

A Study on Marble-Slag Based Geopolymer Green Concrete

Authors : Zong-Xian Qiu, Ta-Wui Cheng, Wei-Hao Lee, Yung-Chin Ding

Abstract : The greenhouse effect is an important issue since it has been responsible for global warming. Carbon dioxide plays an important part of role in the greenhouse effect. Therefore, human has the responsibility for reducing CO₂ emissions in their daily operations. Except iron making and power plants, another major CO₂ production industry is cement industry. According to the statistics by EPA of Taiwan, production 1 ton of Portland cement will produce 520.29 kg of CO₂. There are over 7.8 million tons of CO₂ produced annually. Thus, trying to development low CO₂ emission green concrete is an important issue, and it can reduce CO₂ emission problems in Taiwan. The purpose of this study is trying to use marble wastes and slag as the raw materials to fabricate geopolymer green concrete. The result shows the marble based geopolymer green concrete have good workability and the compressive strength after curing for 28 days and 365 days can be reached 44MPa and 53MPa in indoor environment, 28MPa and 40.43MPa in outdoor environment. The acid resistance test shows the geopolymer green concrete have good resistance for chemical attack. The coefficient of permeability of geopolymer green concrete is better than Portland concrete. By comparing with Portland cement products, the marble based geopolymer not only reduce CO₂ emission problems but also provides great performance in practices. According to the experiment results shown that geopolymer concrete has great potential for further engineering development in the future, the new material could be expected to replace the Portland cement products in the future days.

Keywords : marble, slag, geopolymer, green concrete, CO₂ emission

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