Environmental Engineering and Management Journal xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx
http://www.eemj.icpm.tuiasi.ro/; http://www.eemj.eu

"Gheorghe Asachi" Technical University of Iasi, Romania

SYNERGIC EFFECTS OF SUNFLOWER STALKS AND SODIUM SILICATE IN DEVELOPING AN ECOLOGICAL CONCRETE

Cătălina Mihaela Grădinaru[1*], Adrian Alexandru Șerbănoiu[1], Petru Mihai[1], Gabriel Constantin Sârbu[2], Radu Muntean[3]

[1]Gheorghe Asachi" Technical University of Iași, Faculty of Civil Engineering and Building Services, 1 Prof. Dimitrie Mangeron Blvd., 700050, Iași, Romania
[2]Gheorghe Asachi" Technical University of Iași, Faculty of Hydrotechnical Engineering, Geodesy and Environmental Engineering, 65 Prof. Dimitrie Mangeron Blvd., 700050, Iași, Romania
[3]Transilvania University of Brașov, Faculty of Civil Engineering, 5 Turnului Street, 500152, Brașov, Romania

Abstract

Building industry is a very large domain in the global economy and it has a lot of consequences over the environment through many and different aspects. These consequences are various, from the more and more extended area of construction up to gas emissions released during materials manufacture and transportation, construction process, exploitation of buildings and, finally, their deconstruction. The concrete, the most used material in construction industry all over the world, must become greener and greener every passing day. Involving natural and renewable raw materials in concrete composition is a variant to develop an ecological concrete that sustain a healthier environment by using less of depleting mineral resources and by decreased gas emissions released into the atmosphere. This research has a high degree of novelty due to its aim to study the effects of sunflower stalks used as partial replacement of the mineral aggregates from the concrete composition, combined with the effects of sodium silicate used as additive. There were developed concrete recipes with sunflower stalks shredded and treated with 40% sodium silicate solution as 20%, 50% and 80% replacement of mineral aggregates with regular concrete additives and then was supplementary added sodium silicate in 5% of the cement volume from the concrete composition. Tests were carried out on the density and compressive strength of the concrete at 28 days and 3 months and on its flexural and splitting tensile strength at 28 days. The results showed that the sodium silicate addition has positive effects on the concrete compressive strength and had no or a small negative effect on its density and tensile strength.

Keywords: compressive strength, glass water, renewable resources, tensile strength, vegetal aggregates

Received: March, 2019; Revised final: June, 2019; Accepted: July, 2019

[*]Author to whom all correspondence should be addressed: e-mail: catalina.gradinaru@tuiasi.ro; Phone: +40729143623; Fax: +40232-233-368