An Exploration of the Effect of Mixing Wollastonite with Sandy Clay in Cold Sintered Bricks

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The built environment accounts for more than 36% of global emissions. 10% of these emissions are directly related to the production, processing, and transportation of building materials. Concrete which is the most widely used material contributes to more than 7% of the emissions. Unsustainable sourcing and use of conventional building materials such as cement, aggregates, and steel compounds the environmental degradation challenge. The increasing dominance of these materials exacerbates the shortage in affordable housing and limits access to formal housing among low-income households. Sole reliance on incremental innovation on existing alternative materials such as bricks cannot guarantee the achievement of sustainable material sourcing and production. This study explores the potential application of locally available materials to deliver sustainable construction materials using emerging production technologies.

The objectives include 1) To test the potential of wollastonite and wollastonite-sandy clay mixture for the production of bricks 2) To characterize microstructural properties and quantity of the physical properties of samples made from wollastonite and wollastonite-sandy clay mixture and 3) To compare the physical and mechanical properties of construction material made from Wollaston and wollastonite-sandy clay mixture. Samples from Wollastonite and NaOH, and Comparative wollastonite, sandy clay and NaOH were produced. The cold sintering was done for press for two hours at 200°C and 400Mpa pressure. Cold sintered wollastonite resulted into samples with a compressive strength of 163N/mm². A mixture of wollastonite and sandy-clay soil produced dense particles and higher compressive strength of up to 179.30N/mm². Increasing the sample thickness significantly reduces the compressive strength slightly to 166.20N/mm². The results give an indication of the potential use of locally materials for sustainable brick production. The reduction in carbon footprint through lower temperature production process has also been demonstrated through the cold sintering process. The outcome provides a reference for research in cold sintered bricks.