

DURABILITY OF CEMENT MORTARS WITH A HIGH PROPORTION OF MINERAL ADMIXTURE AFTER BACTERIAL ENVIRONMENT EXPOSURE

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Abstract: The paper presents a study of evaluating the resistance of cement composites with high proportions of blast furnace slag against sulfur oxidising bacteria attack using thermal analysis method.

Experimental

- cement mortars with cement replacement by blast furnace slag in proportions 65 to 95%;
- bacterial environment of sulfur oxidising bacteria *Acidithiobacillus thiooxidans*;
- 3, 6, 9, and 12-month exposition intervals of composites to bacteria;
- mortars' parameters studied by thermal analysis (TG/DSC, Netsch STA Jupiter analyser): hydration degree, portlandite content;
- surface changes of mortars studied by electron microscopy (SEM, JEOL).

Results

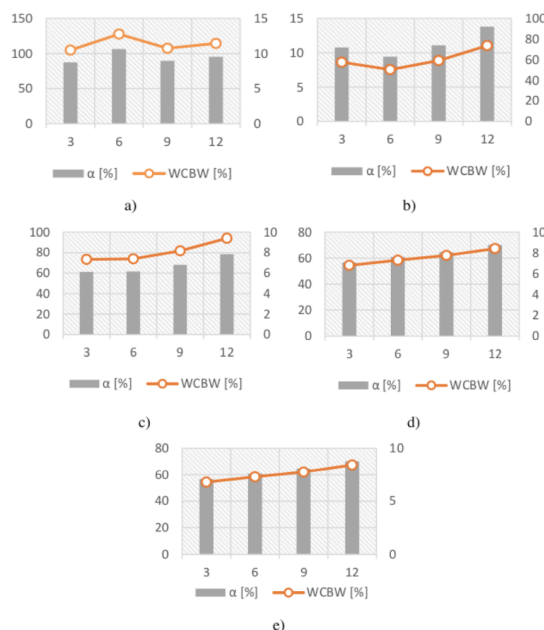


Fig. 2. Development of chemically bounded water and hydration degrees of the mortar samples a) CMS-0; b) CMS-65; c) CMS-75; d) CMS-85; and e) CMS-95 during the 3, 6, 9, and 12-month bio-corrosion experiment.

Conclusion

Thermal analysis proved to be an effective tool to monitor the deterioration stage of the cement mortars. Based on the hydration degree and portlandite content, the positive effect of slag admixture has been confirmed against the action of bacteria.

Table 2. Content of total portlandite in cement mortars before the experiment (wt.%).

	CMS-0	CMS-65	CMS-75	CMS-85	CMS-95
Ca(OH) ₂ (%)	21.3	7.1	5.1	6.3	3.6

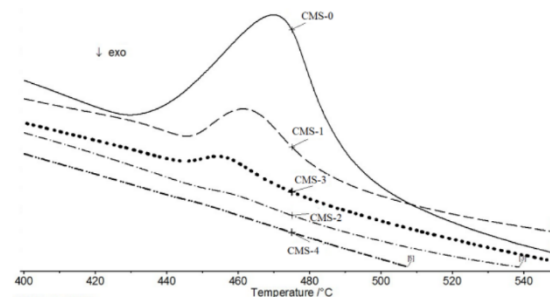


Fig. 1. The comparison of DSC peaks of portlandite in samples without and with blast furnace slag.

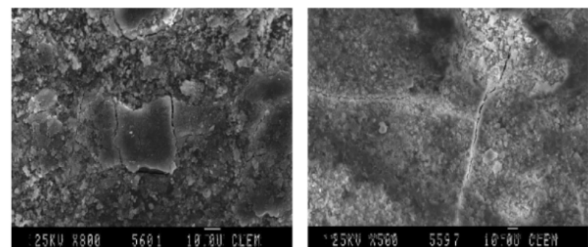


Fig. 3. SEM micrograph of the samples after 12-month exposition to bacteria.

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