Numerical Model for Leaching & Transporting Behavior of Radiocesium in MSW Landfill

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Radiocesium-Contaminated Wastes and Final Disposal ~Fukushima Daiichi nuclear disaster~

Leaching tests
~Radiocesium leachability to water~
Evaluate the leaching rate of radiocesium in incineration ashes

Soil sorption tests
~Distribution coefficient in leachate~
Measure the concentration in the solid phase using waste leachate

Numerical simulation model
~Radiocesium leaching and transporting behavior~
Flow Equation (Richard’s model)
\[ \frac{\partial (\rho \phi \theta_s)}{\partial t} = \nabla \left[ - \rho_s k_s \frac{K_s}{\rho_s + \rho_g \Phi} \nabla \theta_s \right] \]
Transport Equation (Advection-disperion model)
\[ \frac{\partial (\rho \phi \theta_s)}{\partial t} + \nabla \cdot \left( - \rho_s k_s \frac{K_s}{\rho_s + \rho_g \Phi} \nabla \theta_s \right) = - \theta_s A_c \cdot \nabla \theta_s + R \]
Cs Leaching & Soil Sorption (Based on experimental results)
\[ R = \rho_c k_c t + \rho_c \frac{\partial S}{\partial t} \]
Mass balance in solid phase (Including sorption and decay)
\[ \frac{\partial S}{\partial t} = \beta (K_c - S) - AS \]

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