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The fatty acids based organofunctional silane protective coatings for concrete

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Concrete is a strong and hard material used for construction but it can undergo corrosion as a result of water permeation inside the concrete structures. As together with water many aggressive substances get inside the concrete structures, the surface absorbability of concrete is an important factor determining the stability of concrete constructions [1, 2]. One of the effective methods of concrete protection from the adverse effects of water is covering its surface with a protecting coat restricting the permeation of aggressive agents.

The silicon-based compounds, such as silanes, siloxanes and silicones have been often applied in building industry [3]. Organofunctional alkoxysilanes are monomeric silicon compounds that as a result of hydrolysis and condensation produce a stable polysiloxane coating that covers the pore surface. The coating restricts the water permeation but permits free permeation of vapor towards outside of a given concrete element [4]. Another approach applied in order to restrict the adverse effect of water on concrete is the addition of hydrophobic admixtures at the stage of its production [5]. The hydrophobic agents such as fatty acids, their salts (soap), vegetable oils, wax emulsions and animal fats, change the surface tension in pores and cracks, which limits water permeation [5-7].

Our earlier papers present the synthesis of alkoxysilyl derivative based on rapeseed oil (RPTMS) by the reaction of nucleophilic substitution of 3-chloropropyltrimethoxysilane with appropriate sodium salts (rapeseed soap) [8]. The obtained silane has been used for production of wood [8] and steel [9] surface coating protecting from the adverse effect of water.

In this paper we report on an alternative method of synthesis of the above-mentioned silane (RPTMS) from the commercially available oleic acid (OPTES) and propose its use for making concrete surface coating protecting from water permeation inside its structure.

Keywords: fatty acids; sol-gel processes; organically modified silanes; concrete; protective coatings

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