

# **Mechanical and physical properties of concrete mixture containing scraped PVC pipes waste as partial sand replacement**

## **Abstract**

This study deals with the effect of using polyvinyl plastic waste (PVC) as a partial replacement for fine aggregate on the physical and mechanical properties of normal concrete. Natural sand (fine aggregate) is partially substituted by equivalent weight ratios of PVC waste particles, while other proportions of the concrete mixture remain unchanged. The physical tests include density, absorption, and ultrasonic pulse velocity. As well as mechanical tests for compressive, splitting, and flexural strengths are performed in addition to the modulus of elasticity. All specimens are tested after 7, 14, and 28 days. The results of the experiments showed that the incorporation of PVC particles affected the physical and mechanical properties of the concretes produced. Physical properties (density and ultra sound velocity) reduced as PVC ratios increased, whereas absorption rate is increased. Furthermore, when comparing the compressive, tensile, and flexural strengths of partial substitution ratios ranging from 5% to 15%, the results showed that the specimens with partial substitution ratios above had increases of 5.6% –10.19%, 3.125% –15.625%, and 1.61% –6.45%, respectively, when compared to the reference specimens. While the modulus of elasticity decreased as the PVC content increased. In conclusion, the results showed that when the PVC content exceeds 15%, the strength characteristics decline.

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