

## Documents

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**Size reduction via planetary milling and acid leaching effect on rice husk ash-derived nano-silica**  
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### Abstract

Among the common sources of silica from agricultural waste are rice husk and rice husk ash (RHA). In this study, RHA used was prepared through the controlled burning of the rice husk. Two different RHA sizes were used in the synthesizing process via precipitation method: the original RHA (without planetary milling) and the planetary milled RHA. Prior to the precipitation method, RHAs were acid leached using hydrochloric acid (HCl) as the leaching agent and then subjected to heat treatment. This study strives to highlight the effect of planetary milling of RHA and acid leaching treatment on the acquired rice husk ash-based nano-silica properties. XRF analysis obtained show that leaching pre-treatment at two different temperatures had resulted in insignificant percentage of silica. Meanwhile, the XRF, XRD, FTIR and FESEM characterization confirmed that the obtained powders contain up to 99.7% of high purity amorphous silica particles in size less than 100 nm. FESEM micrographs indicated the insignificant difference in the resultant nano-silica particles size which suggest the physical alteration of RHA in the early stage might not have a significant role on producing nano-sized silica. The results of this study could suggest a convenient and reproducible method for the preparation of high-purity rice husk ash-derived nano-silica particles in an amorphous structure with a high potential to be used in a wide range of applications. © 2022

### Author Keywords

Acid leaching; Nano-silica; Planetary milling; Precipitation method; Rice husk ash

### Index Keywords

Agricultural wastes, Chlorine compounds, Hydrochloric acid, Leaching, Milling (machining), Particle size analysis, Precipitation (chemical); Acid leaching, Common source, High purity, Nano Silica, Nanosilica particles, Planetary milling, Precipitation methods, Rice husk, Rice-husk ash, Size-reduction; Silica

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