DEVELOPMENT OF A NEW ALKALI-ACTIVATED BINDER INCORPORATING DREDGED SEDIMENTS

Reine Karam, IMT Lille Douai, Univ. Lille, EA 4515 – LGCgE – Laboratoire de Génie Civil et géoEnvironnement, Département Génie Civil & Environnemental ; IFSTTAR, GERS, EE, F-44344 Bouguenais, France
reine.karam@imt-lille-douai.fr
Dimitri Deneele, IFSTTAR, GERS, EE, F-44344 Bouguenais, France
Institut des Matériaux Jean Rouxel (IMN), Université de Nantes, CNRS, 2 rue de la Houssinière, France
David Bulteel, IMT Lille Douai, Univ. Lille, EA 4515 – LGCgE – Laboratoire de Génie Civil et géoEnvironnement, Département Génie Civil & Environnemental, France

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Alkali activated materials (AAMs) are known to be alternative binders to Ordinary Portland Cement (OPC) since the latter has the disadvantage of emitting large amounts of CO_2 during its manufacture. Indeed, industrial by-products such as blast furnace slag (BFS) have been the main precursors in the alkali-activation reactions. On the other hand, dredging operations in the marine ports result in the formation of large volumes of sediment. In Europe, 100-200 Mm^3 of sediment are dredged annually, and future regulations tend to restrict their immersion at the sea. The valorisation of a part of these sediments as raw materials in the composition of binders would contribute to limit the depletion of natural resources.

So the aim of this work is oriented towards the development of a new type of alkali-activated mineral binder, based on blast furnace slag, incorporating dredged sediments. This study aims to assess the effects of sedimentary additions on the properties of the new binder.

Parameters affecting the alkali-activation of BFS were fixed (nature of the activator: a solution of Na_2SiO_3 and NaOH with 5% Na_2O and an activator modulus M_s equals to 1.45, while the Water/Solid ratio is set at 0.45). Then, variable percentages of sediments between 0 and 30% were incorporated into the studied formulations of the alkali-activated materials (MAAs), while W/S varied in order to maintain a constant workability. The effects of these sedimentary additions on the properties of the obtained material were studied.