

Short summary

The biological polyacrylate curtain injection tests to some extent showed significant algae toxicity ($G_A \gg 8$). Because of this, it was difficult to determine whether the requirements for DIBt-approval (Deutsches Institut für Bautechnik, Berlin) for building materials that subsequently harden within soil and ground water are met. The purpose of the research project "Examination regarding the verification of the adequacy of the algae test pursuant to DIN 38412-33 for watery eluates as part of the testing of curtain injections" was to determine the cause of the high algae toxicity of polyacrylate curtain injections and also define the applicability of the algae toxicity tests in compliance with DIN 38412-33 for the eco-toxicological assessment of polyacrylate curtain injections.

Within the framework of the research project the eluates of two curtain injection products were examined. The eluates were obtained with the aid of four resp. inverse column experiments. The fractionation of the TOC maxima showed significant algae toxicity (G_A -value = 768). Degradation tests revealed that, given the selected test conditions, the dissolved organic compounds degraded quickly. After completion of the degradation tests the fractionation did not show any algae toxicity (G_A -value = 1). Regarding the luminescent bacteria test and the Daphnia test, the fractionation of the TOC maxima showed minor (G_L -value = 4 und 1) to no toxicity (G_D -value = 1).

The IR-spectrometric tests of the precipitations showed significant conformance with sodium or potassium polyacrylate suspensions. With aid of NMR-spectroscopy, mainly dissolved acrylic acid (as acrylate), ethylene glycol, amines and formate were identified in the eluates of the TOC maxima. After completion of the degradation tests the eluates of the TOC maxima showed, apart from aliphatic hydrocarbons and formate, no further identifiable compounds. In the eluates of the turbidity maxima dissolved acrylic acid, ethylene glycol, amines and formate were detected.

The influence of turbidity on algae growth was examined using watery solutions of untreated, pyrogenic silicic acid. The examinations showed that with increasing turbidity the biomass production significantly decreased. This effect could be diminished by increasing the addition of culture medium. The eluates of the TOC maxima of the formulations no. 1 and no. 2 also showed that the addition of culture medium results in a reduction of algae toxicity.

The method pursuant to DIN 38412-33, based on the results of the results of this research project, is only suitable to a limited extent for the examination of algae toxicity of watery eluates as part of the testing of curtain injections. The method is only conclusive if the test solutions show minor turbidity and minor precipitation. Therefore, the eluates should always be examined shortly after elution. They should be stored at room temperature ($> 15^\circ\text{C}$) in a dark place and should under no circumstances be frozen.