RICE HULL IN THE PRODUCTION OF AMORPHOUS SILICA

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Rice hull, the outer covering of the rice grains is a by-product in paddy milling and is largely a waste material. Rice hull consists of about 75 per cent of organic substance, 5 per cent of moisture, and 20 per cent of ash. The rice hull ash is mainly composed of silica. Silica in amorphous form could be produced by burning rice hull under controlled conditions. However, it was observed that, silica in both amorphous and crystalline form are obtained when rice hull is subjected to high temperature heat treatment.

The present investigation was undertaken in order to make a study of structural changes occurring in silica of rice hull ash, under heat treatment, by using x-ray powder diffractrometric analysis (XRD). Twelve rice hull samples from different locations were analysed in this study and all burnt samples above 900°C showed crystalline silica in cristobalite form. However, the degree of crystallinity of these varieties vary considerably and they were classified into three basic groups according to their x-ray diffractograms. Three samples, one from each group were burnt in a gradient kiln at different temperatures under identical heating conditions. The XRD analysis of the above burnt samples clearly indicates that the samples burnt below a particular temperature showed amorphous silica and the others showed crystalline silica in cristobalite form. Also the degree of crystallinity increases with increasing temperature. The analysed samples indicated markedly different temperatures for the above convertion. (750,825, 900°C). Hence, because of the variation in temperature it was observed in the above study, that the required burning temperature to form crystalline silica in rice hull ash is a unique character burning below the above observed temperatures amorphous silica could be produced. The production of amorphous silica has industrial application for the production of silica refractory bricks, cement and various fillers.