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Alkaline hydrothermal treatment of the waste produced in the semi-dry flue gas desulfurization system

Lucas C Grosche and **Denise A Fungaro**
IPEN - Nuclear and Energy Research Institute, Brazil

Semi-dry flue gas desulfurization ash (SDA) is a byproduct generated from the desulfurization system of coal-fired power station. The beneficial reuse application for SDA material is relatively undeveloped and this residue is underutilized. SDA was used as raw material for the synthesis of zeolitic material by alkaline hydrothermal treatment. Different experimental conditions, such as, reaction time, temperature, alkali hydroxide concentration and solid/liquid ratio were studied. Raw ash material and synthesis products were characterized by XRD, XRF, particle size analyzer, TG-DTG-DTA and SDA was classified according to Brazilian Environmental Regulations. The results show that SDA has a higher CaO and SO_3 content. The major minerals present in SDA are hannebachite, anhydrite, calcite, portlandite, gehlenite and sodium carbonate. The size of SDA particles is around 0.399-355.656 μM with median diameter of 7.63 μM. Thermal behavior of SDA was characterized by the existence of six and four stages under air and inert atmosphere, respectively. SDA can be classified as Class II A (non-dangerous/non-inert) materials. The presence of zeolite hydroxysodalite confirms successful conversion of SDA into zeolitic material after activation in NaOH solutions. Along with the zeolitic product katoite, hydrocalumite and Al-substituted tobermorite were obtained. All the compounds formed present ionic exchange capacity. SDA utilization minimizes the environmental impact of disposal problems and further enables application for treatment of wastewater.

Biography

Lucas C Grosche has completed his BSc in Chemical Engineering Chemistry at Oswaldo Cruz University, Brazil and MSc in Chemical Engineering Chemistry at São Paulo University. Currently, he is pursuing his PhD in Technology Materials at Nuclear and Energy Research Institute, Brazil.

lcgrosche@gmail.com

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