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AN INVESTIGATION OF THE MICROSTRUCTURE OF A LATERITIC SOIL STABILIZED WITH CORN COB ASH

The use of bio-ash as partial substitute for cement in civil engineering works, has the potential to reduce the overall net carbon dioxide contribution of the construction sector to the environment. Studies in the chemical stabilization of lateritic soils indicate the possibility of a relationship between the cation exchange capacity of lateritic soils and the optimal amount of pozzolanic ash required to affect a modification for soil stabilization purposes. This study investigates this further, using corn cob ash (CCA) and an A-2-7 lateritic soil as case study. Metallic oxide composition of soil and CCA respectively were determined using the X-ray fluorescence equipment from which the cation exchange capacity of the soil was determined. Various samples of soil-cement, soil-cement-CCA and soil-CCA were thereafter prepared and subjected to unconfined compressive strength (UCS) test, following the procedures of BS 1377-7:1990. Attempts to confirm the presence of silicates of potassium (K_2SiO_3) and magnesium ($M_8Si_8O_{20}(OH)_8 \cdot 12H_2O$) in the stabilized soil using Scanning Electron Microscopy (SEM) examination were inconclusive. The cation exchange capacity of the soil was theoretically determined as 1.45%, which is close to the CCA content of 1.5% that returned the highest UCS value. Further work is required to account for the different roles of potassium, calcium and magnesium (usually present in pozzolanic ash) in the stabilization of lateritic soils.

Note: