

# EFFECT OF EXPERIMENTAL VARIABLES ON THE EXTRACTION OF NANOSILICA PREPARED BY SUGARCANE BAGASSE ASH

Reference	Presenter	Authors (Institution)	Abstract
04-008	Felipe Borros Carvalho	Fungaro, D.A. (Instituto de Pesquisas Energéticas e Nucleares); Carvalho, F.B. (Instituto de Pesquisas Energéticas e Nucleares); Rovani, S. (Instituto de Pesquisas Energéticas e Nucleares); Santos, J. (Universidade de São Paulo);	Sugarcane bagasse is one of the important biomass sources in Brazil, which is used as a fuel in the sugar industry. As a result, a large quantity of ash is generated and creates a serious disposal problem. The waste bagasse ash can be used as a valuable material to obtain nanosilica. Initially, NaOH was mixed with sugarcane bagasse ash (ash:NaOH 1:2 w/w) and the resultant mixture was fused at 350 °C for 30 min. Next, sodium silicate was solubilized in water and nanosilica was produced by neutralizing with acid. The structure, properties and yield of silica produced is strongly influenced by the extraction method used. Therefore, the silica extraction was conducted using various type of acid (hydrochloric, sulfuric and acetic), acid concentration (0.5; 4.0; and 8.0 mol L <sup>-1</sup> ) and gelation pH (2, 4 and 7 for hydrochloric and sulfuric acids and 4, 5 and 7 for acetic acid). The synthesized nanosilica characteristics were studied using various techniques. Experimental results showed that hydrochloric acid and sulfuric acid produced nanosilica materials with similar yield and purity in each different process parameter. The production of nanosilica particles with the addition of acetic acid was the least favorable under the study conditions, probably due to its weak acid characteristic. The purity of all the synthesized silica nanoparticles is in the range of 94-98% and impurities such as sulfur and iron were presents as main minor compound. The study reveals that the industrial waste material sugarcane bagasse ash acts as an alternative source for the production of nanosilica powder widely used in areas such as ceramics, chemicals, catalysis, chromatography, energy, electronics, coatings, stabilisers, emulsifiers and biological sciences.