

Profitable Project Investment Opportunity in Extraction of Ultrapure Silicon from Rice Husk Ash

About Silicon

Rice husk ash is a unique source of high grade amorphous silica. The silica present in rice husk, being of biogenic origin, is inherently amorphous. Amorphous silica obtained from rice husk is chemically active and hence a very useful product. At higher temperatures, it undergoes a phase change resulting into crystalline forms of silica.



The silica precipitation technology is a novel method for silica precipitation where the chemicals used are regenerated making it a closed loop operation. Successful studies for extraction of silica on laboratory scale, which meet the industrial requirements, have been carried out. Also studies are being carried out for suitable application of the undigested ash obtained after extraction, in water treatment plants with or without further improving the activated carbon content of the ash.

Silicon, the second most abundant element on earth, is an essential part of the mineral world. Its stable tetrahedral configuration makes it incredibly versatile and is used in various way in our everyday lives.



Burning the fuel, rice husk to generate energy results in the waste product called rice husk ash (RHA). RHA is an abundant agricultural by-product. It is rich in silica (about 60%) and can be made into economically viable raw material which can be used for production of ultrapure silica. The present work deals with the production of silica particles.

Properties of Silicon

Silicon is a crystalline semi-metal or metalloid. One of its forms is shiny, grey and very brittle (it will shatter when struck with a hammer). It is a group 14 element in the same periodic group as carbon, but chemically behaves distinctly from all of its group counterparts. Silicon shares the bonding versatility of carbon, with its four valence electrons, but is otherwise a relatively inert element.

Process of extraction

1. Digestion: This involves the digestion of the rice husk ash with caustic at specific conditions. In this process the silica in the ash is gets extracted with caustic to form sodium solution. After the completion of the digestion the solution is filtered for the residual undigested ash present in the solution. The clear filtrate is taken for precipitation.

2. Precipitation: This step involves precipitation of silica from the sodium silicate solution. Carbon dioxide at a specific flow rate is passed through the silicate solution at design conditions. Continuous stirring is employed during the operation. The precipitated silica is filtered, washed with water to remove the soluble salts and dried. The filtrate containing sodium carbonate is taken for regeneration.

3. Regeneration: Regeneration is the step where calcium compound reacts with the sodium carbonate to form calcium carbonate and sodium hydroxide. The resulting solution is filtered to remove the solid calcium carbonate and aqueous sodium hydroxide is used for digestion again. The calcium carbonate is washed with water and dried. The dried calcium carbonate can be either calcined to get calcium oxide, which is reused, for regeneration or the calcium carbonate is sold and fresh calcium hydroxide is used for regeneration which gives an option of one more value addition.

4. Production of Ultrapure Silicon:

A chlorine based system is used in the method of transferring silicon from SiO_2 to polysilicon. The process is flexible enough to allow the use of chlorine as the halide conversion medium by



modifying the process, hydrogen, argon and a silicon chloride containing gas are injected into inductively coupled plasma operating at a temperature of approximately 2500°C.

Under these conditions, the silicon chlorides decompose to silicon, chlorine, and possibly hydrogen ions, and the gaseous product flows into a baffled cold trap held at approximately 1500°C. by resistance heating.

Silicon is used in the aluminium industry to improve castability and weldability, not to add strength as noted in the text. Silicon-aluminium alloys tend to have relatively low strength and ductility, so other metals, especially magnesium and copper, are often added to improve strength. Silicon resins are widely used as coatings, moulding compounds, laminates sealants, room temperature curing cements for electrical insulation, impregnating electric coils, bonding agents and vibrating damping devices.

Semiconductor grade silicon is used in the manufacture of silicon chips and solar cells. Fumed silica is used as filler in the cement and refractory materials industries, as well as in heat insulation and filling material for synthetic rubbers, polymers and grouts. Silicon rubbers are versatile materials, which find application in a wide variety of products. It is also used in medical devices used within the body (surgical).

Project at a Glance

Capacity:	300 Kg/day
Plant & Machinery:	Rs. 246 Lakhs
T.C.I:	Rs. 557 Lakhs
Rate of Return:	39%
Break Even Point:	46%

**Niir Project Consultancy Services
(NPCS) can provide Detailed Project
Report on Extraction of Ultra-Pure
Silicon from Rice Husk Ash**

See more:

<http://goo.gl/SIKSZO>

Our Detailed Project Report Contains

➤ Introduction

- Project Introduction
- Project Objective and Strategy
- Concise History of the Product
- Properties
- BIS (Bureau of Indian Standards) Provision & Specification
- Uses & Applications

➤ Market Study and Assessment

- Current Indian Market Scenario
- Present Market Demand and Supply
- Estimated Future Market Demand and Forecast
- Statistics of Import & Export
- Names & Addresses of Existing Units (Present Players)
- Market Opportunity

➤ **Raw Material**

- **List of Raw Materials**
- **Properties of Raw Materials**
- **Prescribed Quality of Raw Materials**
- **List of Suppliers and Manufacturers**

➤ **Personnel (Manpower) Requirements**

- **Requirement of Staff & Labor (Skilled and Unskilled) Managerial, Technical, Office Staff and Marketing Personnel**

➤ **Plant and Machinery**

- **List of Plant & Machinery**
- **Miscellaneous Items**
- **Appliances & Equipments**
- **Laboratory Equipments & Accessories**
- **Electrification**
- **Electric Load & Water**
- **Maintenance Cost**
- **Sources of Plant & Machinery (Suppliers and Manufacturers)**

➤ **Manufacturing Process and Formulations**

- **Detailed Process of Manufacture with Formulation**
- **Packaging Required**
- **Process Flow Sheet Diagram**

➤ Infrastructure and Utilities

- Project Location
- Requirement of Land Area
- Rates of the Land
- Built Up Area
- Construction Schedule
- Plant Layout and Requirement of Utilities

Along with project financials, as under:

- Assumptions for Profitability workings
- Plant Economics
- Production Schedule
- Land & Building

Factory Land & Building

Site Development Expenses

- **Plant & Machinery**

Indigenous Machineries

Other Machineries (Miscellaneous, Instruments, Laboratory Equipments and Accessories etc.)

- **Other Fixed Assets**

Furniture & Fixtures

Pre-operative and Preliminary Expenses

Technical Knowhow

Provision of Contingencies

• Working Capital Requirement Per Month

Raw Material

Packing Material

Lab & ETP Chemical Cost

Consumable Store

- Overheads Required Per Month and Per Annum
Utilities & Overheads (Power, Water and Fuel
Expenses etc.)

Royalty and Other Charges

Selling and Distribution Expenses

- Salary and Wages
- Turnover per Annum
- Share Capital

Equity Capital

Preference Share Capital

• Annexure 1 :: Cost of Project and Means of Finance

• Annexure 2 :: Profitability and Net Cash Accruals

Revenue/Income/Realisation

Expenses/Cost of Products/Services/Items

Gross Profit

Financial Charges

Total Cost of Sales

Net Profit After Taxes

Net Cash Accruals

- **Annexure 3 :: Assessment of Working Capital requirements**

Current Assets

Gross Working. Capital

Current Liabilities

Net Working Capital

Working Note for Calculation of Work-in-process

- **Annexure 4 :: Sources and Disposition of Funds**

- **Annexure 5 :: Projected Balance Sheets**

ROI (Average of Fixed Assets)

RONW (Average of Share Capital)

ROI (Average of Total Assets)

- **Annexure 6 :: Profitability ratios**

D.S.C.R

Earnings Per Share (EPS)

Debt Equity Ratio

• Annexure 7 :: Break-Even Analysis

Variable Cost & Expenses

Semi-Var./Semi-Fixed Exp.

Profit Volume Ratio (PVR)

Fixed Expenses / Cost

B.E.P

- **Annexure 8 to 11 :: Sensitivity Analysis-
Price/Volume**

Resultant N.P.B.T

Resultant D.S.C.R

Resultant PV Ratio

Resultant DER

Resultant ROI

Resultant BEP

• Annexure 12 :: Shareholding Pattern and Stake Status

Equity Capital

Preference Share Capital

• Annexure 13 :: Quantitative Details- Output/Sales/Stocks

Determined Capacity P.A of Products/Services

Achievable Efficiency/Yield % of Products/Services/Items

Net Usable Load/Capacity of Products/Services/Items

Expected Sales/ Revenue/ Income of Products/ Services/
Items

- **Annexure 14** :: **Product wise domestic Sales Realisation**
- **Annexure 15** :: **Total Raw Material Cost**
- **Annexure 16** :: **Raw Material Cost per unit**
- **Annexure 17** :: **Total Lab & ETP Chemical Cost**
- **Annexure 18** :: **Consumables, Store etc.,**
- **Annexure 19** :: **Packing Material Cost**
- **Annexure 20** :: **Packing Material Cost Per Unit**

- **Annexure 21 :: Employees Expenses**
- **Annexure 22 :: Fuel Expenses**
- **Annexure 23 :: Power/Electricity Expenses**
- **Annexure 24 :: Royalty & Other Charges**
- **Annexure 25 :: Repairs & Maintenance Exp.**
- **Annexure 26 :: Other Mfg. Expenses**
- **Annexure 27 :: Administration Expenses**
- **Annexure 28 :: Selling Expenses**

- **Annexure 29 :: Depreciation Charges – as per Books (Total)**
- **Annexure 30 :: Depreciation Charges – as per Books (P & M)**
- **Annexure 31 :: Depreciation Charges - As per IT Act WDV (Total)**
- **Annexure 32 :: Depreciation Charges - As per IT Act WDV (P & M)**
- **Annexure 33 :: Interest and Repayment - Term Loans**
- **Annexure 34 :: Tax on Profits**
- **Annexure 35 :: Projected Pay-Back Period And IRR**

See more:

<http://goo.gl/SIKSZO>

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<https://goo.gl/VstWkd>

Niir PROJECT CONSULTANCY SERVICES

An ISO 9001:2008 Company

Who are we?

- One of the leading reliable names in industrial world for providing the most comprehensive technical consulting services
- We adopt a systematic approach to provide the strong fundamental support needed for the effective delivery of services to our Clients' in India & abroad

What do we offer?

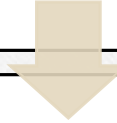
- Project Identification
- Detailed Project Reports/Pre-feasibility Reports
- Market Research Reports
- Technology Books and Directory
- Databases on CD-ROM
- Laboratory Testing Services
- Turnkey Project Consultancy/Solutions
- Entrepreneur India (An Industrial Monthly Journal)

How are we different ?

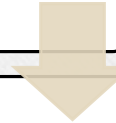
- We have two decades long experience in project consultancy and market research field
- We empower our customers with the prerequisite know-how to take sound business decisions
- We help catalyze business growth by providing distinctive and profound market analysis
- We serve a wide array of customers , from individual entrepreneurs to Corporations and Foreign Investors
- We use authentic & reliable sources to ensure business precision

Our Approach

Requirement collection



Thorough analysis of the project



Economic feasibility study of the Project



Market potential survey/research



Report Compilation

Who do we serve?

- Public-sector Companies
- Corporates
- Government Undertakings
- Individual Entrepreneurs
- NRI's
- Foreign Investors
- Non-profit Organizations, NBFC's
- Educational Institutions
- Embassies & Consulates
- Consultancies
- Industry / trade associations

Sectors We Cover

- Ayurvedic And Herbal Medicines, Herbal Cosmetics
- Alcoholic And Non Alcoholic Beverages, Drinks
- Adhesives, Industrial Adhesive, Sealants, Glues, Gum & Resin
- Activated Carbon & Activated Charcoal
- Aluminium And Aluminium Extrusion Profiles & Sections,
- Bio-fertilizers And Biotechnology
- Breakfast Snacks And Cereal Food
- Bicycle Tyres & Tubes, Bicycle Parts, Bicycle Assembling

Sectors We Cover *Cont...*

- Bamboo And Cane Based Projects
- Building Materials And Construction Projects
- Biodegradable & Bioplastic Based Projects
- Chemicals (Organic And Inorganic)
- Confectionery, Bakery/Baking And Other Food
- Cereal Processing
- Coconut And Coconut Based Products
- Cold Storage For Fruits & Vegetables
- Coal & Coal Byproduct

Sectors We Cover *Cont...*

- Copper & Copper Based Projects
- Dairy/Milk Processing
- Disinfectants, Pesticides, Insecticides, Mosquito Repellents,
- Electrical, Electronic And Computer based Projects
- Essential Oils, Oils & Fats And Allied
- Engineering Goods
- Fibre Glass & Float Glass
- Fast Moving Consumer Goods
- Food, Bakery, Agro Processing

Sectors We Cover *Cont...*

- Fruits & Vegetables Processing
- Ferro Alloys Based Projects
- Fertilizers & Biofertilizers
- Ginger & Ginger Based Projects
- Herbs And Medicinal Cultivation And Jatropha (Biofuel)
- Hotel & Hospitality Projects
- Hospital Based Projects
- Herbal Based Projects
- Inks, Stationery And Export Industries

Sectors We Cover *Cont...*

-
- Infrastructure Projects
 - Jute & Jute Based Products
 - Leather And Leather Based Projects
 - Leisure & Entertainment Based Projects
 - Livestock Farming Of Birds & Animals
 - Minerals And Minerals
 - Maize Processing(Wet Milling) & Maize Based Projects
 - Medical Plastics, Disposables Plastic Syringe, Blood Bags
 - Organic Farming, Neem Products Etc.

Sectors We Cover *Cont...*

- Paints, Pigments, Varnish & Lacquer
- Paper And Paper Board, Paper Recycling Projects
- Printing Inks
- Packaging Based Projects
- Perfumes, Cosmetics And Flavours
- Power Generation Based Projects & Renewable Energy Based Projects
- Pharmaceuticals And Drugs
- Plantations, Farming And Cultivations
- Plastic Film, Plastic Waste And Plastic Compounds
- Plastic, PVC, PET, HDPE, LDPE Etc.

Sectors We Cover *Cont...*

- Potato And Potato Based Projects
- Printing And Packaging
- Real Estate, Leisure And Hospitality
- Rubber And Rubber Products
- Soaps And Detergents
- Stationary Products
- Spices And Snacks Food
- Steel & Steel Products
- Textile Auxiliary And Chemicals

Sectors We Cover *Cont...*

- Township & Residential Complex
- Textiles And Readymade Garments
- Waste Management & Recycling
- Wood & Wood Products
- Water Industry(Packaged Drinking Water & Mineral Water)
- Wire & Cable

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