



Rice Hull Ash — An Effective Bio-Regenerable Filter Aid

Rice Hull Ash (RHA) is produced from a renewable biomass – rice hulls, which was once a disposal problem for the rice milling industries. Properties and performance of rice hull ash depend on different ways they are processed. RHA from Agrilectric’s unique combustion process is highlighted by:

- High amorphous silica, and low crystalline silica, low carbon contents and low metal oxides contaminants (Table I)
- Highly porous and individual “micro-filter” structure (Fig. 1)
- Mean particle size 120 microns after Agrilectric Research patented combustion process
- Physical properties: specific gravity 2.3, loose bulk density 16-22 lbs/ft³, pH 7-9
- Good filtration performance with low cake compactibility, fast flow, clear filtrate, high cake density, good suspending, and easy cake release properties
- Reduced health concern with less crystalline silica content compared to other traditional filter aids
- Absorption capability: 65-80% liquid absorption
- Excellent heat insulator with high melting point.



Fig. 1 A typical RHA particle from SEM

- Amorphous silica as cement additive or production of sodium silicate and pure silica for semi-conductive applications.

Table I

Components	Wt%
Amorphous silicon dioxide	92-95%
Crystalline silica	<1%
Carbon	2-8%
Metal oxides contaminants	<3%

Agrilectric generates a cleaner bio-renewable energy, develops and produces Rice Hull Ash products to protect the natural world

Agrilectric Companies generate electrical Energy from a renewable biomass — rice hulls to meet the increasing demand of a renewable, cleaner energy source as alternative of fossil fuel such as coal, natural gas, and oil. Rice Hull Ash (RHA) produced from Agrilectric’s combustion system is characterized by highly porous, low crystalline silica, and carbon contents, and low metal oxides contamination. Agrilectric is expanding research and filtration product development and exploring opportunities in various industries. Our technical and R&D team is available to work with you on your filtration needs. Please contact us at 337-430-0006, or visit our website at www.agrilectric.com.

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Highlights

Agrilectric Research Company Innovative Filter Aids

- Filter aids that remove metals from wastewater and sequester them into the solid phase
- Filter aids that contain high Btu’s and burn away to minimize landfill volume
- Filter aids that offer single product solution to emulsion breaking, coagulation/ flocculation + filtration



Agrilectric Research Rice Hull Ash Filter Aids with Innovative Technology

Properties such as highly porous structure, rigidity, little cake compactibility, low bulk density, good dispersion and suspension, chemical stability qualified Rice Hull Ash as an excellent filter aid. Compared to traditional filter aids, Rice Hull Ash filter aids are from renewable biomaterials, contain less metal oxides contaminants, and possess less health concern due to very low crystalline silica content. Agrilectric Research's technology is developing different types and grades of RHA filter aids for various applications (Table 2). If you have a filtration need, or an application for high quality amorphous silica, please contact us at 337-430-0006 or visit us at our website www.agrilectric.com

Case History

An international chemical company was unhappy with low density, high moisture, sloppy filter cakes from an acid neutralization project. Filter cake production was way above forecast and landfill costs seemed certain to exceed budget. The company changed their filter aid to Agrilectric Research's MaxFlo. Filter cake density increased by 22%. Landfill costs fell by 40% and the project moved forward and 16% below budget.

A large chemical company was treating their facility's ground water for metals contamination. Mixing problems were creating long filter cycle times and a polymer pumping system failure had created two days of downtime. The plant changed to ProFix SF and all their problems were solved. Dramatic improvements in filter cycle times and filter cake release meant that additional equipment was no longer needed.

A refinery company was facing unproven treatment technologies and incineration costs that would have smashed the budget. MaxFlo LoAsh was introduced. The filter cake caloric value exceeded 6,500 Btu per pound qualifying the cakes for low cost "Fuels Program" incineration. Eventually, MaxFlo LoAsh reduced the refiner's filter press cycle times by 15%, increased the filter cake solids by 10%.

A large manufacturer of high purity intermediates for the urethane industry was faced with an enormous increase in operating costs when it was discovered that their traditional filter aid contaminated their product and the only solution was to acid wash the filter aid prior to use. MaxFlo was tested and it not only solved the contamination problem but also delivered superior performance in product color and filter flux.

Education Corner

Filter Aids

Filter aids are used to assist filtration of colloids, extra fine particles, gel like, and highly compactible materials, which are difficult to be filtered due to low filtrate rate, unacceptable filtrate clarity, high cake moisture content, or serious filter medium clogging. They can be used separately as a so called "precoat" on the filter media or in conjunction with feeding suspension as "body feed" (or "admix"), or a combination of "precoat" and "body feed". Objectives of "precoat" and "body feed" are to protect filter medium, increase porosity and pore size of a filter cake, decrease cake compactibility to significantly improve filtration performance. A wide range of pressure or vacuum filters, for example, filter press, vertical and horizontal leaf filters, candle filters, rotary drum vacuum filters can be used with both methods.

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Table 3: Properties of four type of filter aids

Property	Filter aid			
	Agrilectric Research RHA	DE	Perlite	Cellulose
Permeability, Darcy	0.2-5	0.05-30	0.4-6	0.4-12
Median pore size, microns	0.5-10	1.1-30	7-16	-
Compactibility	Low	Low	moderate	high
Metal Contamination	Low	Moderate	moderate	low
Crystalline silica content*, wt%	<1%	<1 to 70%	<1% to 5.8%	none

* Crystalline silica is considered to be hazardous to the human respiratory tract.



“Rice Hull Ash filter aids are produced from renewable biomaterials, contain less metal oxides contaminants, and possess less health concern due to less crystalline silica content.”

Table 2: Agrilectric Research Company Filter Aids Product with Innovation

Agrilectri Research Filter Aids Product	Applications	Results and Benefits
<p>MaxFlo™ Basic filter aid products providing high permeability, high particle retention efficiency, and high cake density.</p>	<p>Liquid filtration for fine particles, gels, and compactible materials removal; water and wastewater treatment; sludge dewatering Applications: beverage, beer, food, chemical, petrochemical, refining, industries and water and wastewater treatment facilities</p>	<p>Increased filtration efficiency with higher filtration rate; more filtrate yield; better filtrate clarity; drier filter cake</p>
<p>MaxFlo Klear™ Low dust Maxflo™ specially designed for Swimming Pool Filtration</p>	<p>High performance filter aids for swimming pool water filtration. Proved excellent results as sand filter additives and replacement of DE for DE filters.</p>	<p>Fast operation, high filtrate clarity, and dust free working environment</p>
<p>Profix™ Filter aids combining heavy metal and hazardous organic compounds fixation and solidification technology.</p>	<p>Filtration or dewatering of hazardous semi-solid or liquid waste containing heavy metals, and hazardous organic compounds. Applications: chemical, petrochemical, metal, waste management industries</p>	<p>Clean liquid phase and less hazardous solid phase which passes TCLP. Costs for waste stabilization disposal of EPA hazardous waste are eliminated.</p>
<p>MaxFlo SF™ Maxflo™ filter aids with modified surface properties. It combines demulsification, coagulation, flocculation and filter aids pretreatment into one step.</p>	<p>Hard to separate solid-liquid or liquid-liquid system requiring emulsion breaking and particle flocculation, and filter aids treatment. Applications: chemical, petrochemical, refining, metal, mining industries, and water and wastewater treatment facilities</p>	<p>Minimized chemical pretreatment steps; Easier control of chemical dosing process; Improved chemical dispersion; Improved pretreatment and solid-liquid separation efficiency</p>
<p>MaxFlo LoAsh™ MaxFlo filter aid of high Btu value and low ash content if burned. It can be used as an industrial fuel.</p>	<p>Biosludge dewatering; Refinery API and oil sludge; Organic solvent contaminant treatment. Applications: chemical, petrochemical, refining industries and water and wastewater treatment facilities</p>	<p>Burnable filter cake; Low cost BIF or fuels incineration; High solid-liquid separation performance</p>
<p>MaxFlo LoAsh SF™ Self flocculated Maxflo™ with high Btu value</p>	<p>Oil sludge with stabilized emulsion, biosludge. Applications: chemical, petrochemical, refining industries and water and wastewater treatment facilities</p>	<p>Combining emulsion breaking, flocculation and filter aids pretreatment into one easy step; Filter cake with high Btu value which can be used as a fuel</p>
<p>ProFix SF™ Self-floc ProFix™ filter aid</p>	<p>Water or wastewater with heavy metal or hazardous organic contaminants Applications: chemical, petrochemical, metal, waste management industries</p>	<p>Combing benefits of ProFix™ and MaxFlo SF™</p>



Agrilectric Research Company

P.O. Box 3716
Lake Charles, Louisiana 70602
Phone: (337) 430-0006
Fax: (337) 421-6344
info@agrilectric.com
www.agrilectric.com

ISO 9001:2000 Recognition

These days a manufacturer's guarantee of meeting an intended quality assurance level is no longer enough. ISO 9001 standards are third party specifications that provide a reliable total quality management framework for buyers who wish to ensure that a given product, service or process meets the intended quality standard. The new ISO 9001:2000 standards aim to guarantee the effectiveness and efficiency of the organization, its processes and customer focus. Quality conscious buyers around the world perceive ISO compliance as an important value-addition. We at Agrilectric Research continue to identify the necessary requirements to exceed the ISO 9001:2000 Quality Management System requirements.



Education Corner

Filter Aids continued from page 2

A filter aid material is characterized by the following properties:

- Porous particulate structure with irregular shapes (Fig. 1);
- Rigid particle and incompactible filter cake;
- Excellent dispersing and suspending properties;
- Low bulk density;
- Chemical stable and inert within operating conditions.

Principle types of filter aids include Diatomaceous Earth (DE), Perlite, cellulose, and Rice Hull Ash. Properties of the four types of



Agrilectric Power Generation and RHA Production

Agrilectric has been generating renewable power in Louisiana since 1984. The company utilizes rice hulls (a byproduct from a neighboring rice mill) as a fuel to provide enough generation to supply local businesses and contribute to the public utility. Approximately 97,000 tons of rice hulls are consumed along with 16,000 tons of Rice Hull Ash (RHA) produced annually. Under Agrilectric proprietary combustion technology, RHA produced from Agrilectric is highly porous, low in carbon and crystalline silica content, and possesses excellent filtration, absorption and insulation properties. Different grades of RHA filter aid products and absorbents are processed and manufactured by Agrilectric Research Company.

Agrilectric Research and Product Development

Agrilectric Research is committed to continuous research, product development and support to customers. Agrilectric Research will continue to be the leading quality supplier of rice hull ash products. Recent data reinforces the claims that Agrilectric's products are superior and have the highest quality and product stability in renewable filter aids. Our Product Development Includes:

- New grades of filter aids with high permeability and excellent filtrate clarity along with low crystalline silica
- Customized filter aids products to fit customer's unique applications
- New product development with innovative technologies.

filter aids are shown in Table 3. An optimized filter aid should provide acceptable filtrate clarity and at the maximum filtrate rate. In some applications, metal contamination level, and crystalline silica content are also within considerations. Lab scale and pilot scale filtration test are necessary to assist selection of optimized type and dosage of filter aids. Filtration cycle rate analysis is used for optimization of filter aids dosage. Filtration test and cycle analysis for filter aids type and dosage selection will be covered in a future issues of Agrilectric Research "Filter Aids News". Please email us for a copy at info@agrilectric.com