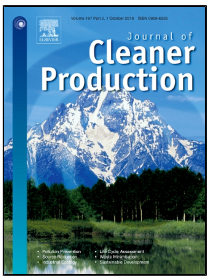
Accepted Manuscript



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PII:	S0959-6526(18)32489-2
DOI:	10.1016/j.jclepro.2018.08.156
Reference:	JCLP 13940
To appear in:	*Journal of Cleaner Production*
Received Date:	31 May 2017
Accepted Date:	14 August 2018

Please cite this article as: A.B.M.A. Kaish, Khalid Mohammed Breesem, Manal Mohsen Abood, Influence of Pre-treated Alum Sludge on Properties of High-Strength Self-compacting Concrete, *Journal of Cleaner Production* (2018), doi: 10.1016/j.jclepro.2018.08.156

Influence of Pre-treated Alum Sludge on Properties of High-Strength Self-compacting Concrete

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Abstract:

The disposal of alum sludge (AS) produced from drinking water treatment plants is gradually becoming a threat to the environment. The conventional disposal by landfill is not feasible because AS is considered as hazardous waste. By contrast, treated alum sludge (TAS) contains useful chemical compounds (silicon dioxide and aluminium trioxide which are the main constituents of cement). This study explored the influence of TAS on the production of high-strength self-compacting concrete (HSSCC) made up of 5%, 10%, 15%, 20% and 25% cement replacement. The experimental work was divided into 15 mixes as well as three control mixes with three different water/powder (w/p) ratios (0.36, 0.38 and 0.4). The fresh properties of self-compacting concrete (SCC) were determined via the slump flow, V-funnel, V-funnel at T5 min and L-box tests to meet the flowability requirements. The strength and durability properties of SCC were also tested at different specimen ages. In addition, the effects of elevated temperature on TAS-incorporated concrete were observed at different temperatures for 3 h. Experimental results revealed the encouraging effects of TAS on the fresh, hardened and durability properties of HSSCC with maximum

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