Utilization of Algerian wastes for the production of new pozzolans


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INTRODUCTION

- The generation of waste has been increasing considerably in the last decades, but fortunately the technological development supplies to the market a numberless of industrial technologies for their treatment and recycling, that allow, in several cases, the use of those wastes in different applications. One of the advantages that the sector of the construction presents is the acceptance of enormous quantities of products, in addition, it admits an immense range of qualities, what allow to make large diversity of industrial technologies for their treatment and recycling, that allow, in several cases, the use of those wastes in different applications. One of the advantages that the sector presents is the acceptance of enormous quantities of products, in addition, it admits an immense range of qualities, what allow to make large diversity of applications.

- The replacement of Portland cement (cement clinker) by active additions as pozzolanic materials is a way of saving capital costs and reducing environmental penalties (error of the technique) compared with OPC.

- The setting time increased for both additions, in this case due to the typical dilution effect provoked by pozzolans, but SLD2 showed a higher value of compressive strength at long ages of curing (90 days).

- All the samples analyzed are high pozzolanic products, with comparable activities to those of commercial MK and SF, mainly at 28 days, and with higher activities at 90 days.

MATERIALS

Two sludges generated in the hydraulic barrage:
- Bentonite waste (BNT) from oil drilling recovered after use.
- Scrap of construction brick (SC) burned at low temperature recovered in a construction brick industrial plant.

Two sludges come from two dams in the west of Algeria:
- Tiaret (SLD1)
- Tipaza (SLD2).

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RESULTS AND DISCUSSION: Pozzolanic activity

The most active waste was SLD2, that fixed more lime than silica fume at 28 days, the rest of the wastes show a good pozzolanic activity since all of them were capable of fixing lime at first ages.

RESULTS AND DISCUSSION: Blended cements

The value of consistency increased with the addition of SLD1 and SLD2, due to the increasing in water demand of pozzolans. The setting time increased for both additions, in this case due to the typical dilution effects of pozzolanic additions.

CONCLUSIONS

- The wastes consisted mainly of SiO$_2$, CaO, Al$_2$O$_3$, Fe$_2$O$_3$, and MgO.
- All the samples analyzed are high pozzolanic products, with comparable activities to those of commercial MK and SF, mainly at 28 of curing, and with higher activities at 90 days.
- From experimental data, the best pozzolanic material was SLD2.
- The value of consistency increased with the addition of SLD1 and SLD2, due to the increasing in water demand of pozzolans. The setting time increased for both additions, in this case due to the typical dilution effects of pozzolanic additions.

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