

ABSTRACT

The objective of this project is to study the influence on the concrete durability the incorporation of mud from the sewage purifying plant of Sabadell (Barcelona) as an addition. Due to the large amount of mud generated as a residue in the sewage purifying plants, that causes an environmental impact and polluting effects, it is planned out the possibility of using it as an addition of the concrete.

After analysing the actual situation of mud, its origin and treatments given to them, the experimental work started. The first part consisted in the characterisation of the materials used, paying special attention to the mud and studying its physical, chemical and mineralogical properties.

Once the materials were characterised, the production of the different samples began. The percentages of dry mud, used as an addition in relation of the amount of cement, were 2.5%, 5% and 10%. As well as some reference samples without any addition of mud were made. The concrete dosage was constant, changing only the amount of mud added. After putting the concrete in the moulds, they remained in a wet room until the beginning of the different tests.

In order to evaluate the durability of the concrete, five tests were made. Three of the tests consisted in putting to the test the samples to wet-dry cycles for thirty-two weeks with three different dissolutions: drinking water, seawater and a sulphate dissolution. The weight variation of the samples was controlled along the process and in the end the compression strength values were measured. The data obtained has been analysed, comparing the results of each test and searching some correlation.

Other of the tests made was the volumetrical stability by autoclave in order to cause an accelerated ageing of the concrete, accelerating the hydration process of the potential expansive components with the purpose to study its dimensional instability. The outcomes of this test were satisfactory since none of the samples tested suffered expansions.

At last, the carbonatation test was carried out, putting the samples in an atmosphere with 20% of carbon dioxide. The low resistance against the carbonatation due to the high porosity of the concrete with addition of mud has been observed in this test, being the depth of carbonatation penetration larger when the percentage of mud added increases.

After the tests were made, some x-ray diffractions were carried out to study the hydration products. The conclusion of those tests was that the addition of mud in the concrete presents no anomaly in any of the durability tests made, referred to crystalline components.

Once the tests ended, some conclusions and possible applications of concrete with dry mud from purifying plants in the civil engineering were determined. A structural use of this material is, at first, totally limited, but maybe some applications were low loads would be involved could be found.