

Development of High Quality Refractory Bricks from Fireclays for Industrial Applications

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Abstract : Available indigenous refractory bricks in Nigeria can only be used in the lining of furnaces for melting of cast iron operating at less than 1,400°C or in preheating furnaces due to their low refractoriness less than 1,500°C. The bricks crack and shatter on heating at 1350 to 1450°C. In this paper, a simple and adaptable technology of manufacturing high-quality refractory bricks from selected Nigerian clays for furnace linings was developed. Fireclays from Onibode, Owode-Ketu in Ogun State and Kwoi in Kaduna State were crushed, ground, and sieved into various grain sizes using standard techniques. The pulverized clays were blended with alumina in various mix ratios and indurated in the furnace at 900 - 1600C. Their chemical, microstructure and mineralogical properties were characterized using atomic absorption spectrophotometry, scanning electron microscopy and x-ray diffraction spectrometry respectively. The mineralogical and spectrochemical analyses suggested that the clays are of siliceous alumino-silicate and acidic in nature. The appropriate blending of fireclays with alumina provided the tremendous improvement in the refractoriness of the bricks and other acceptable service properties comparable with imported refractory bricks. The change in microstructure from pseudo-hexagonal grains to equiaxed grains of well - ordered sequence of structural layers could be responsible for the improved properties.

Keywords : alumina, furnace, industry, manufacturing, refractoriness

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