



Effect of calcium carbide residue on the properties of compacted clay and water treatment residue

Woottipong Prakongwittaya¹, Suwimol Asavapisit^{2*}, Rungroj Piyapanuwat³

¹ *Environmental Technology, School of Energy, Environment and Materials, King Mongkut's University of Technology Thonburi, Pracha U-thit Road, Bangmod, Thung-kru, Bangkok 10140, Thailand*

² *National Center of Excellence for Environment and Hazardous Waste Management, Department of Environmental Engineering, King Mongkut's University of Technology Thonburi, Pracha U-thit Road, Bangmod, Thung-kru, Bangkok 10140, Thailand*

³ *King Mongkut's University of Technology Thonburi (Ratchaburi), Rang Bua, Chom Bueng, Ratchaburi 70150, Thailand.*

*e-mail: Suwimol.asa@kmutt.ac.th

This research studied the properties of compacted clay and Water Treatment Residue (WTR) containing Calcium Carbide Residue (CCR). The ratio of clay:WTR are 0:100, 30:70, 50:50, 70:30 and 100:0 by weight and CCR at level of 0, 10, 20 and 30 %wt. were investigated. The addition of WTR caused the increase of water content in Liquid Limit (LL), Plastic Limits (PL), and Optimum Moisture Content (OMC) while Shrinkage Limit (SL) decreased. At 28 days, the unconfined compressive strength (UCS) of compacted clay decreased from 20.16 to 14.79 kg/cm² when the levels of WTR increased from 0 to 100 % wt. The increase of LL, PL, OMC and reduction of SL were found in compacted clay and WTR containing CCR at levels of 0 to 30 % wt. The UCS results showed that at 56 days, all samples containing 30 %wt. of CCR have maximum UCS. When the WTR was added into compacted clay from 0 to 100 %wt., the UCS decreased from 36.57 to 32.25 kg/cm². In addition, the all compacted clay and WTR at all ratios with 30 %wt. of CCR have permeability coefficient less than the value of 1×10^{-7} cm / s. specified in the standard of compacted clay liner for landfill.

Keywords: Calcium carbide residue; Permeability coefficient; Unconfined compressive strength; Water treatment residue