Kiattikun ThongDaeng 2011: Utilization and Life Cycle Assessment of Cement Produced from Industrial Wastes. Master of Engineering (Environmental Engineering), Major Field: Environmental Engineering, Department of Environmental Engineering. Thesis Advisor: Assistant Professor Monthon Thanuttamavong, Ph.D. 124 pages.

This research aims to propose an alternative approach on industrial waste management using combinations of certain types of industrial waste to reuse as construction materials. By selection of potential wastes in accordance with the "NICE Criteria" for a process of clinkerization, new cementing materials can be produced. It is found that a combination of wastes namely water supply sludge, waste limestone powder, ark shell and lime with a proportion of 25 : 50 : 5 : 20 is an appropriate proportion which produces cementing materials having self hardening properties and environmental friendly.

Based on the XRD analysis on a gray cementing material (GCM), compounds of C_3S and C_2S are found similar to those exist in an Ordinary Portland Cement. Experimental results show that strengths of GCM mortar markedly increase with initial curing time. In addition, the porous concretes can be produced using GCM with lignite fly ash with 10 - 30% by dry weight. The porous concrete mortars can obtaine sufficient void ratio and permeability and increased strength with curing time. It was believed that hydration of the major compounds such as Calcium Silicate (C_3S and C_2S) and the pozzolanic reaction due to a presence of lignite fly ash produced Calcium Silicate Hydrate (CSH) which contributes to strength development of concrete mortars.

Evaluation on a Life Cycle Analysis on GCM clinkerization in laboratory concerning global warming due to emission of carbondioxide as a potential impact is performed using SimaPro 7.1 with Superseded (IPCC 2001 GWP 100a Version 1.04) and Gate to Gate as evaluation methods. It is found that a highest impact on global warming of 0.538 kg CO_2 eq. is significantly attributed to a process of clinkerization for 1 kilogram. Subsequently, energy use, induced lime and transportation also contribute to global warming with impacts of 0.397, 0.255 และ 0.0386 kg CO_2 eq. respectively. In addition, a total environmental impact due to global warming of 1.120 kg CO_2 eq. obtained in this study conforms to result obtained by a similar research.

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