

Development of a Novel Composite for Bricks by Laterite, Fly Ash, Sand and Waste Plastic

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Natural aggregate sources are becoming depleted due to high demand in the construction industry and the amounts of disposed waste plastic material are increasing. Hence, researchers are exploring the use of alternative materials instead of natural resources. Therefore, the present invention provides a composite material wherein laterite, sand, chemically unmodified Polyethylene Terephthalate (PET), and fly ash (FA) are mixed in a container to disperse raw material in PET and molded. Initially X-ray diffraction (XRD) analysis have conducted for laterite, FA, and sand to identify major mineral phases. After preparing the sample bricks according to the different proportions of raw materials under four samples series, standard compressive strength (CS) in both dry and wet conditions and water absorption (WA) analysis was conducted. XRD analysis of FA and laterite have confirmed the presence of crystalline silica and kaolinite as major phases respectively and sand has responsible peaks for quartz and feldspar as obvious. The highest CS in wet and dry conditions has recorded for the combination in “series A” which has 35% PET, 25% FA, and 20% laterite and sand. Further, the increasing FA content able to increase CS in wet and dry conditions. Under the higher plastic content breakeven point cannot be detected due to the high plasticity nature. The composite with the highest plastic with only FA has lowest WA of 0.08% but its’ CS is lower than the aforesaid combination in “series A” and this combination has 0.32% of WA which is still below the standard WA to reference. Though higher plastic content in materials is lightweight and suitable for the high seismic active areas, the highly flammable nature stands as a major drawback. Therefore, 35% plastic, 25% FA, and 20% laterite and sand can be taken as a favourable and novel combination for the production of bricks.

Keyword: Compressive strength, Water absorption, Plastic, Fly ash