Solidification/Stabilization of Toxic Cations with Granulated Blastfurnace Slag Matrices

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Ashes coming from municipal waste incineration solidificated/stabilizated with cementitious binder could be used as aggregates in concrete. Consequently, it is important to investigate the leaching behaviour of these aggregates. The immobilisation of a large number of heavy metals, commonly present in the incinerated wastes: Ba, Cr, Zn, Pb, Cu, Co, Cd, Ni and As, has been investigated. Cementitious matrices have been prepared with ground granulated blastfurnace slag (*ggbs*) (specific surface area Blaine 400 m^2/kg), mixed only with water, or alkali activated with sodium silicate solution (SiO_2/Na_2O = 1), respectively; term of reference is portland cement (Type I EN 197). *Ggbs* employed, typical of italian iron-making industry, had a fairly high calcium oxide content, allowing activation with only plain water.

Mortar specimens 16 $\times$ 4 $\times$ 4 cm have been prepared with such binder, after addition of 10% ash coming from an italian municipal solid waste incinerator, and cured for 48 hours in a moist environment. Each specimen, of weight 560 $\pm$ 5 g, has been placed in a container filled with deionized water (2.9 l), exceeding 10 cm in height the specimen surface. Exchange surface was 288 cm^2.

After ten and sixty days, respectively, water samples have been analysed. The results show the availability of *ggbs* mixed only with water in entrapping toxic cations better than portland cement, owing to the formation of a highly compact, low porous calcium silicate gel, as evidenced by pore size distribution tests.

A disc pelletiser was used to produce aggregates with *ggbs* and portland cement, containing 25% of ash, respectively. Two fractions of aggregates were produced: 10 - 15 and 15 - 25 mm. In order to avoid long hardening times of *ggbs* mixed only with water, the pellets prepared with *ggbs* immediately were covered with a thin layer of portland cement, so to allow a faster handling and utilization of the material. Compressive strengths at different ages were determined on concretes produced with these aggregates. The results show that concretes made with *ggbs* aggregates exhibit greater compressive strengths compared to portland cement aggregates at the ages of 28 and 90 days.