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Extraction and characterization of Nanosilica from Rice Husks

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Rice husks are a residue that represents 23% in weight of rice production. Main compounds of rice husks are cellulose, lignin, hemicellulose and silica[1]. Treating chemically and burning adequately rice husks is possible to extract amorphous silica with high surface area[1,2]. The aim of this work is to extract and to characterize nanosilica from two types of rice husks, named agulhinha and cateto. The extraction of nanosilica was realized by acid treatment and burning accordingly Souza et al. 2002[2]. Thermogravimetry (TGA) was used to characterize burn comportment and activation energy Ea, using Osawa method[3], of rice husks in air atmosphere. Fourier transformed infrared spectroscopy (FTIR) and particle size analysis was used to characterize the material obtained from rice husks treated and burned at 650ºC. Values of activation energy of rice husks were found in the range of 100-200kJ mol^{-1}, (Table 1), like obtained in Mansaray et al. (1999)[4], Teng et al. (1997)[5], and Sonobe et al. (2008)[6].

	E_a (kJ mol^{-1})				
	No treatment	Water	Citric Acid	Acetic Acid	Phosphoric Acid
Agulhinha	127,0±4,3	126,7±7,3	134,8±4,1	146,8±10,6	146,0±9,5
Cateto	120,4±8,9	136,7±7,2	139,7±12,9	135,3±11,7	163,3±16,1

The treatment of rice husks promoted an increase in the activation energy, suggesting a content reduction of compounds into rice husks with low onset oxidative temperature after treatment. FTIR results showed a good peak correlation between commercial silica and residue from treated and burned rice husks. Large particle size distribution was observed with nano and micro particles. The results showed the potential of silica extraction from rice husks, with application in composites, cement, and chemicals products.

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