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Mineralogical, physico-chemical and technological characterization of clays from Maroua (Far-North, Cameroon) for use in ceramic bricks production

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Abstract

This article summarized some characteristics of clayey materials from semi-arid climate in Far North Cameroon and evaluated their use in ceramic bricks production. Three samples (Ma1, Ma2 and Ma3) were characterized using XRD, FTIR, XRF and firing at 900, 1000 and 1100°C. SiO_2 (~64-75%), Al_2O_3 (~12-15%), Fe_2O_3 (~2-5%) and (~7%) of fluxing agents (K_2O, CaO, Na_2O) were the predominant oxides with a reduce contents in Ma3. Quartz (~40%), K-feldspar (~25%) and plagioclase (~14%) were non-clay minerals while clays minerals were mainly kaolinite (~4-10%), illite (~4-7%) and smectite (~2-7%). Ma1 and Ma2 are similar in terms of mineralogy, particle size distribution and plasticity. Sample M3 is most sandy (65%) and less plastic (2.3%). After firing Ma1 and Ma2 provided good technological properties compared to Ma3. At 1000°C for example, they displayed a metallic sound, bulk density of 1.8g/cm^3, a linear shrinkage <5%, water absorption of 13% and flexural strength >5MPa. Mixing Ma3 with other samples (up to 50%) substantially improved the quality of the firing specimens for making construction bricks.