



RICE HUSK TECHNOLOGY

NEW RICE HUSK PROCESSING TECHNOLOGY

All over the world, the removal of the rice husk during the processes in numerous rice mills causes a serious environmental problem. This agricultural waste however has a significant calorific value and a high percentage of amorphous silica.

With innovative technology these favourable characteristics of the rice husk can be used for solving environmental problems and, at the same time, can be used to produce electricity and high value industrial products.



"GREEN" TECHNOLOGY

Pörner Ingenieurgesellschaft mbH, Grimma, Germany is offering a new processing technology for the production of silica using the rice husk from the rice milling process as feedstock. Processing technology consists of a rice husk fired power plant and a chemical plant, producing high value industrial substances, namely liquid sodium silicate, precipitated silica and activated carbon, from the rice husk ash.

FEEDSTOCK

Rice husks make up about 20 % of the rice (paddy) weight. Rice millers world wide therefore generate more than 100 million tons of rice husks. Nowadays almost 70 % of the rice husks are not commercially used. Using one of the world's major agriculture products - rice - as a primary feedstock and avoiding disposal of

- rice husks which are not very biodegradable and
- ash from combustion of rice husks

This makes the technology "Green" and is able to solve a world wide environmental problem.



Rice producing countries of the world

According to international estimates the rice demand by 2020 will grow to 780 million tons. Because the rice growing areas can not be dramatically extended to fit this need, the rice harvest from one hectare would increase from 5 to 12 tons by means of new improved rice seeds.

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PREPARATION OF FEEDSTOCK

- During rice milling, approximately 70 % of the raw rice is processed to “white” rice.
- The rice husks, which constitute about 20 % of the raw rice are shelled, separated and stored in storage silos.
- The bran from rice polishing, which constitutes about 10 % of the raw rice is separated and most commonly used for animal feed.



Raw rice is processed to white rice for consumption

All these processing steps are executed in classic rice mills all over the world.

RICE HUSK PROCESSING PLANT

The rice husks from various rice mills are then collected and transported to the rice husk processing plant.

Unloading is done pneumatically or with gravity flow and excavators to intermediate silos. Before entering the silos impurities are separated by means of a riddle screen. Afterwards the husks are ground and fed to storage silos.

The caloric value of about 14 MJ/kg of the rice husks represents about 35 % of the caloric value of diesel or bunker oil with a caloric value of 40.5 MJ/kg.



The waste product - unground and ground rice husks

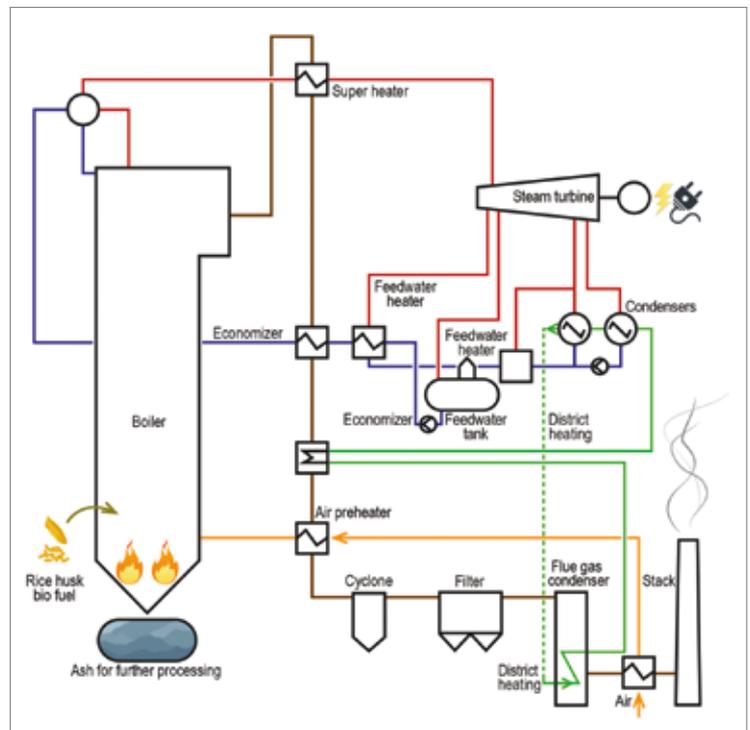
COMBUSTION AND POWER GENERATION UNIT

A special rice husk combustion unit generates steam and the rice husk ash is separated in hoppers. The main part of the steam is feed into a steam turbine-generator set which generates electric energy.

Electric energy is either partly used for the rice mill if it is located nearby and for the rice husk processing plant. The main part of electric energy is sold to the public grid and is a valuable product of the plant.

Depending on the combustion technology and process parameter rice husk ash with more or less carbon content (5 % - 40 %) can be produced. The other components of the ash are amorphous silica and a small amount of crystalline silica as well as some inerts.

The ash is collected from the several hoppers and the flue gas filters of the combustion unit and is stored in storage silos.



Rice husk combustion unit



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LIQUID SODIUM SILICATE AND ACTIVATED CARBON PRODUCTION

The rice husk ash is first digested with caustic soda and then filtered. In the filter diluted liquid sodium silicate is separated from unwashed carbon filter cake. The diluted liquid sodium silicate is fed to storage tanks while the carbon cake in the filter is washed and chemically cleaned before being dried in the drying section.

The special dryers allow the production of powdered, activated carbon with a residual water content of about 8 %. The powdered activated carbon is screened and stored in storage silos. For distribution of activated carbon packaging in bags of various sizes is executed in the packing unit. The liquid sodium silicate (~24 % silicate) can be sold as a commodity chemical in tank-tainers or trucks.



Rice husk ash with high carbon content

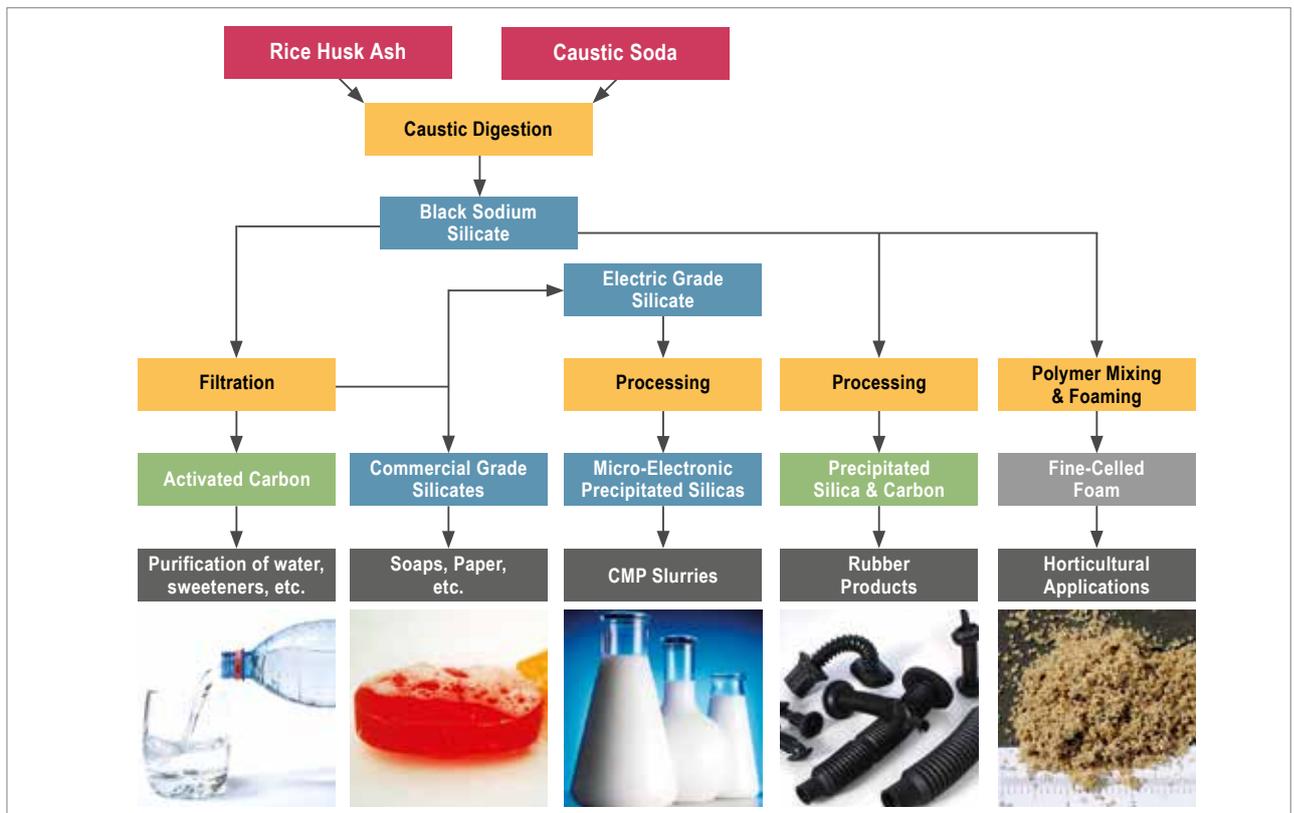
PRECIPITATED SILICA PRODUCTION

Liquid sodium silicate is processed with acid and filtered. The filter separates a diluted sodium sulfate (Glauber's salt solution) and the wet silica product. The salt solution can be evaporated or fed to a reverse osmosis and solid salt is produced as valuable by-product. The wet filter cake is finally washed and fed to the drying unit. With special dryers a precipitated silica product with about 8 % water content is produced.



Rice husk ash with low carbon content

The precipitated amorphous silica powder is screened and stored in storage silos. For distribution of silica products packaging in bags of various sizes is executed in the packing unit.



Silicate is used in many products



RICE HUSK TECHNOLOGY

MAIN APPLICATIONS OF THE PRODUCTS

Precipitated Silica:

Typical properties of our products: BET surface area 205-290 m²/g (gas adsorption), DBP oil absorption 170-240 ml/100g

- Rubber reinforcement
- Solar panels
- Plastic reinforcement
- Agriculture (animal food)
- Food, healthcare, cosmetics
- Catalyst; coatings
- Pulp and paper processing
- Detergents and soaps
- Adsorbents
- Anticaking agent for packing

Liquid Sodium Silicates:

Weight ratios of SiO₂ to Na₂O from 1.6 to 3.3

- Detergents and cleaning compounds
- Adhesives & cements
- Paints & coatings
- Pulp & paper processing
- Ceramics & binders
- Water treatment
- Textile processing
- Mining & mineral processing
- Petrochemical processing

Activated Carbon:

Activated carbon is a kind of carbon processed to have small, low-volume pores for adsorption or chemical reactions.

- Food and beverages (decolouring)
- Pharmaceuticals
- Water purification
- Sweetener
- Solvent recovery
- Air purification

THE PÖRNER GROUP

The Pörner Group is offering the Rise Husk Processing Technology as an EPC Contractor.

By providing all engineering services from one source: from conceptual design to basic and detail engineering, procurement and project management up to commissioning and start-up, Pörner Group realizes all projects tailored to the customer's requirements.

Contact us for further information.

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