet special requirements
ISO 9001 / GMP manufacturing	<ul style="list-style-type: none"> ◆ Guarantees high quality and consistency
Kosher approved FDA and BATF compliant	<ul style="list-style-type: none"> ◆ Meets regulatory requirements

The purification of ingredients and final products by the food and beverage industry is essential to the production of consistent, high quality goods demanded by the consumer.

ECOSORB products are used extensively in food and beverage processing including purification and clarification of cane and beet sugar, soft drink syrups, high fructose corn syrup, wine and juice, distilled spirits and a variety of other products. When compared to dusty powdered activated carbon, ECOSORB products provide a clean, dust-free working environment while significantly increasing capacity, lowering production costs and reducing solid waste.

Common process challenges in this industry include:

- ◆ Reducing color in liquid sugar solutions
- ◆ Eliminating undesirable tastes and odors
- ◆ Removing chill haze and turbidity
- ◆ Removing divalent cations, anions and ash

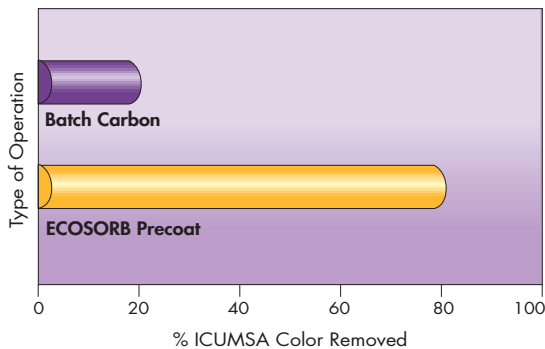
In liquid sugar applications, ECOSORB products significantly extend filter cycle times to reduce labor costs, solid waste, and sweetwater losses. Major users of cane sugar are also able to substitute lower cost feedstocks by using ECOSORB products to upgrade their sugar quality.

ECOSORB products are ideal for improving and reclaiming sugar and syrups from out of specification products. Artificial flavors, colors and natural by-products are cost effectively removed allowing the ingredients to be reused in the process.

ECOSORB products enjoy worldwide use because of their high performance, smooth operating efficiencies and clean dust-free handling. All ECOSORB food and beverage products are produced to comply with the U.S. Code of Federal Regulations.

ECOSORB® Products For The Food and Beverage Industry

SUGAR DECOLORIZATION EFFICIENCY
ECOSORB Precoat vs Batch Carbon
 (Equivalent Carbon Dose Basis)



ECOSORB precoat operation maximizes adsorption efficiency compared to traditional batch treatment.



ECOSORB® Products For The Pharmaceutical Industry

The need for high quality intermediates and final products in the pharmaceutical industry requires consistent quality oriented purification media. The removal of contaminants and undesirable by-products is essential to improving yields in the production of high quality pharmaceutical compounds. ECOSORB products are used commercially in a wide range of purification and recovery applications.

ECOSORB products are formulated to address various process demands. Formulations are designed to function with both aggressive solvent and aqueous systems.

ECOSORB products are particularly well suited for:

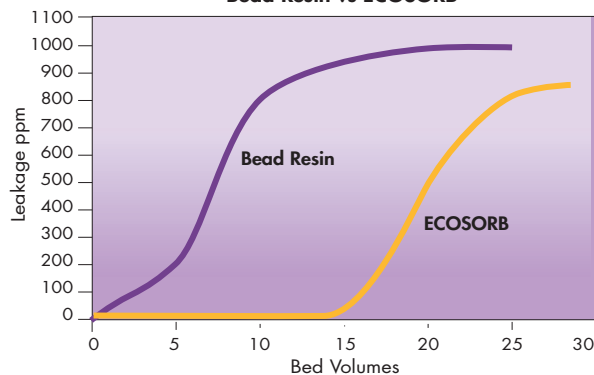
- ◆ Removing undesirable reaction contaminants
- ◆ Removing color bodies
- ◆ Recovering precious metal catalysts such as platinum and palladium
- ◆ Purifying prior to crystallization to increase yields
- ◆ Removing undesirable fermentation by-products



ECOSORB products enable pharmaceutical manufacturers to solve their purification and recovery challenges with a multi-functional media that may be implemented in various process streams. ECOSORB products can be operated in either deep beds or industrial precoat filters. Deep bed operations are highly effective in removing poorly adsorbed and trace level contaminants.



CYTOCHROME C LOADING
Bead Resin vs ECOSORB



ECOSORB's fine ion exchange resin particles maximize kinetics vs bead resin.

The selective removal of a broad range of contaminants is required in many industrial applications to increase operating efficiency, improve finished product quality or comply with strict environmental regulations.

ECOSORB products are being used in a wide range of industrial applications including:

Metal Finishing

- ◆ Purifying plating bath solutions to reduce brightener by-products and extend bath life
- ◆ Removing lubrication oils from aqueous part washing solutions

Wastewater

- ◆ Reducing heavy metals from discharge streams
- ◆ Reducing anionic species from effluents
- ◆ Removing dyes and inks

Condensate

- ◆ Removing traces of oil and organic contaminants

Fine Chemicals

- ◆ Improving feed stock quality
- ◆ Removing organic contamination from brines
- ◆ Maximizing precious metal catalyst recovery

ECOSORB products are available in a variety of formulations for the reduction of a broad range of organic and inorganic contaminants.

ECOSORB products offer numerous processing benefits, including:

- ◆ Improving product quality
- ◆ Minimizing process excursions
- ◆ Purifying streams for recycle

In addition ECOSORB products help meet critical product specifications without major capital expenditures. ECOSORB, a unique family of multi-functional purification media, is used in many industries to provide cost-effective solutions for challenging purification and recovery problems.

ECOSORB® Products

For Specialty

Applications:

- ◆ **Metal Finishing**
- ◆ **Wastewater**
- ◆ **Condensate**
- ◆ **Fine Chemicals**



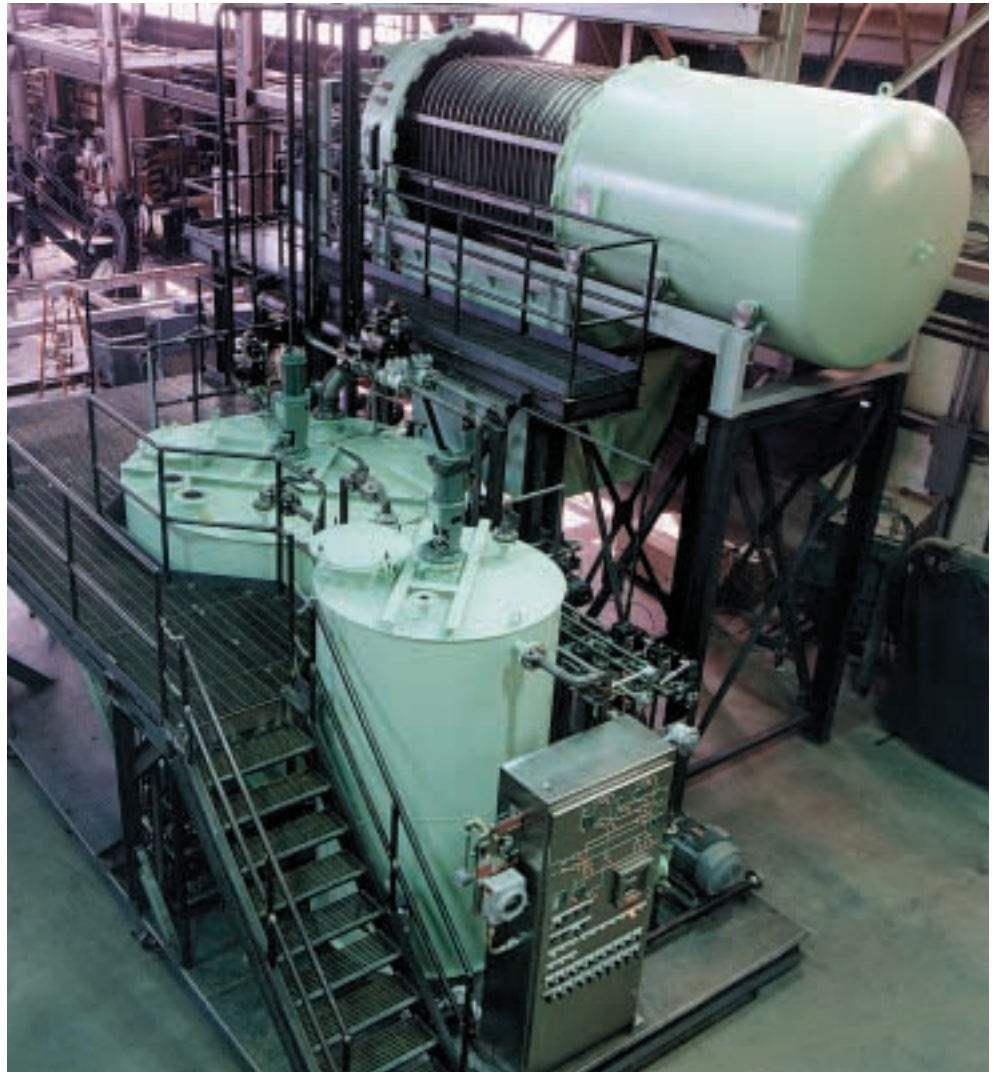
**ECOSORB® –
Advancing
The Science of
Purification
Technology**

The ECOSORB family of multi-functional purification media continues to provide advanced solutions for both established and emerging process technologies. The benefits of ECOSORB have redefined industrial filtration processes making treatment with powdered activated carbon obsolete.

Improved adsorptive performance, enhanced product quality and consistency, and lower operating costs are just a few of the benefits that have made ECOSORB the product of choice for solving critical process challenges.

ECOSORB Advantages:

- ◆ Lower labor and operating costs
- ◆ Improved product quality
- ◆ Consistent process performance
- ◆ Reduced solid waste
- ◆ Dust-free operating environment
- ◆ Minimal capital investment required



ECOSORB products are ideal for use in standard industrial filter systems.

Photo credit: The filtration systems division of Aqua Care Systems Inc.



ECOSORB lab evaluation provides scalable results allowing quick commercial implementation.

Graver Technologies has developed ECOSORB® products for a wide variety of markets and applications. We will custom formulate new products for special applications and process needs. Graver Technologies is ready to help you evaluate ECOSORB products for your application.

We offer samples, laboratory precoat filters and strong technical support. **Inside the USA, call 800-249-1990, other locations call 302-731-1700, fax: 302-731-1707 or send an e-mail to info@gravertech.com.**

Customized Purification Solutions for Your Process Applications



ECOSORB products are manufactured to meet high standards of quality and performance and where applicable, meet CFR requirements. All ECOSORB products are manufactured in our GMP and ISO 9001 registered facility in Glasgow, DE.



Superior Products & Global Reach

Whether your business is around the corner or around the world, Graver Technologies can support you with superior products and services. Our ion exchange, adsorbent, filtration and membrane products deliver exceptional performance in some of the harshest process environments in North America, Europe, Asia, the Pacific Rim, South America and Africa.

Graver Technologies is a member of The Marmon Group of companies, an international group with over \$6 billion in annual sales. Graver Technologies manufactures products that facilitate and enhance separation and purification processes. Graver Technologies has the technical resources and financial strength that make us the perfect partner for your business, whether it's around the corner or around the world.

All information and recommendations appearing in this bulletin concerning the use of products described herein are based on tests believed to be reliable. However, it is the user's responsibility to determine the suitability for his own use of such products. Since the actual use by others is beyond our control, no guarantee, expressed or implied, is made by Graver Technologies as to the effects of such use or the results to be obtained. Graver Technologies assumes no liability arising out of the use by others of such products. Nor is the information herein to be construed as absolutely complete, since additional information may be necessary or desirable when particular or exceptional conditions or circumstances exist or because of applicable laws or government regulations.

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