

Utilization of Polyethylene Terephthalate Dust and Wastewater Sludge as Eco-Brick Materials

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Finding a solution for wastes is a crucial point in the industrial sector. This study is mainly focused to find an effective solution for wastes; polyethylene terephthalate (PETE/PET) plastic dust and sludge that are generated from plastic recycling process in Eco-Spindles (Pvt) Ltd by developing an eco-brick as a construction material to prevent the environmental impacts. In this recycling process, the PET-based plastic dust and wastewater sludge are produced. Different mixing ratios of PET-plastic dust and sludge respectively ranging from 250g to 400g and from 50g to 250g, were used to prepare eco-bricks by using same amount of cement and sand (i.e., each 500g). The prepared bricks were tested to identify the mechanical properties; compressive strength and the physical properties; density, water absorption and linear expansion. Of the eco-brick samples tested, the highest compressive strength was recorded of the brick with 17% (i.e., 250g) of PET plastic dust and 14% (i.e., 200g) of sludge after curing age of 28 days. The highest density was in the brick with 17% of PET plastic dust and 14% of sludge. The brick prepared using the mixing ratio of 17% of PET plastic dust and 14% of sludge showed the lowest water absorption. The highest water absorption was recorded for the brick with the mixing ratio of 28% (i.e., 400g) plastic dust and 3% (i.e., 50g) sludge and there is no significant variation of linear expansion of brick. And also, there is a strong negative linear relationship between compressive strength of bricks and water absorption. The carbon uptake of bricks was ranged from 3% to 5%, thereby showing carbon storing potential. So, the brick prepared using 17% of PET plastic dust and 14% of sludge can be identified as the most suitable eco-brick for the construction purposes while enhancing green building concepts.

Keywords: Environmental Impacts, PET Plastic Dust, Plastic Recycling Process, Wastes