Studies on the physico-mineralogical and mechanical properties of ancient and contemporary bricks of Kathmandu valley (Nepal)

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Abstract:
The mineralogical composition of the clay raw materials used for the production of different types of ceramic products like tiles [1,2], contemporary and ancient clay bricks is one of the main quality indicators of its physico-mechanical properties [3]. Hence, it is considered that the mineralogical phase analysis of the clay-based bricks is one of the important aspects of studies for the approximate estimation of physico-chemical and mechanical properties. It is said that mechanical strength, i. e., durability of clay bricks depends on their physico-mineralogical properties [4]. The mineralogical, physical and mechanical properties of the fired clay bricks are generally inter-related to each others. Considering these facts, present work was focused to investigate the properties of mineralogical composition, water absorbtivity (WA), apparent porosity (AP), bulk density (BD) and compressive strength (CS) of twenty four different types of contemporary (17 samples) and ancient (7 samples) bricks of Katmandu valley using XRD, FTIR techniques and ASTM standards [5].

Minerals in the analyzed brick samples were found mainly of quartz, feldspars, spinel with primary mullite, muscovite, margarite and hematite. Disappearance of feldspars and appearance of the alumina-rich spinel and primary mullite phase peaks in all brick samples are not same degree indicating that the firing temperature used to produce these brick samples should not be same. It is found a good correlation between the physical properties of WA, AP and BD with CS for both types of ancient and contemporary brick samples. In general, compressive strength of all analyzed samples is found to be increased with decreasing the WA and AP, and with increasing the BD as depicted in **Figs 1(a)** and **1(b)**. Furthermore, the durability of ancient bricks seems to be more than contemporary ones.

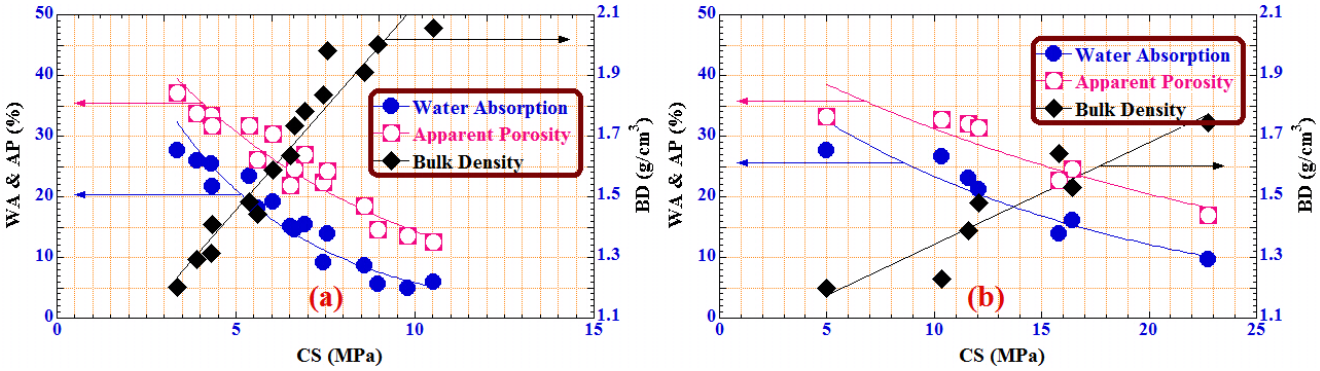

Fig. 1: Correlation between WA, AP & BD with CS for (a) contemporary and (b) ancient brick samples.

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