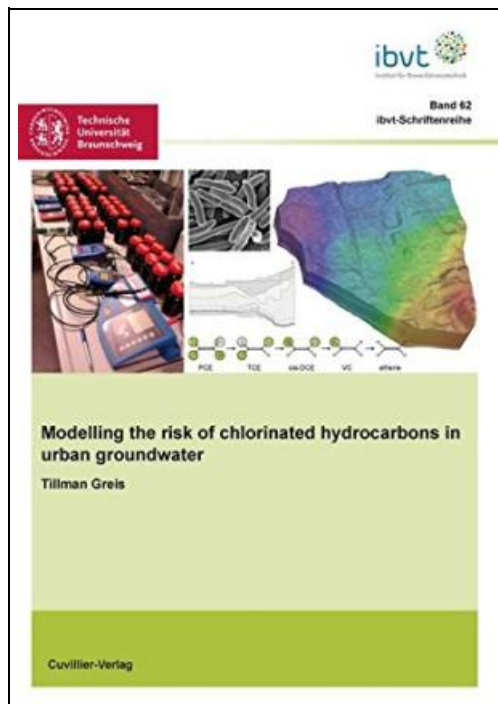# Modelling the risk of chloridnated hydrocarbons in urban groundwater



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## Reviews

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# MODELLING THE RISK OF CHLORIDNATED HYDROCARBONS IN URBAN GROUNDWATER



Cuvillier Verlag Okt 2015, 2015. Buch. Condition: Neu. Neuware - The main target of this work is the development of a risk assessment approach of groundwatercontaminations in an urban area. A multidisciplinary approach was performed to assessdegradation potential of contaminant species in soil and the inherent risk posed by anthropogenicsubstances. Experimental and theoretical methods range from chemical and biochemical to geoengineeringapplications. This especially concerns molecular biological, wet-chemistry techniquesand Finite Element groundwater transport and reaction modelling. The spatial dimensionsconsidered in the studies range from small laboratory to field scales. With regard to these appliedmethods the overall goal was a holistic risk approach to intertwine both, reactive transport ofcontaminants in groundwater and human health risks.An experimental area polluted with chlorinated ethenes and located in Braunschweig was chosento validate the model. Based on repeated measurement campaigns pollutant concentrations aswell as other environmental parameters and chemical data were determined and their quality wasvalued at assessed literature data. With the obtained experimental data a groundwater reactivetransport model was established and validated. Further, to test the influence of the flow, transportand reaction model parameters a sensitivity analysis was performed. Based on this analysis,contaminant specific probabilities of occurrence were calculated with a Monte-Carlo simulationapproach. Additionally, model optimisation techniques were applied to improve conformity ofsimulated and experimental data.It could be shown, that a simplified first-order reaction kinetic is only partially capable of renderingthe measured field data. Hence, it was necessary to extend and improve the underlyingdegradation kinetics by means of modified Monod-equations. Here, the extension mainlycomprises the introduction of inorganic electron acceptors as well as inhibiting reactions to refinethe reductive dechlorination process of the chlorinated hydrocarbons. The next important stepconcerns the derivation of a health risk approach from the aforementioned concentrationprobabilities of occurrence. The combined model approach finally enables to calculate spatial andtemporal health risk occurrence. 153 pp....

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