ABSTRACT

Assessment of industrial potentials of Northern Nigeria Clay

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Clays from Northern Nigeria were investigated in order to determine their engineering properties, mineralogy and their elemental compositions so as to know their possible applications in various industries. Atterberg limit tests, X-Ray Diffraction and X-Ray Fluorescence were carried out on the clay samples. The plasticity index from the atterberg limit indicates that samples from Papa, Gombe, Dukku, Pindiga, Alkaleri, Gombe Abba and Kirfi are clays with plasticity ranging from very high to intermediate, while samples from Bojude, Gombe and Gabarin are poor clays with silt contents. The mineralogy indicates that all the samples have kaolinite as the major clay mineral and quartz as the major non clay mineral except sample from Pindiga which has Na- montmorillonite as the major clay mineral and minor amount of kaolinite. The elemental analysis indicates that silica and alumina are the major oxides in all the samples with composition ranging from 47.60-76.20 weight percent (wt %) and 14.10-36.40 wt% respectively. TiO_2 contents ranges from 1.70-2.88 wt%, Fe_2O_3 contents ranges from 0.35-8.69 wt%, MgO contents ranges from 0.01-1.74 wt% and K_2O contents ranges from 0.05-2.12. MnO, CaO, Na_2O, P_2O_5, Cr_2O_3, NiO, V_2O_5, ZrO_2, CuO, SO_3 and ZnO contents are less than 1.00 wt % in all the samples. The clays were found to be useful in few industries like ceramics, plastics and drilling fluid. This limited industrial application is because of the high content of impurities.