

ABSTRACT

This study aims to evaluate the feasibility of using ceramic, marble, and granite waste as substitutes for coarse aggregate in high-strength concrete. Three primary parameters were tested: abrasion value (referring to SNI 03-2417-2008), specific gravity (SNI 03-1969-2008), and compressive strength (SNI 03-1974-1990). Tests were conducted at 0%, 25%, 75%, and 100% replacement of natural coarse aggregate with waste materials. Results showed that natural aggregates had the best abrasion resistance, while granite waste was the closest alternative to technical standards, followed by marble and ceramic waste. In terms of compressive strength, concrete with natural aggregate achieved the highest value, but mixes with 25% and 75% granite or marble substitution still met high-strength criteria (≥ 50 MPa). In contrast, 100% ceramic waste produced the lowest strength and is not recommended for structural applications. The study concludes that partial replacement of coarse aggregate with construction waste can support material sustainability and efficiency. The optimal substitution recommendations are 25% for ceramic, 75% for marble, and 25–75% for granite.

Keywords: construction waste, compressive strength, coarse aggregate, ceramic, marble, granite